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OUTCOMES 2

PERSONAL DEVELOPMENT, HEALTH AND EDUCATION

HSC COURSE

FIFTH EDITION

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All activities have been written with the safety of both teacher and student in mind. Some, however, involve physical activity or the use of equipment or tools. **All due care should be taken when performing such activities**. Neither the publisher nor the authors can accept responsibility for any injury that may be sustained when completing activities described in this textbook.

Aboriginal and Torres Strait Islander readers should be aware that this publication may contain images or names of people who have since passed away. The publisher appreciates that this inclusion may distress some indigenous communities. These images have been included so that the young multicultural audience for this book can better appreciate specific aspects of indigenous history and experience.

In this book, the word *Aborigine* rather than *Koori* is used when referring to indigenous Australians. The issues raised are not unique to the indigenous people of New South Wales and so the Australia-wide reference has been maintained.

It is recommended that teachers should first preview resources on Aboriginal topics in relation to their suitability for the class level or situation. It is also suggested that Aboriginal parents or community members be invited to help assess the resources to be shown to Aboriginal children. At all times the guidelines laid down by the appropriate educational authority should be followed.

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Preface

This fifth edition of *Outcomes 2: HSC Course* covers the HSC Course as outlined in the Stage 6 PDHPE Syllabus. In this edition the content has been revised with a particular focus on updating data and statistics, especially throughout Core 1 and associated options. Snapshots and case studies have also been updated and many inquiry questions have been written.

The text continues to focus on the most recent trends and practices in health and physical performance and provides the most relevant information to help you complete the course successfully and enjoy your studies along the way.

Additional online resources accompany this edition to take the *Outcomes* package to a new level. Online student resources, such as video eLessons, weblinks, chapter quizzes and revision tests are available in your eBookPLUS (see page viii). For teachers, the eGuidePLUS provides a range of support material.

The structure of the textbooks mirrors the structure and content 'dot points' of the revised Stage 6 PDHPE Syllabus. The first part of this book covers the two HSC core strands, which represent 60 per cent of course time, followed by chapters covering all five option topics, of which you will study two for the remaining 40 per cent of the course.

This full-colour text places a strong emphasis on critical inquiry exercises and practical applications as fundamental learning tools to engage you with the content and reinforce understanding. The inquiry exercises challenge your thinking and inspire deeper research, while the applications invite you to put theory into practice, with individual and group tasks.

New ideas are included for the use of 'thinking tools' to assist you in gathering and analysing information, answering questions and solving problems. You will also be prompted to use ICT for presenting your work and sharing your research findings. Weblinks are included to encourage you to explore contemporary issues in greater depth or to access the latest available data.

Revision and extension questions at the end of each chapter link to the most relevant syllabus outcomes and aim to consolidate your understanding of the topics. Mark allocations indicative of those allocated in HSC examinations have been added as a guide. The Appendix gives valuable hints and advice on HSC exam techniques.

A range of contemporary snapshots and case studies feature throughout the chapters — a popular feature of the *Outcomes* series as these enhance the content and help you to appreciate the relevance and importance of health and physical activity issues for Australians in today's world.

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CHAPTER 1

How are priority issues for Australia's health identified?



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H1**, **H2**, **H15**, **H16** from the PDHPE HSC syllabus.

Australians enjoy relatively high levels of health compared to many other nations. Statistics reveal that we have a relatively long life expectancy, declining death rates and reasonable access to health care.

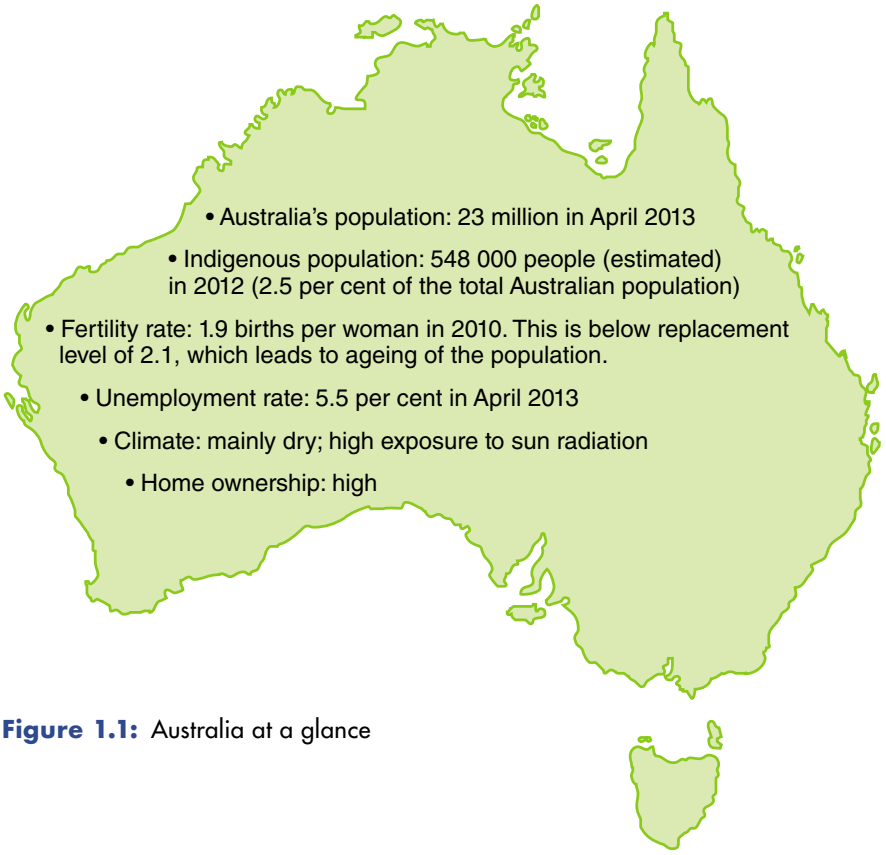


Figure 1.1: Australia at a glance

study on

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See more
Trends in Australian health measurements

Practice HSC exam questions

Health priority issues are those health issues that are of greatest concern to governments and support organisations due to the effect they have on the overall health of Australians and the burden of health on the economy.

It would seem we are a healthy population and we benefit from Australia's generally high standards of health care and the wide range of available health services. However, there are many health concerns that the federal, state and local governments identify as **health priority issues** to be addressed in order to achieve better health for all Australians. For example:

- certain groups in society are more at risk of health problems than others
- some diseases and other health problems are more prevalent than others
- changes in the structure of our population affect the types of health service that people require.



MEASURING HEALTH STATUS

Health status is the pattern of health of the population in general over a period of time.

Epidemiology is the study of disease in groups or populations through the collection of data and information, to identify patterns and causes.

To identify health priority issues within a population it is necessary to understand the **health status** of that population and its subgroups. The health status of a nation is the pattern of health of the population in general over a period of time. To create an accurate and comprehensive picture of the health status of Australians, a range of information needs to be accessed.

We measure health status through the process of data and information collection known as **epidemiology**, which is the study of disease in groups or populations.

Role of epidemiology

Epidemiology is used by governments and health-related organisations to obtain a picture of the health status of a population, to identify the patterns of health and disease, and analyse how health services and facilities are being used.

Epidemiology considers the patterns of disease in terms of:

- **prevalence** (the number of cases of disease in a population at a specific time)
- **incidence** (the number of new cases of disease occurring in a population)
- distribution (the extent)
- apparent causes (determinants and indicators).

Observations and statistics help researchers and health authorities to:

- describe and compare the patterns of health of groups, communities and populations
- identify health needs and allocate health-care resources accordingly
- evaluate health behaviours and strategies to control and prevent disease
- identify and promote behaviours that can improve the health status of the overall population, such as eating less fat and more fibre.

The data collected through the epidemiological process focus on quantifiable and direct measures of ill health (or the lack of good health), such as patterns of illness, injury and death, rather than on the positive qualities of health and well-being. Epidemiology commonly uses statistics on:

- births
- deaths
- disease incidence
- disease prevalence
- contact with health-care providers
- hospital use (treatment received in hospitals for medical problems)
- injury incidence
- work days lost
- money spent on health care.

Prevalence is the number of cases of disease that exists in a defined population at a point in time.

Incidence is the number of new cases of disease occurring in a defined population over a period of time.



Figure 1.2: Data for epidemiological studies are gathered from many sources, including the information collected by doctors and other health professionals, health surveys by government departments and health-related organisations, and the register of births and deaths.

Impairment is a loss or abnormality of body structure or of a physiological or psychological function.

Limitations of epidemiology

Epidemiology has proved to be an effective approach to measuring health status, but it has some limitations. For example, epidemiological statistics:

- do not always show the significant variations in the health status among population subgroups (for example, between Aboriginal and non-Aboriginal Australians)
- might not accurately indicate quality of life in terms of people's level of distress, **impairment**, disability or handicap. Statistics tell us little about the degree and impact of illness.
- cannot provide the whole health picture. Data on some areas, such as mental health, are incomplete or non-existent.
- fail to explain 'why' health inequities persist
- do not account for health determinants — the social, economic, environmental and cultural factors that shape health.

study on

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See more
Role of epidemiology

Practice HSC exam questions

Instruments are methods or devices for recording, measuring or controlling.

Epidemiology emphasises controlled measurement based on disease and associated risk factors, with limited consideration of other contributing factors to health. Statistics also have limitations due to:

- the varying reliability of data
- the numerous sources of information
- imprecise methods of data collection
- whether surveys use standard **instruments**, definitions and classifications.

For example, the National Health Survey conducted by the Australian Bureau of Statistics collects data through surveying one adult and one child from each sample dwelling to gain a picture of the health status of Australians. This type of data collection gives fairly reliable data on illnesses such as asthma and colds, but unreliable data on illnesses such as cancer. To achieve an accurate picture of the health status of Australians, data would also need to be collected from places such as hospitals and nursing homes.



Collection bodies (Examples of)

Medical Research Council	Australian Bureau of Statistics	Government departments	Workplace Safety Australia	National Heart Foundation	National Injury Surveillance Unit	Roads and Traffic Authority

Collection, observation, analysis, reporting, dissemination, comparisons

Information/statistics

Vital statistics	*Population surveys*	*Surveillance*	*Health outcomes*
• Life expectancy • Disease incidence and prevalence • Hospital utilisation • Cost of health care • Morbidity • Mortality	• Baselines • Indicators • Self-reporting • Monitoring	• Database • Monitoring • Reporting	• Changes — declines, increases in rates • Procedures • Interventions

Figure 1.3: The epidemiological process revealing Australia's health status

Broadening the framework of epidemiology

Despite its limitations, epidemiology provides valuable scientific information about disease and associated risk factors. It has been useful in providing a basis for investigating issues such as the impact of social, cultural and economic factors that support health or cause disease.

Recently, health authorities have acknowledged the need to adopt a measurement approach that focuses on the health of populations more than the diseases of individuals. To address inequities in health we must go beyond the disease and its risk factors to the environmental and social frameworks in which individuals live. The epidemiological measurement process must incorporate a social perspective to identify and combat the leading causes of sickness and death in Australia, and to reduce inequities in health. The higher rates

of morbidity and mortality in rural and remote populations, for example, are directly related to the social and environmental context of these communities.

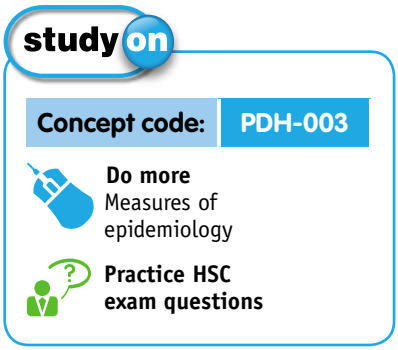
To reduce health inequities, factors such as poor access to health services, low socioeconomic status, attitudes to illness and health promotion, limited education about self-care and health practices must be addressed.



INQUIRY

The role of epidemiology

1. What is epidemiology?
2. What can epidemiology show?
3. Who uses epidemiological measures?
4. Does epidemiology measure everything about health status? Explain.



Mortality refers to the number of deaths in a given population from a particular cause and/or over a period of time.

Measures of epidemiology

The common indicators of the health of a community include measures of mortality (deaths), infant mortality, morbidity (ill health) and life expectancy.

Mortality

Mortality is the number of deaths in a group of people or from a disease over a specific time period, usually one year. An objective and often easily determined measure of health status, data on mortality can be used to compare health status across groups and between years. For example:

- 143 473 deaths were registered in 2010 in Australia, of which 73 484 (51 per cent) were males and 69 989 (49 per cent) were females
- the standardised death rates (deaths per 100 000 of population) for all categories of overseas-born Australians, both male and female, are lower than those of the Australian-born population
- in 2010, the standardised death rate for Australia was six deaths per 1000 standard population, the same as in 2007 and 2009. The Northern Territory recorded the highest standardised death rate and the ACT had the lowest rate.

Table 1.1: Causes of death, Australia, 2010

Cause of death*	Number	Proportion of total deaths (%)	Median age (yrs)	Standardised death rate
Infectious diseases	2 148	1.5	80.7	8.5
Cancer	43 298	30.2	75.3	176.1
Blood and immunity disorders	408	0.3	82.0	1.6
Endocrine, nutritional and metabolic diseases	5 704	4.0	81.7	22.5
Mental and behavioural disorders	7 030	4.9	87.5	26.1
Diseases of the nervous system	6 206	4.3	82.8	24.3
Diseases of the heart and blood vessels	45 499	31.7	85.0	173.9
Diseases of the respiratory system	11 949	8.3	83.2	46.6
Diseases of the digestive system	5 125	3.6	80.5	20.3
Diseases of the skin and subcutaneous tissue	399	0.3	86.2	1.5
Diseases of the muscles, bones and tendons	1 180	0.8	84.0	4.6
Diseases of the kidney, urinary system and genitals	3 399	2.4	86.0	12.9
Conditions originating in the perinatal period	616	0.4	0.5	2.8
Congenital and chromosomal abnormalities	605	0.4	0.9	2.7
Ill defined causes	972	0.7	71.1	3.9
External causes	8 918	6.2	52.7	37.8
All causes	**143 473**	**100.0**	**81.2**	**566.1**

Causes of death data in this table are classified using the 10th revision of the International Classification of Diseases (ICD-10).

Source: Australian Bureau of Statistics, 'Causes of death, Australia, 2010', cat. no. 3303.0, Introduction, table 1.1. Note that totals may not add up due to rounding.

In Australia overall, the main causes of death are cardiovascular (heart and blood vessel) diseases, cancers and respiratory diseases. For some of the leading causes of death, such as heart disease, strokes and some types of cancer, the death rates are falling.

APPLICATION

Analysing data in a table

1. Using the data for number of deaths in table 1.1, rank the six most common causes of death.
2. What proportion of total deaths related to diseases of the heart and blood vessels?
3. Draw a bar graph to show the standardised death rates for the seven most common causes of death.
4. Identify the causes of death related to:
   (a) the highest median age
   (b) the lowest median age.

SNAPSHOT



Trends in causes of death

The proportion of deaths from heart disease has decreased over the past decade, accounting for 15% of all deaths in 2010, compared with 20% in 2001, according to figures released today by the Australian Bureau of Statistics (ABS). Over the last 10 years the proportion of deaths due to circulatory diseases has decreased from 38% in 2001 to 32% in 2010. Deaths due to cancers have increased from 29% in 2001 to 30% in 2010. The leading cause of death in Australia in 2010 was heart disease. Deaths due to dementia and Alzheimer's disease have more than doubled over the past 10 years, accounting for 6.3% of all deaths in 2010 compared to 2.9% in 2001. Lung cancer was responsible for the most deaths caused by cancer and is the fourth leading cause overall. Lung cancer accounted for 5.6% of all deaths and is the second leading cause of death for males and the fourth leading cause for females.

Source: Australian Bureau of Statistics, media release, 20 March 2012.

INQUIRY

Causes of death — trends

1. Read the snapshot on trends in causes of death and identify the causes of death that have:
   (a) increased
   (b) decreased
   (c) stayed much the same.
2. What was the leading cause of death in 2010 in Australia?
3. Of all the deaths from cancer in 2010, identify the type of cancer that was the most prevalent cause of death.
4. Suggest some possible reasons for the decline in the number of heart attacks causing death.

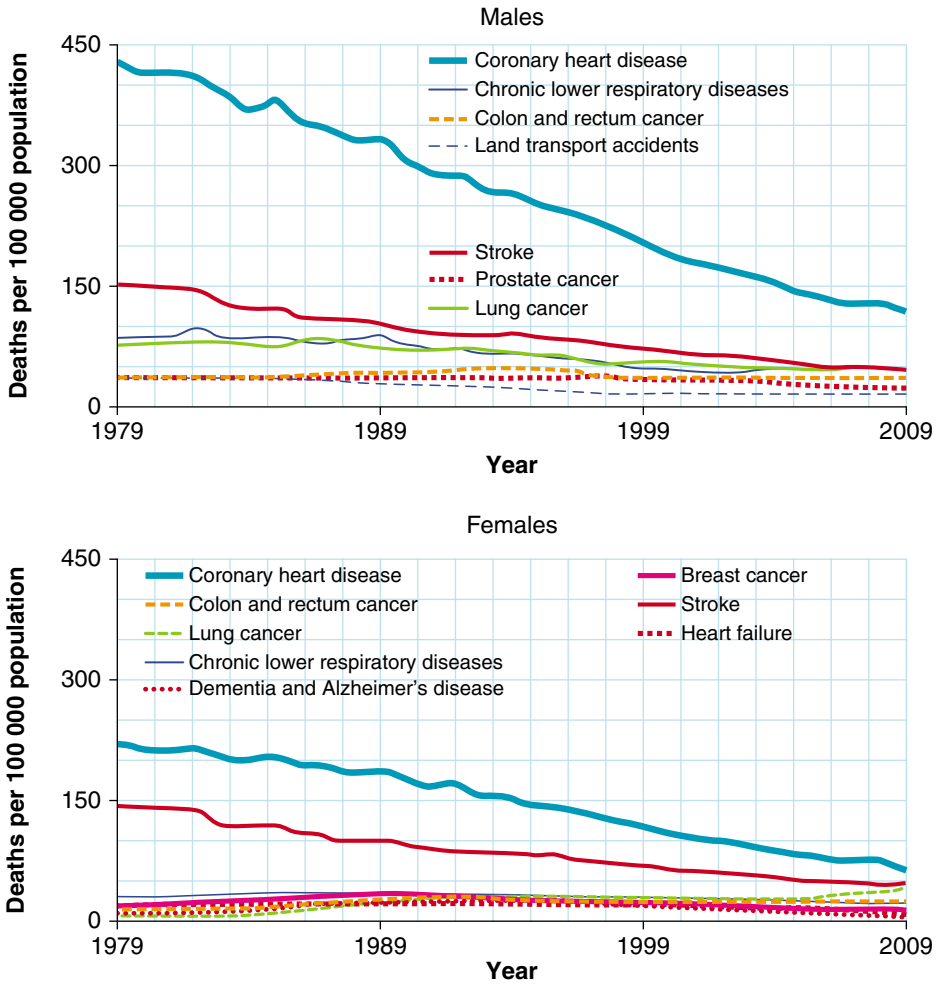


Figure 1.4: Trends in selected leading causes of death, by sex, 1979–2009 (*Source: Australia's health 2012*, p. 94.)

Table 1.2: Mortality rates for Australia and the average among OECD countries, for selected causes of death, by sex, 2009 (deaths per 100 000 population)

	Males		Females	
Cause of death	**Australia**	**OECD Average**	**Australia**	**OECD Average**
Coronary heart disease	98.9	117.5	52.3	60.4
Stroke	36.0	54.8	33.9	42.3
Lung cancer	39.9	51.9	19.5	19.0
Chronic lower respiratory diseases	4.6	4.8	3.4	2.5
Diabetes	15.1	18.4	10.4	14.1
Colon and rectal cancer	18.1	24.7	11.2	14.0
Prostate cancer	24.3	22.5	–	–
Breast cancer	–	–	18.5	20.1
Suicide	11.9	18.2	3.3	5.1
All causes	568.8	739.5	368.3	448.8

Source: Australia's health 2012, table 2.4, p. 95.

INQUIRY

Death rates for males and females

1. Examine the graphs in figure 1.4 and write half a page describing the trends you can identify.
2. In small groups, discuss what data such as that in table 1.2 can tell us about the health status of Australians.

Infant mortality

Infant mortality refers to the number of infant deaths in the first year of life, per 1000 live births.

The **infant mortality** rate is the number of infant deaths in the first year of life per 1000 live births. This measure is considered to be the most important indicator of the health status of a nation, and can also predict adult life expectancy.

Infant mortality can be divided into:

- neonatal (deaths in the first 28 days of life)
- post-neonatal (deaths in the remainder of the first year of life).

The former is influenced by the quality of maternal and neonatal care.

The infant mortality rate in Australia has declined steadily over the past few decades (see figure 1.5). The infant mortality rate was 3.8 infant deaths per 1000 live births in 2011.

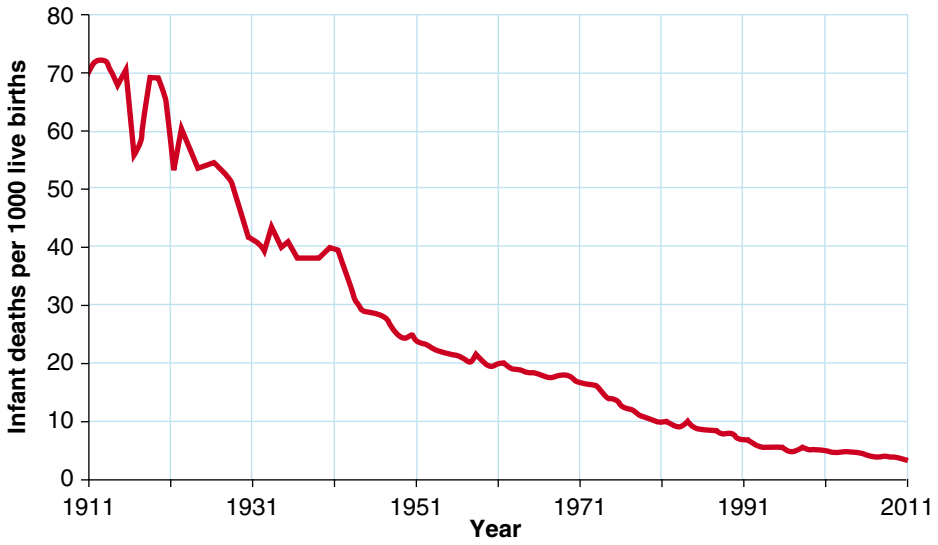


Figure 1.5: Infant mortality rate, Australia, 1911–2011 (number of infant deaths per 1000 live births) (*Source:* Australian Bureau of Statistics, Deaths, Australia, cat. no. 3302.0.)



Figure 1.6: Improved support services such as baby health clinics and immunisation programs have contributed to the reduction in infant mortality in Australia over the last century.

Sanitation relates to cleanliness and involves action taken to protect people from illness, the transmission of disease or loss of life due to unclean surroundings or practices.

The decline in the infant mortality rate over recent decades can be attributed to:

- improved medical diagnosis and treatment of illness
- improved public **sanitation**
- health education
- improved support services for parents and newborn babies and children.

Despite a continued decline, infant mortality still accounts for 70 per cent of all deaths of children aged 0–14 (ABS cat. no. 3303.0).

The infant mortality rate is higher among indigenous infants. In the period 2009–2011, in New South Wales, Queensland, South Australia, Western Australia and the Northern Territory combined, the infant mortality rate for indigenous infants was around twice the rate for non-indigenous Australians (ABS cat. no. 3302.0). Most infant deaths were attributed to complications of pregnancy, labour and delivery.



Figure 1.7: An Aboriginal health worker checks on an infant at a Northern Territory health clinic while his mother looks on. The infant mortality rate for indigenous Australians is significantly higher than the rate for non-indigenous Australians.



INQUIRY

Significance of infant mortality rates

1. Investigate reasons for the decline in infant mortality rates over the past few decades.
2. Are indigenous infant mortality rates similar to non-indigenous rates? Explain any differences.
3. Why is the infant mortality rate a good indicator of the general health and well-being of a population?
4. Suggest preventative measures that could be undertaken during pregnancy that would support a continued decline in infant mortality rates.

Morbidity

Morbidity is the incidence or level of illness, disease or injury in a given population.

Morbidity (sickness) refers to patterns of illness, disease and injury that do not result in death. Illness, disease and injury are all conditions that reduce our quality of life, either temporarily or permanently. Information about the incidence (see, for example, figure 1.8) and prevalence of these conditions in the total population gives us a broader perspective on the nation's health than that provided by mortality statistics.

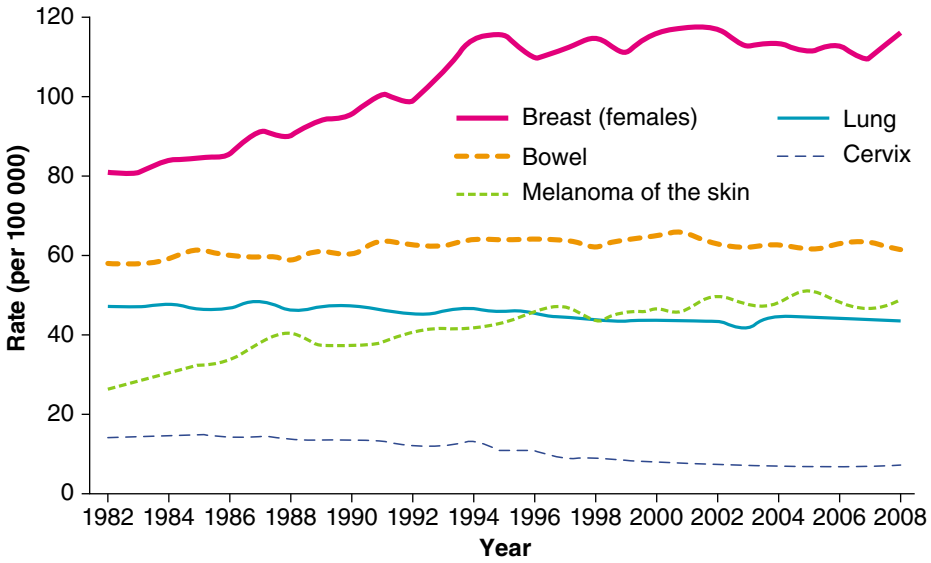


Figure 1.8: Trends in the incidence of selected cancers, Australia, 1982–2008 (*Source:* AIHW, *Australia's health 2012*, p. 261.)

Inpatient care is the care of patients whose condition requires hospitalisation.

Medicare is Australia's public-funded universal health-care system, ensuring all Australians have access to free or low-cost medical, optometric and hospital care.



Morbidity measures and indicators include:

- *hospital use* (the cause and number of admissions to hospital). These statistics provide some measure of the rates of illness (acute rather than chronic) and accidents in the community. The causes of hospital use indicate the major reasons for our ill health as a nation. They also provide useful information about the pattern of more serious diseases, such as cancer and stroke, which require medical treatment. However, they do not describe less serious illness and ill health that remain untreated. Hospitalisation statistics have limitations as indicators of morbidity as they do not distinguish between re-admissions for the same condition and conditions that require further care. Rather, they treat each episode of **inpatient** care as a new case.
- *doctor visits and Medicare statistics*. **Medicare** statistics (services claimed on Medicare) indicate the reasons for doctor visits and the number of visits. They can also provide the number of days absent from work as a result of sickness. However, this information does not always include visits to doctors for checkups (either yearly health checks or checks for the purpose of pregnancy or contraception) or for advice and counselling. As with hospital use statistics, doctor visits by females may not always reflect ill health; for example, the statistics count visitations for pregnancy and childbirth.
- *health surveys and reports*. National health and other surveys can provide a range of key health indicators and bring together an extensive range of health information. Often, health surveys depend on self-reporting, so individual perceptions of health and illness affect the information gathered to varying degrees.
- *disability and handicap*. The incidence of disease or accident can lead to impairment, disability and handicap. A person incurring injury in an accident, for example, could be impaired. The resulting abnormal function or loss of physical or mental capacities could cause disability by disturbing the individual's normal activity or performance. Disability can be in terms of self-care, mobility, verbal communication, schooling and/or employment. A handicap is a perceived social disadvantage that results from the impairment or disability.

Figure 1.9: The extent of hospital use is one of the measures of morbidity (illness, disease or injury).

INQUIRY

Australia's health — issues and trends

Read the snapshot 'Health report card shows a nation where most are healthy, but lifestyle challenges ahead', then answer the following questions.

1. Describe the health trends in Australia that:
   (a) compare favourably to other countries
   (b) compare unfavourably to other countries.
2. Identify the most common risk factors for poor health in Australia.
3. Identify groups in Australia with high levels of health risk factors.

SNAPSHOT

Health report card shows a nation where most are healthy, but lifestyle challenges ahead

Australians are generally healthy, with the majority feeling positive about their quality of life, according to the latest national report card on health released by the Australian Institute of Health and Welfare (AIHW). But most Australians also have at least one health risk factor that is likely to contribute to poorer future health.

Australia's health 2012, launched today by Health Minister Tanya Plibersek in Canberra, brings together the latest statistics and information on health.

AIHW Director and CEO David Kalisch said that while good health is always good news, there are challenges ahead to maintain an overall healthy population.

'Australia compares well internationally: we enjoy one of the highest life expectancies in the world — 79.5 years for men and 84.0 years for women — our level of smoking continues to fall, and most children are fully immunised,' Mr Kalisch said.

'However, there are several areas where Australia compares less favourably. For example, among developed countries, Australia has relatively high death rates from heart disease, diabetes, and chronic lung disease.

'And Australia has one of the highest rates of obesity: the latest figures show, 1 in 4 Australian adults and 1 in 12 children were obese.'

Australia's health 2012 shows that all Australians have at least one risk factor for poor health, and about 1 in 7 people have five or more risk factors. The most common combination of risks was inadequate fruit and vegetable consumption with insufficient physical activity.

'Many Australians eat too few vegetables, fruit and wholegrain cereals, and eat too many foods high in fat, sugar and salt. And almost 60% of Australians over 15 don't do enough physical activity to benefit their health.'

High levels of health risk factors are common among socially disadvantaged people, people with disabilities, Aboriginal and Torres Strait Islander people, and those living in rural areas.

'Most Australians rate their health highly — about 85% of people aged 15 and over rate their health as good or better,' Mr Kalisch said.

'The proportion rating their health highly is not the same across all population groups. For example, 61% of people who were unemployed for a year or more rated their health highly, compared with 91% of employed people. And the rating generally decreases with age.'

'In the next two decades, the number of people aged 65 and over is expected to nearly double, and the number aged 85 and over to more than double. This means that healthy ageing is a priority for now, not for the future,' Mr Kalisch said.

Source: AIHQ media release, 19 June 2012.

Life expectancy is the length of time a person can expect to live. More specifically, it refers to the average number of years of life remaining to a person at a particular age, based on current death rates.

Life expectancy

Life expectancy is the length of time a person can expect to live. It can be defined as the number of years of life a person of a particular age has remaining. It is based on the current death rate so it does not account for subsequent changes in death rates.

Life expectancy at birth is a common indicator of health status and is often used as evidence in statements about the improved health of Australians. For people born in the period 2008–2010, average life expectancy at birth was 84.0 years for females and 79.5 years for males. Life expectancy is also often calculated at ages 65 and 85 (see figure 1.10). Life expectancy at 65 years of age is an estimate of how old someone who turns 65 in a particular year will be when they die, as long as current death rates in that year continue unchanged.

Life expectancy is greater now than it was a few decades ago and is increasing. In other words, people are now living longer. Life expectancy has continued to rise steadily since the 1920s, although in the 1960s there was a marked increase in male deaths from cardiovascular disease. Australia has one of the highest life expectancy rates, ranking fifth in the world, with only people in Japan, Andorra, Iceland and Switzerland living longer.

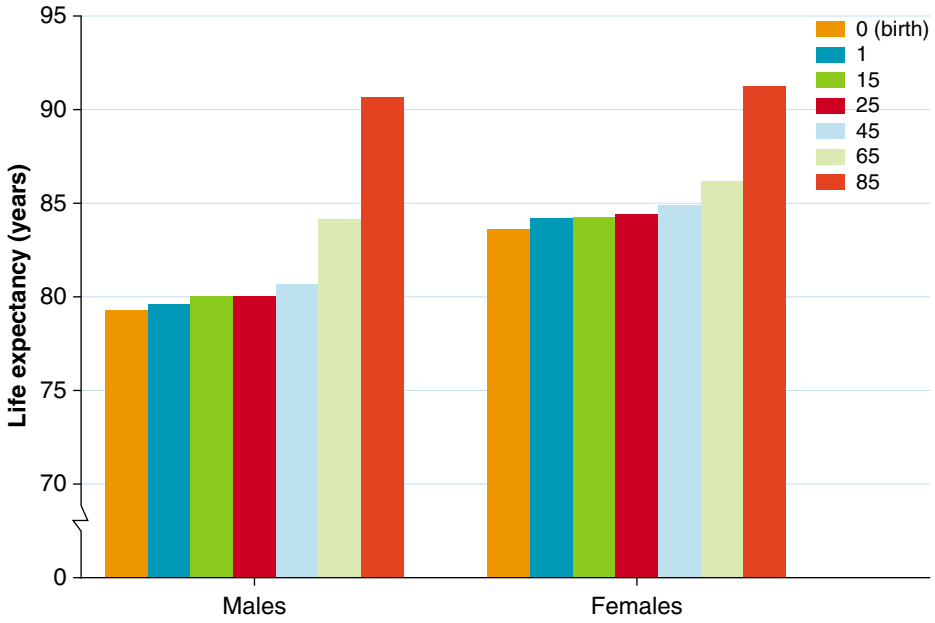


Figure 1.10: Life expectancy at different ages, by sex, 2008–2010 (*Source:* AIHW, *Australia's health 2012*, p. 121)

Improvements in life expectancy since the 1970s have resulted from a reduction in death rates at all ages. These improvements can be attributed to:

- lower infant mortality
- declining death rates for cardiovascular disease
- declining overall death rates from cancer
- fall in deaths from traffic accidents.

We may be living longer because medical knowledge and management have improved, not necessarily because some health problems no longer exist. It is also important to consider the quality of life of people who have had their life extended through medical intervention. For some, the quality of life is improved, for others it is not.

As life expectancy increases, so too does our ageing population. At present, a significant percentage of our population are aged; this number continues to increase. This has led to an increased demand for health services that cater for the elderly, an increased need for nursing homes, and the need to provide care for a growing number of dependent people. The impact of our ageing population on health services is discussed in chapter 2 (page 77).



Figure 1.11: As life expectancy rates increase, the aged population grows; and improved services are required to meet their needs.

APPLICATION

Measuring health status

Carry out research to find more information on one of the measures of epidemiology — mortality, infant mortality, morbidity or life expectancy. Access your eBookPLUS and use the weblinks for the following organisations to find the most recent information on trends. Present your findings as a brief oral or PowerPoint presentation.

- **Australian Bureau of Statistics**
- **Australian Institute of Health and Welfare (AIHW)**
- **Department of Health and Ageing**
- **National Heart Foundation**
- **National Injury Surveillance Unit**
- **World Health Organization**

IDENTIFYING PRIORITY HEALTH ISSUES

In order to improve Australia's health, governments and health authorities prioritise particular health issues, based generally on:

- how much they contribute to the burden of illness in the community
- their potential for reducing this burden.

These priority issues (discussed in chapter 2) include:

- the health inequities experienced by certain groups within our society
- our growing and ageing population
- the high levels of **chronic disease** and other health problems evident in our society.

In determining the disease burden on the community and its potential to be reduced, health authorities need to consider a number of factors. These include:

- **social justice** principles
- priority population groups
- prevalence of the condition
- potential for prevention and early intervention
- costs to the individual and community.

A **chronic disease** is one that is ongoing or characterised by long suffering.

Social justice is a value that favours the reduction or elimination of inequity, the promotion of inclusiveness of diversity, and the establishment of environments that are supportive of all people.

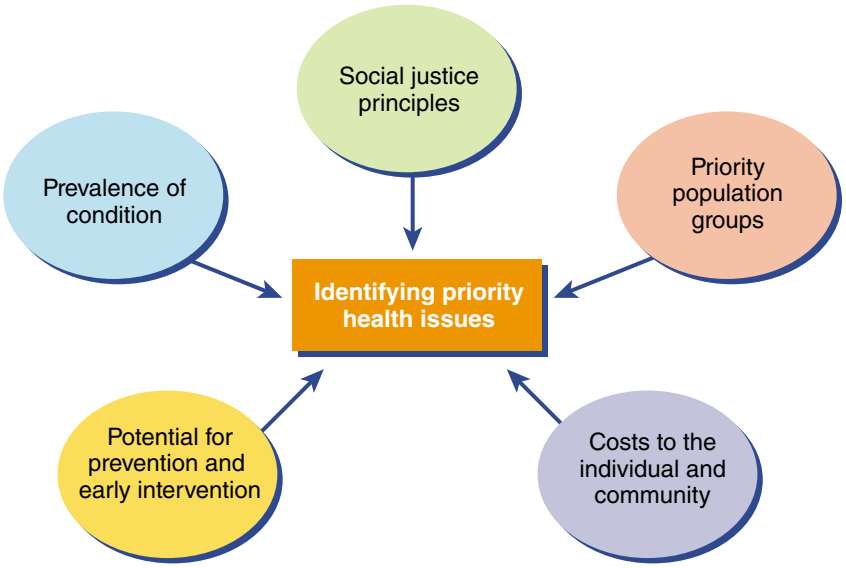


Figure 1.12: Factors for identifying priority health issues

Social justice principles

Diversity comprises the differences among individuals and among groups of people.

Social justice principles relate to eliminating inequity in health, promoting inclusiveness of **diversity** and establishing supportive environments for all Australians.

The selected priority issues for Australia's health must reflect the principles of social justice. We need to recognise and address inequities in health. These inequities encompass both differences in the incidence and prevalence of sickness and death, and inequalities in the social, economic, political and cultural factors that influence health.

Although our national health status is relatively good compared with that of other nations, improvement could occur in some areas. The alarmingly high incidence of diabetes in the indigenous population and the high incidence of injury in the 15–24 years age group are significant inequities in health.

By applying the principles of social justice in our identification of health priorities, we can determine the impact these principles have on reducing health inequities and improving the health of the nation. As an example, the provision of equal access to resources, health services, education and information may reduce the incidence of diabetes in the indigenous population.

study on
Concept code: PDH-004
See more
Social justice principles
Practice HSC exam questions

INQUIRY

Social justice

Examine the poster in figure 1.13. In small groups, discuss how the 'Close the Gap' campaign:

(a) aims to address social justice inequities
(b) is focusing on a health priority issue to improve Australia's health.

Priority population groups

Multiculturalism is the coexistence of groups in a society representing different cultural and linguistic backgrounds.

Australia is characterised by its diversity and **multiculturalism**. Our population has subgroups of people who have significantly different health statuses,



Figure 1.13: Oxfam Australia is working in coalition with over 40 indigenous and non-indigenous organisations to close the 12-year life expectancy gap between Aboriginal and Torres Strait Islanders and other Australians. National Close the Gap day has been held annually since 2007. www.oxfam.org.au/closethegap

and these inequities reflect our diverse population. The identification of priority population subgroups with inequitable health status is important for determining health priority issues. It allows health authorities to:

- determine the health disadvantages of groups within the population
- better understand the social determinants of health
- identify the prevalence of disease and injury in specific groups
- determine the needs of groups in relation to the principles of social justice.

Epidemiological information reveals that:

- indigenous populations have much higher death rates from heart disease, injury, respiratory diseases and diabetes
- people from a low socioeconomic background have a higher incidence of disease risk factors such as high blood pressure, high cholesterol levels, smoking and lower use of preventative health services
- people living in rural or isolated locations have higher death rates and a higher incidence of heart disease and injury, compared with people who reside in metropolitan areas

study on
Concept code: PDH-005
See more
Priority population groups
Practice HSC exam questions

- men are at much greater risk than women of developing a number of diseases (including heart disease and lung cancer).

These are only a few examples of subgroups that have specific health issues.

study on

Concept code: PDH-006

See more
Burden of disease in Australia

Practice HSC exam questions

Prevalence of condition

Epidemiological data provide a guiding path for determining the priority areas for Australia's health. Epidemiology provides information on the incidence of mortality and morbidity in the Australian population and thus, to a certain degree, on the health status of the population. It reveals the prevalence of disease and illness, and helps us to identify risk factors. The identification of risk factors can indicate the potential for change in a health area.

High prevalence rates of a disease indicate the health and economic burden that the disease or condition places on the community. Statistics reveal, for example, that cardiovascular disease is the leading cause of preventable death in Australia.

Potential for prevention and early intervention

The majority of diseases and illnesses suffered by Australians result from poor lifestyle behaviours. It would seem easy to improve health status by encouraging individuals to change their poor behaviours, but the situation is not this simple. It is difficult to change individual behaviours because often they reflect the environmental situation in which the individual lives.

Socioeconomic status, access to information and health services, employment status, housing, support networks and environmental **infrastructure**, for example, are increasingly being viewed as the determinants of health inequities across the population.

Infrastructure is the technical structures that support a society, such as roads, water supply, sewerage and power grids.

For change to occur — that is, for the burden of the major causes of disease and sickness to be reduced — we must address both individual behaviours and environmental determinants. Most of the chronic diseases, injuries and mental health problems have social and individual determinants that can be modified, so prevention and early intervention may lead to improved health status.

study on

Concept code: PDH-007

Practice HSC exam questions



Figure 1.14: Prevention of illness, such as protecting the skin from sun damage and potential melanoma, can improve health outcomes for individuals.

Breast screening program reaching target group

More than 1.7 million women had a screening mammogram through BreastScreen Australia in 2009–2010, with over 1.3 million in the target age group, according to a report released today by the Australian Institute of Health and Welfare (AIHW).

'BreastScreen Australia aims to reduce illness and deaths from breast cancer through early detection of unsuspected breast cancer, which allows early intervention', said AIHW spokesperson Lisa McGlynn.

The report, BreastScreen Australia monitoring report 2009–2010, shows that 55% of women aged 50–69 — the program's target age group — were screened in 2009–2010.

In 2009–2010, participation was highest in Outer regional areas (58.2%), and lowest in Very remote areas (47.2%).

'To improve access for women in Remote and Very remote locations, states and territories use relocatable screening services, mobile screening vans and community buses to overcome transport barriers,' Ms McGlynn said.

The difference between Aboriginal and Torres Strait Islander and non-Indigenous women was greater, with 36% of Aboriginal and Torres Strait Islander women aged 50–69 having a screening mammogram in 2009–2010, compared with 55% of non-Indigenous women.

Breast cancer is the most common cancer affecting Australian women (excluding non-melanoma skin cancers). In 2008, there were around 7000 new cases diagnosed in Australian women aged 50–69 — this equates to around 19 women aged 50–69 diagnosed with this disease every day.

In 2010, about 1000 women aged 50–69 died from breast cancer. This equates to around 3 women in the target group dying from this disease every day. Many breast cancers detected through BreastScreen Australia are small — around half of the cancers detected in the target group in their first screen, and nearly two-thirds in the target group in subsequent screens

'Small breast cancers are associated with better treatment options and improved survival', Ms McGlynn said.

In line with BreastScreen Australia's aim to reduce death resulting from breast cancer, since the program was introduced in 1991, breast cancer deaths for females aged 50–69 have decreased by 37% from 68 to 43 deaths per 100 000 women.

Source: AIHW media release, 17 October 2012.



INQUIRY

BreastScreen and early intervention

Read the snapshot 'Breast screening program reaching target group', then answer the following questions.

1. What is the target group for breast screening?
2. Outline the participation rate for breast screening among different groups of women in Australia.
3. What is the trend for breast cancer mortality for women in the target age group?
4. Explain how breast screening acts as an early intervention program to reduce the prevalence of breast cancer in Australia.



INQUIRY

Prevention and early intervention

Choose one example of a chronic disease or illness; for example, cancer, cardiovascular disease, diabetes, asthma or depression.

1. For the chronic disease or illness that you selected, is there potential for early intervention and prevention? Explain.

2. Do you think that your selected disease or illness should be a priority for Australia's health? Explain your answer.
3. How do the trends in the incidence and prevalence of cardiovascular disease support the idea that it is a disease that benefits from early intervention and prevention strategies?

Costs to the individual and community

Disease and illness can place a great economic and health burden on the individual, which can be measured in terms of financial loss, loss of productivity, diminished quality of life and emotional stress. The cost of treatment, medication and **rehabilitation** may be more than the individual can afford. Further, injury and disease may affect the individual's ability to be productive, and often the need to stop work during treatment and rehabilitation reduces the individual's ability to earn and thus to maintain their quality of life. The emotional stress and social upheaval that often result from illness and injury are another burden. It is difficult to estimate the pain and suffering that an individual experiences as a result of illness and injury, but it is a significant factor. In addition, illness, disease and premature death all place an economic burden on the community.

Rehabilitation is the process of restoring a part of the body or a person to near normal function after an injury or disease.

study on
Concept code: PDH-008
See more
Cost of health
Do more
Cost of health
Practice HSC exam questions

The impact of disease in economic terms can provide some estimate of the cost to the community. This cost can be useful for health authorities when they are prioritising health issues and determining health interventions.

Illness results in both direct and indirect costs.

- *Direct costs* include the money spent on diagnosing, treating and caring for the sick, plus the money spent on prevention. These costs can be estimated from the expenses of medical services, hospital admissions, pharmaceutical prescriptions, prevention initiatives, research, screening and education, for example.
- *Indirect costs* are the value of the output lost when people become too ill to work or die prematurely (for example, the cost of forgone earnings, absenteeism and the retraining of replacement workers).

SNAPSHOT

Healthcare expenditure in Australia

In 2004–05, the following seven disease groups accounted for more than half (57% or $29.8 billion) of allocated health expenditure in Australia:

- cardiovascular diseases — $5.9 billion (11% of total allocated health expenditure)
- oral health — $5.3 billion (10%)
- mental disorders — $4.1 billion (8%)
- musculoskeletal diseases — $4.0 billion (8%)
- neoplasms — $3.8 billion (7%)
- injuries — $3.4 billion (7%)
- respiratory diseases — $3.3 billion (6%).

Health care costs are generally higher for older people because of the increased levels of chronic diseases and greater numbers with life-threatening illnesses in these age groups. In 2004–05, over one-fifth (21%) of total allocated health expenditure ($11.0 billion) was for people aged 75 years and older.

Allocated health expenditure was 18% higher for females than for males — $28.6 billion compared with $24.1 billion. On a per person basis, allocated health expenditure was higher overall for females than for males — $2,781 for females compared with $2,380 for males. If maternal conditions are excluded, expenditure was $2,618 or 10% higher than for males.

Source: AIHW 2010, *Health system expenditure on disease and injury in Australia*, 2004–05.

INQUIRY

Healthcare expenditure in Australia

Read the snapshot 'Healthcare expenditure in Australia', then answer the following questions.

1. What was the most expensive disease group in 2004–2005?
2. On which age group in the population is healthcare spending highest, and why?
3. Which factor accounts for part of the higher healthcare costs for females compared to males?

INQUIRY

Identifying health priority issues for Australia

1. Why is it important to prioritise issues for health?
2. How do we identify health priority issues?
3. Describe the role of social justice in determining health priority issues.
4. How can social justice contribute to improved health for all Australians?
5. Make a copy of the mind map on page 16 (figure 1.12). Expand the mind map to show the main points you have learned about each of the factors used for identifying priority health issues.

SUMMARY

- Epidemiology provides data and information about disease, injury, illness and death. It indicates the risk factors for and apparent determinants of disease.
- The common measures of epidemiology include mortality, infant mortality, morbidity and life expectancy.
- Epidemiological data reveal that the major causes of sickness and death in Australia are cardiovascular disease and cancer.
- Epidemiology is a valuable tool in providing information to health authorities. However, it has limitations, such as its failure to provide information about the social determinants of health.
- In identifying health priority issues, health authorities need to apply the principles of social justice — equity, diversity and supportive environments.
- In identifying health priority issues, health authorities also need to consider groups that experience inequities in health, the prevalence of different diseases, the costs of disease to the individual and community, and the potential for early intervention and prevention in health areas.

QUESTIONS

Revision

1. What is the role of epidemiology? Explain how epidemiology can be used to determine the priority areas for Australia's health. (H2) (4 marks)
2. Explain the main measures of epidemiology. What information do they provide about the current health status of Australians? (H2) (4 marks)
3. Is Australia a healthy nation compared with the rest of the world? Explain your answer. How can Australia's health be improved? (H2, H15) (5 marks)
4. Distinguish between the terms 'prevalence' and 'incidence'. (H2) (2 marks)
5. Identify reasons for Australia's declining infant mortality rate. (H2) (3 marks)
6. Does epidemiological information measure everything about health status? Explain your answer. (H2) (4 marks)
7. What are the major causes of morbidity and mortality in Australia? Describe the trends in their prevalence rates. (H2) (4 marks)
8. Why is it important to prioritise health issues? (H1) (3 marks)
9. Explain the factors that governments and health authorities need to consider when identifying health priority issues. (H1) (5 marks)
10. Identify some groups in Australian society that suffer health inequities. (H2, H15) (2 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 2

What are the priority issues for improving Australia's health?



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H1**, **H2**, **H3**, **H16** from the PDHPE HSC syllabus.

Health authorities and governments have given priority to certain health issues in our society that impact on the health status of Australians. Priority health issues include:

- particular groups experiencing health inequities
- the high levels of preventable chronic disease, injury and mental health problems
- our growing and ageing population.

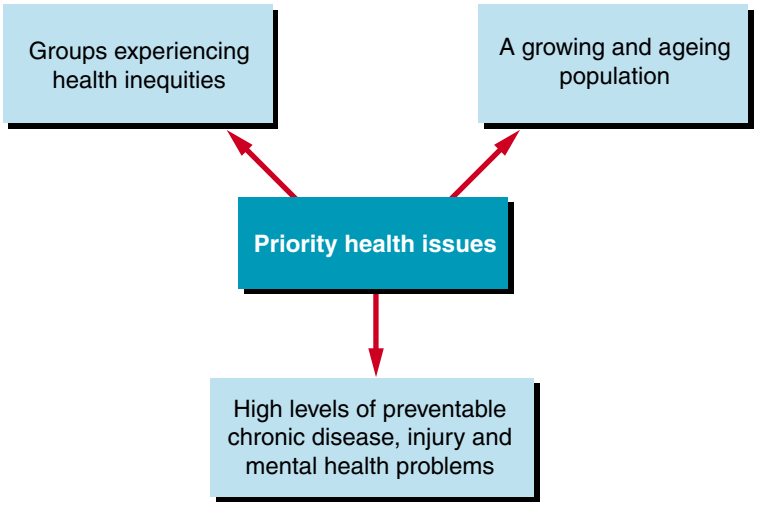


Figure 2.1: Priority health issues



GROUPS EXPERIENCING HEALTH INEQUITIES

Inequities are unfair differences in levels of health status between groups in a society.

The mortality statistics described in chapter 1 appear to indicate a generally improved health status for Australians, but unfortunately this is not shared Australia-wide. There are some fundamental differences in the level of health of particular groups in our generally affluent society. These differences exist in terms of:

- the unequal distribution of some illnesses or conditions throughout the population (across different cultures, geographic locations, ages and genders)
- health **inequities**; that is, the unjust impact on the health status of some groups due to social, economic, environmental and cultural factors, such as income, education, availability of transport and access to health services.

Major indicators — such as the incidence and prevalence of disease and different rates of sickness, hospitalisation and death — point to areas in which inequities exist.

Health is, to a large extent, the result of people's decisions about health behaviours (such as regular participation in physical activity) and their everyday experiences as they interact and respond to the social, physical and cultural environments in which they live. However, an individual's level of health is determined by a broader range of factors and not just their health-related decisions. Sociocultural, socioeconomic and environmental factors play a significant role in the achievement of good health. Some factors have the potential for change, such as individuals choosing not to smoke, or governments making roads safer. Other factors, such as an individual's genetic makeup, are generally not modifiable.

A **determinant** is a factor that can have an impact on a person's or group's health status, either positively (protective factors) or negatively (risk factors).

Sociocultural determinants of health include family, peers, media, religion and culture.

Socioeconomic determinants of health include employment, education and income.

Environmental determinants of health include geographical location, and access to health services and technology.

Health is therefore not only the responsibility of the individual. Governments and health authorities recognise that people cannot always choose a particular lifestyle. Health promotion and illness prevention campaigns attempt to address the **determinants** that have an impact on health or affect people's ability to make good decisions about their health. These can be classified as:

- **sociocultural determinants** of health, including family, peers, media, religion and culture
- **socioeconomic determinants** of health, including employment, education and income
- **environmental determinants** of health, including geographical location, and access to health services and technology.

In the following sections we investigate the main groups that experience health inequities in Australia; that is:

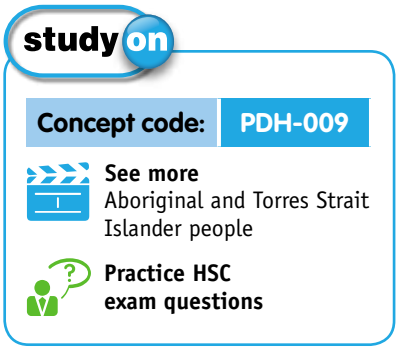
- Aboriginal and Torres Strait Islander peoples
- socioeconomically disadvantaged people
- people in rural and remote areas
- overseas-born people
- elderly people
- people with disabilities.

We will analyse each group in terms of:

- the nature and extent of the health inequities
- the sociocultural, socioeconomic and environmental determinants
- the roles of individuals, communities and governments in addressing the health inequities.

Aboriginal and Torres Strait Islander peoples

Major inequalities exist in the health status of Aboriginal and Torres Strait Islander peoples. These indigenous people experience a much poorer level of health compared with that of non-indigenous people, they die at a younger age and are more likely to have a reduced quality of life.



Nature and extent of health inequities

Indigenous people have:

- lower life expectancy rates at birth for both males and females. Life expectancy for indigenous people is 12 years lower than the life expectancy of non-indigenous people.
- higher mortality rates at all ages compared with the rates for non-indigenous people. In the four states/territories with the largest indigenous populations, 75 per cent of indigenous males and 65 per cent of indigenous females who died were younger than 65 years. This compares with the 26 per cent of non-indigenous males and 10 per cent of non-indigenous females who died younger than 65 years.
- higher mortality rates from preventable causes compared with Australia as a whole. Death rates were almost three times as high for indigenous males and females as for the non-indigenous population.
- high death rates from diseases of the circulatory system (including heart disease and stroke), injuries (including motor vehicle crashes, homicide and suicide), cancer, respiratory diseases (including pneumonia), endocrine, metabolic and nutritional disorders (specifically diabetes), and digestive disorders.

- an infant mortality rate that is twice that for non-indigenous people.

Trends in the health status of Aboriginal and Torres Strait Islander peoples include:

- a decline in death rates from all causes for indigenous males (reflecting a similar reduction for all Australian males)
- a similar decline in death rates for indigenous females.

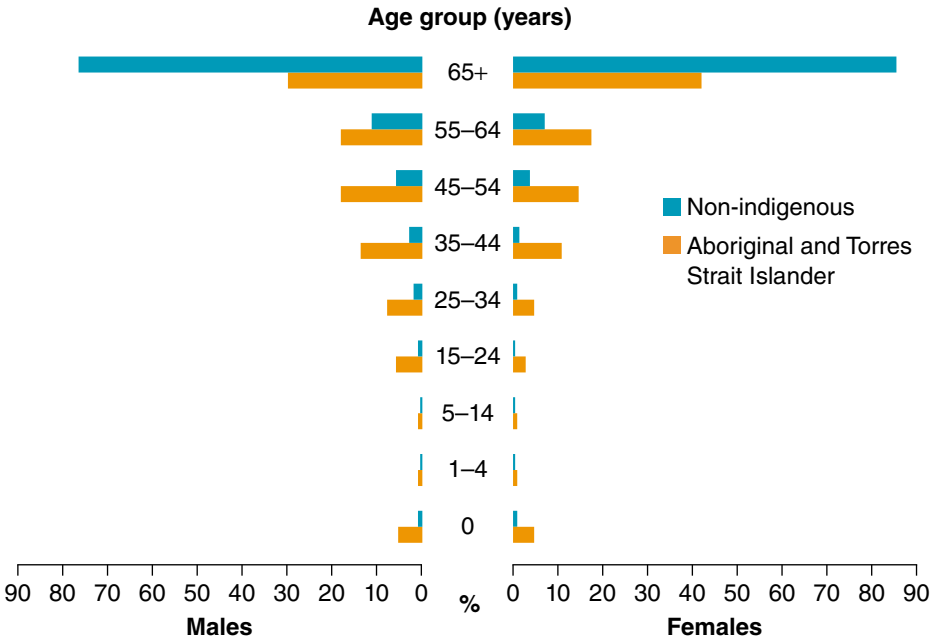


Figure 2.2: Proportion of deaths by age group for indigenous and non-indigenous people, 2006–10 (*Source:* ABS, Deaths collection.)



Analyse a graph

1. In figure 2.2, identify the age group that experiences the highest proportion of deaths among:
   (a) indigenous people
   (b) non-indigenous people.
2. Compare the proportions of deaths of indigenous and non-indigenous Australians in the 0–24 age groups. Suggest reasons for the differences.
3. Propose reasons for the higher proportion of deaths among indigenous people in the 25–44 years age group compared with the same age group among non-indigenous people.

Determinants of indigenous health

Health reports confirm that Aboriginal and Torres Strait Islander people are disadvantaged, compared with other Australians, based on a number of socio-economic indicators. These include lower levels of education, employment and income. These indicators are linked to higher health risk factors such as smoking, alcohol abuse, poor housing and exposure to violence.

Other socioeconomic and sociocultural determinants of health also play a part in the likelihood of higher health risk factors, such as the neighbourhood in which they live and the quality of social connections with family, friends and community. In some studies of indigenous communities, people who felt a lack of control over aspects of their lives, or had experienced removal from their natural family, were likely to self-assess their health as 'fair or poor'.

SNAPSHOT

Indigenous life expectancy gap largely attributable to chronic diseases

While some inroads have been made in the health and wellbeing of Aboriginal and Torres Strait Islander people, there are still many areas where large disparities exist, according to the latest statistical report released today by the Australian Institute of Health and Welfare.

The report, *The health and welfare of Aboriginal and Torres Strait Islander people: an overview 2011*, will be launched today by the Minister for Human Services, the Hon Tanya Plibersek MP. For the first time, the report looks at the impact of chronic diseases on the life expectancy gap between Indigenous and non-indigenous Australians (currently estimated to be 12 years for men and 10 years for women).

It shows that about 80% of the mortality gap can be attributed to chronic diseases, most significantly heart diseases (22%), followed by diabetes (12%) and liver diseases (11%).

'Many chronic diseases have inter-related risk factors which are often associated with social and economic disadvantage in areas such as housing, education and employment,' said Institute spokesperson Dr Fadwa Al-Yaman. 'Much of this chronic disease is potentially preventable.

'In some of these areas there have been improvements, for example, the proportion of Indigenous people who were daily smokers dropped from 49% to 45% between 2002 and 2008.'

'In education, Indigenous Australians aged 25–34 years completed more schooling than those aged 55 years and over and Year 12 retention rates for Indigenous students rose from 29% in 1996 to 47% in 2010.

'For housing, between 1994 and 2008, the proportion of Indigenous households who were home owners or buyers rose from 26% to 32%.'

However, there are still many areas where Indigenous outcomes remain significantly worse.

'For example, babies born to Indigenous mothers were twice as likely to be of low birth weight as babies born to other Australian mothers. And nearly half of all Indigenous children were living in jobless families in 2006 — three times the proportion of all children in Australia,' Dr Al-Yaman said.

Source: ABS, media release, 5 May 2011.



INQUIRY

Aboriginal health inequities

Read the snapshot 'Indigenous life expectancy gap largely attributable to chronic diseases', then answer the following questions.

1. What is the impact of chronic diseases on the mortality gap between indigenous and non-indigenous Australians?
2. Identify the areas in the health and socioeconomic status of indigenous Australians that are:
   (a) improving
   (b) remain significantly worse compared to the general population in Australia.

SNAPSHOT

Number of indigenous heavy smokers drops

By Michelle Henderson

A dramatic drop in the number of indigenous Australian heavy smokers could reduce deaths and disease caused by tobacco, research suggests. The number of Aboriginal and Torres Strait Islanders who smoked more than 20 cigarettes a day almost halved between 1994 and 2008, a report in the *Medical Journal of Australia* on Monday found. The rate dropped from 17.3 per cent of indigenous people in 1994 to 9.4 per cent in 2008 — a 45 per cent decrease.

(continued)

The decline occurred among both men and women, in remote and non-remote areas and included all age groups except older indigenous people. However, those smoking one to 10 cigarettes a day increased by almost one-third, from 16.8 per cent to 21.6 per cent.

Smoking is the number one cause of chronic conditions and diseases such as cancer and cardiovascular disease among indigenous Australians. Fifty per cent of indigenous people smoke compared with less than 20 per cent of the wider community.

Researcher Associate Professor David Thomas from the Menzies School of Health Research said it was well known that heavier smokers have higher health risks so the reduction was welcome news. He said the decline happened before the federal government's $100 million investment to reduce smoking in Aboriginal communities in 2010.

'We are riding a wave of change,' Assoc Prof Thomas told AAP.

'Reducing smoking intensity and prevalence will lead to reduced deaths and illness due to smoking.'

He said wider anti-tobacco campaigns and smoke-free laws introduced across the country may have had an impact on the drop in heavy smoking rates.

The changes may have come about by heavy smokers cutting down or young people not taking up the habit heavily, Assoc Prof Thomas said.

Source: 'Number of indigenous heavy smokers drops' by Michelle Henderson © AAP 2012. See full credit on the Acknowledgements page.



INQUIRY

Smoking amongst indigenous Australians

Read the snapshot 'Number of indigenous heavy smokers drops', then answer the following questions.

1. Outline the findings of the Medical Journal of Australia report.
2. What impact should the findings have on chronic diseases among indigenous Australians?
3. Identify the government laws and campaigns aimed at reducing smoking in Australia.

Socioeconomic status can be broadly measured by a person's level of income, education, housing and employment.

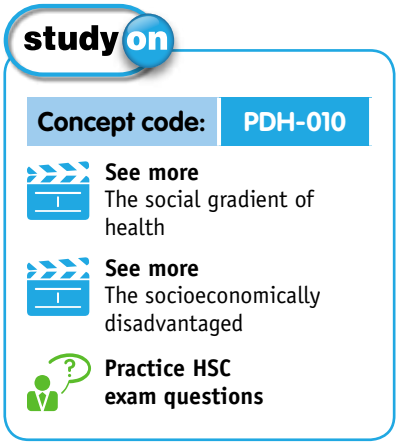
Socioeconomically disadvantaged people

Socioeconomic status (SES) can be broadly measured by income, housing, education level and employment, and how these influence where a person fits into a society over a period of time. People or groups who are characterised by poor levels of education, low income, poor housing and unskilled work or long periods of unemployment are said to be socioeconomically disadvantaged.

There is a consistent relationship between an individual's socioeconomic status and their health. Socioeconomic disadvantage tends to be a risk factor for ill health. In all age groups, men and women from lower socioeconomic backgrounds have higher mortality and higher levels of illness than those of the more affluent groups in the population.

Studies have revealed that, in Australia:

- higher socioeconomic groups have a lower infant mortality rate
- higher socioeconomic groups are better educated about their health — that is, lower education is associated with higher levels of blood pressure in both sexes, higher LDL (low-density lipoproteins) cholesterol levels in women and a higher body mass index in both sexes
- the decline in heart disease death rates is greater in higher socioeconomic groups



- smoking prevalence tends to fall as SES rises. In 2007–2008, of those people 15 years or older, 28.9 per cent of people with the lowest SES smoked, compared with 11.1 per cent of people with the highest SES.
- people of low socioeconomic status appear to be less informed about health
- lower socioeconomic groups make less use of preventative health services such as immunisation, family planning, dental checkups and **Pap smears**
- people from low socioeconomic groups are sick more often and die younger. People from lower socioeconomic areas have higher rates of mortality overall and for most causes of death.

Pap smears are screening tests to detect cervical cancer cells by taking a sample of cells from the cervix.

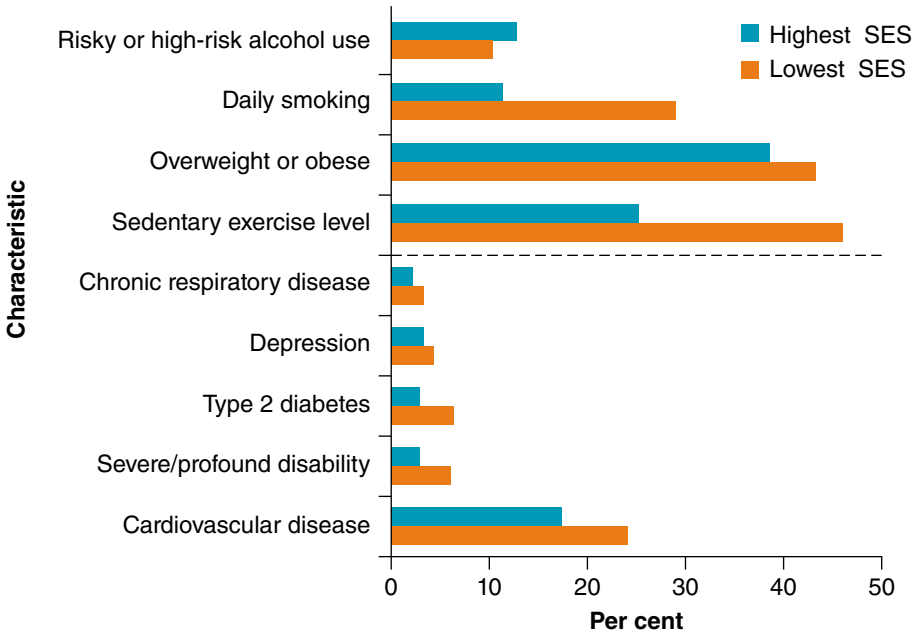


Figure 2.3: Prevalence of risk factors and disease by socioeconomic status, 2007–2008 (per cent) (*Source: Australia's health 2010*, table 5.8, p. 255.)

INQUIRY

Socioeconomically disadvantaged groups

What are the reasons behind the health traits of population subgroups that have low socioeconomic status? In small groups, discuss a health issue that affects socioeconomically disadvantaged groups and list some ways to address the problem. Present your group's ideas in a short PowerPoint presentation.

study on

Concept code: PDH-011

See more
Rural and isolated people

Practice HSC exam questions

People in rural and remote areas

More than 30 per cent of the Australian population lives in rural or remote areas. The health of people living in rural and isolated areas is poorer than that of people living in city areas. Statistics reveal higher mortality and illness rates for this group. For example, although mortality rates across all regions have fallen in the past ten years, the mortality rate for other regions has remained 10 per cent higher than the mortality rate in major cities. This does not necessarily mean that remoteness equates to poor health. There are individuals and groups within rural and remote communities who are of good health. The poorer health status of indigenous Australians is to some extent responsible for the higher rates.



Figure 2.4: Rural males are less likely to seek out health advice.

People living in rural and remote areas are more likely to:

- be smokers
- drink alcohol in hazardous quantities
- be overweight or obese
- be physically inactive.

Determinants of health in rural and remote areas

Health reports on rural and remote area health have identified socioeconomic and environmental determinants related to higher health risk factors. These include lower levels of education and income compared to metropolitan areas, greater exposure to injury in occupations such as farming and mining, higher risk on the road due to longer travelling distances and lower road quality, and a considerably lower percentage of water supplies that are adequately fluoridated.

People living in rural and remote areas have higher costs of living, in terms of food and fuel prices, although housing costs are lower. This means that the diet of residents in rural and remote areas may be affected because of insufficient access to reasonably priced fruit and vegetables. They also have poorer access to health care compared to people living in metropolitan zones due to distance, cost of fuel, and availability of transport. This lack of access is increased by a shortage and uneven distribution of medical services in rural and remote areas, compared to metropolitan areas.

The health of males living in rural and remote areas is comparatively worse than males living in metropolitan areas in Australia. Studies indicate that one factor is an attitude among men in rural and remote areas that injury and illness is part of normal life, and they are less likely to seek help for chronic conditions. According to surveys, they pay less attention to health-related behaviours than men in metropolitan areas.



INQUIRY

Health inequities in rural and remote populations

Read the snapshot 'Men in regional and rural areas at greater health risk', then answer the following questions.

1. What is the 'double disadvantage' of men living in rural regions, according to the AIHW spokesperson?
2. Identify the health risk factors that are more common among men living outside major cities.
3. Propose why the rates of injury and poisoning are so much higher for men living in remote areas.

Read the snapshot 'Facts about the inequity of cancer in rural and regional areas' then answer the following questions.

4. Why is distance a factor in mortality risk from cancer?
5. How is the NSW state government attempting to alleviate this difficulty?

SNAPSHOT

Men in regional and rural areas at greater health risk

Men living in rural Australia are more likely to experience chronic health conditions than their urban counterparts, according to a report released today by the Australian Institute of Health and Welfare (AIHW). The report, *A snapshot of men's health in regional and remote Australia*, shows that male death rates increased with remoteness.

Cardiovascular diseases were responsible for nearly a third of the elevated male death rates outside major cities. Compared with major cities, death rates from diabetes were 1.3 as high for men in inner regional areas and 3.7 as high in very remote areas.

'There is a strong relationship between poor health and social and economic disadvantage', said Sally Bullock, from the AIHW's Population Health Unit.

'Compared with urban areas, rural regions of Australia contain a larger proportion of people from lower socioeconomic groups. This fact, combined with the generally poorer health status of men compared with women, highlights a potential double disadvantage for men living in rural areas.'

The report also shows that men living outside major cities were more likely to have health risk factors such as daily smoking and risky or high risk alcohol use, than their counterparts in major cities. They were also more likely to have experienced a substance use–related mental disorder throughout their lifetime. Male death rates due to injury and poisoning also increased with remoteness.

'The rates of injury and poisoning for men living in very remote areas were over three times as high as for men living in major cities', Ms Bullock said.

Source: AIHW media release, 14 April 2010.

SNAPSHOT

Facts about the inequity of cancer in rural and regional areas

- Cancer survivors living in rural areas have greater anxiety and distress levels and more emotional wellbeing concerns than cancer survivors living in larger cities.
- For some cancers, remote patients were up to three times more likely to die within five years of diagnosis.
- Radiotherapy often requires daily outpatient treatment for over six weeks. Rural patients need to travel and live away from home for this treatment. In some cases, people choose the type of treatment they have based not on what is needed but on the proximity to home, or worse, they refuse treatment altogether.
- Rural cancer patients are 35 per cent more likely to die within five years of diagnosis than patients in cities.
- There is a 6 per cent increase in mortality risk for each 100 km increment in distance from the nearest radiotherapy facility.
- To help bridge the gap in health outcomes between rural and urban patients in NSW, the State Government has increased allowances for travel and accommodation, to provide accommodation subsidies of $43 for single and $60 per double per night and reimbursement for car travel to 19c per kilometre.

Source: www.canassist.com.au.

Overseas-born people

In 2009, 5.5 million people in Australia were born overseas, representing a quarter of the population. Around 60 per cent of overseas-born people were born in a non–English-speaking country.

The highest proportion of overseas-born people were born in the United Kingdom or New Zealand, followed by China, India and Italy.

The health status of migrants varies, depending on their age, socioeconomic status, fluency in the English language and their satisfaction with their life in

Australia. It can be affected by sociocultural determinants such as language barriers, stress of relocation, or lack of contact with people from their original culture. Generally, though, migrants enjoy a higher level of health than that of the Australian-born population. Statistics reveal lower death rates, lower hospitalisation rates and a reduced incidence of lifestyle-related risk factors; for example, the mortality rate for skin cancer is very low among overseas-born Australians. In 2005–2007, death rates for overseas-born people were seven per cent below that of Australian-born people (AIHW, *Australia's health 2010*, p. 270). Known as the 'healthy migrant effect', the main reasons appear to be that:

- people who migrate to Australia are generally willing and financially secure; sick or disabled people are less likely to apply
- the government selects migrants based on their health as well as education, language and job skills.

As the time of residence in Australia lengthens, the more likely overseas-born Australians are to adopt the Australian lifestyle.

Given the general good health of overseas-born Australians, there are some significant inequities in health between our overseas-born population and Australian-born population, including:

- high rates of mortality from lung cancer for people from the United Kingdom and Ireland
- higher rates of diabetes and cervical cancer in the population groups of Asian origin
- markedly lower death rates for people born in China and Vietnam
- a much lower incidence of skin cancer in overseas-born Australians.



Figure 2.5: Overseas-born people tend to have better levels of health than the Australian-born population.

INQUIRY

Health inequities for Australians born overseas

1. Why do many new migrants tend to have good levels of health? Discuss these reasons.
2. Why would overseas-born people have lower rates of skin cancer?
3. Why would Asian migrants have higher rates of diabetes and cervical cancer?
4. Draw a web or bubble map to summarise the ways in which the Australian culture might have a negative impact on the health of some migrant groups over time.

Elderly people

Older Australians (65 years or older) make up about 14 per cent of the Australian population. Australia has an ageing population. The population in Australia aged 65 or over increased from 1.1 million in 1971 (8 per cent of the population) to more than 3 million in 2011 (14 per cent of the population).

Socioeconomic indicators such as higher education and income levels, and supportive social environments all contribute to a higher likelihood of elderly people maintaining good health.

Heart disease and stroke are the two leading causes of death among older Australians, for both males and females. The most commonly reported health conditions for Australians aged 65–74 are vision and hearing loss, high blood pressure and related conditions, and osteoarthritis. The high levels of these

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Other groups experiencing inequities
Practice HSC exam questions

conditions within this age group are often associated with some degree of disability, which places a large financial burden on the health system.

Dementia is another significant health condition in this age group and is more prevalent in females, mainly because they live longer. Dementia and Alzheimer's disease is the third most common cause of death for older females, and the sixth for older males.

Dementia is a condition characterised by a significant loss of intellectual abilities such as memory capacity.



Figure 2.6: The elderly often have mobility problems and require additional support if they have dementia.

INQUIRY

eBookplus

Health inequities for elderly people

Use the **Ageing and health issues** weblink in your eBookPLUS and choose a topic that relates to a health issue for elderly Australians. Read the information and write a short report on how the health issue can be addressed to improve the health status of elderly people.

People with disabilities

Disability is defined in terms of the lack of ability to perform everyday functions or activities. It refers to limitations in functional abilities.

Disability can be measured along a continuum. Components of functioning and disability reflect an interaction between the health condition of the person and his or her environment.

In 2009, 4 million people, or 18.5 per cent of Australia's population, reported having a disability. The conditions that cause disability tend to increase with age. In 2009, 6.6 per cent of 15–24 year olds were affected by disability, compared to 18 per cent of 45–54 year olds, 40 per cent of 65–69 year olds and 88 per cent of people 90 years and over.

The actual number of people living with a disability is increasing as a result of the ageing population. Statistics reveal that the numbers of indigenous people living with severe disability are more than double that of other Australians.

People with disability have significantly worse health outcomes than the general population. The National Health Survey 2007–08 showed that 46 per cent of people aged 15–64 with a severe or profound disability reported poor or fair health, compared with 5 per cent for those without disability.

In December 2012 the NSW state government and the federal government agreed to fully implement a National Disability Insurance Scheme in New South Wales by July 2018. The scheme will provide care and support to around 140 000 NSW residents with a significant disability. It aims to provide coverage to around one-third of the Australian population in the event of disability.

Determinants of health for disabled people

Disabled people in Australia have lower incomes and are more likely to live in poverty than people without a disability. This is partly due to lower education and employment levels compared to the general population. Lack of job opportunities or not having a job then limits opportunities for social connections. The health of disabled people can be affected if they are socially excluded or marginalised. They may also face violence and discrimination related to their disability.

The majority of disabled people live in households rather than accommodation establishments. They can be disadvantaged by living in poor quality housing or be affected by living in accommodation that is inappropriate for their disability.

Disabled people are generally more likely to smoke and have insufficient physical activity than non-disabled people, but have a lower incidence of alcohol misuse. People with a severe or profound disability are more likely to be overweight or obese.

SNAPSHOT

One in five Australians with a disability

Just under one in five (18.5%) Australians had a disability in 2009, according to new figures released today by the Australian Bureau of Statistics (ABS). This represents approximately 4.0 million people. The main disabling conditions reported in 2009 were back problems (15.6% of all persons with a disability) and arthritis (14.8%). Between 2003 and 2009 the proportion of people with a disability decreased by 1.5 percentage points, mainly due to decreases in the prevalence of arthritis, back pain and asthma. However, the number of people with a disability has increased along with population growth. During the same period, there has been almost no change in the proportion of the population with the most severe types of disabilities — those people who always need help or supervision with their mobility, communication and/or self-care. This group has remained relatively steady at approximately 2.9% of Australia's population (634 600 people in 2009).

While there have been significant improvements to support those with a disability in many parts of their lives, little improvement has been made in key areas of everyday life over the last six years:

- labour force participation remained low at around 54%, compared to 83% for people without disabilities; and
- Year 12 attainment was around 25% for people with disabilities, compared to just over 50% for people without disabilities.

Both of these factors may have impacts on the social and economic well-being of people with a disability.

Source: ABS media release, 2 May 2011.



INQUIRY

Health inequities for disabled people

Read the snapshot 'One in five Australians with a disability' then answer the following questions.

1. (a) What is the trend in Australia for:
- (i) the proportion of people with a disability?
- (ii) the number of people with a disability?
- (iii) the proportion of people who are severely disabled?

(b) (i) Identify the two socioeconomic determinants of health that are compared for disabled and non-disabled people.
- (ii) Suggest how they could affect the health risk factors of people with disabilities.

2. An example of an organisation that supports people with disabilities is the Royal Institute for Deaf and Blind Children (RIDBC). Use the **RIDBC** weblink in your eBookPLUS and click on 'Services' to find out more about how the needs of children with hearing or vision impairment are met.

APPLICATION

Groups experiencing health inequities

1. In groups, consider Aboriginal and Torres Strait Islander peoples and one other group experiencing health inequities. For these two groups, research the:
   (a) nature and extent of their health inequities
   (b) sociocultural, socioeconomic and environmental determinants
   (c) roles of individuals, communities and governments in addressing their health inequities.
2. Share your findings with the class in a short oral presentation.

HIGH LEVELS OF PREVENTABLE CHRONIC DISEASE, INJURY AND MENTAL HEALTH PROBLEMS

Figure 2.7 shows the chronic, but preventable, health problems that contribute significantly to the burden of disease and illness in the community. It is possible to identify the risk factors for these diseases and illnesses, the determinants of health, and ways that behaviours can be modified, to help reduce the impact of such health ailments. If health authorities and governments give priority to combating the high prevalence of such diseases and illnesses, the health status of Australians is likely to be improved.

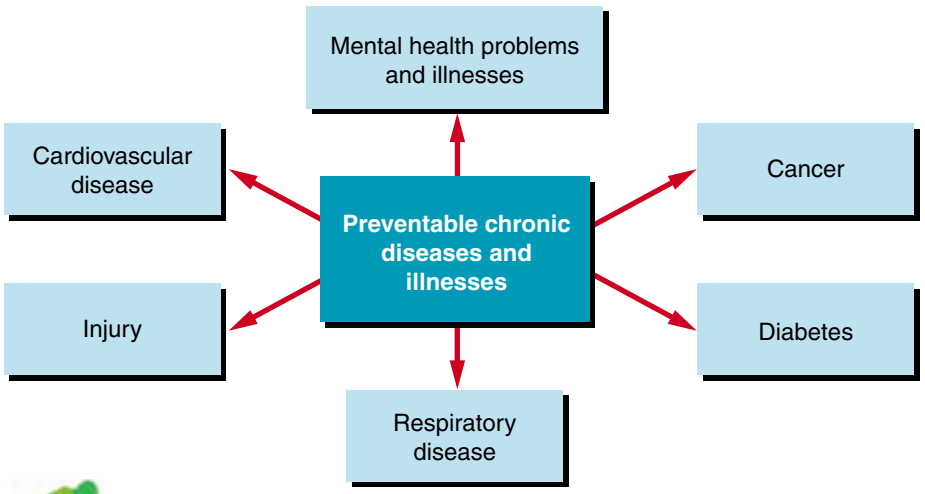


Figure 2.7: The range of preventable chronic diseases and illnesses that are priority issues for Australia's health

INQUIRY

Chronic disease risks embedded in Aussie lifestyle

Read the snapshot 'Chronic disease risks embedded in Aussie lifestyle', then answer the following questions.

1. Identify the lifestyle behaviours that can contribute to chronic disease.
2. (a) Which is the most common risk factor for chronic disease?
   (b) Which chronic diseases is this risk factor particularly linked to?
   (c) How does having multiple risk factors affect the likelihood of having some chronic disease, for men and women?
3. Access a copy of the report *Risk factors contributing to chronic disease 2012*, by using the **Chronic diseases — risk factors** weblink in your eBookPLUS. Use a mind map to represent the key findings in the Summary near the start of the report.

Chronic disease risks embedded in Aussie lifestyle

Most Australians have at least one preventable risk factor for chronic disease, according to a new report released today by the Australian Institute of Health and Welfare (AIHW).

The report, *Risk factors contributing to chronic disease*, provides a comprehensive picture of the lifestyle behaviours of Australians that can contribute to chronic diseases such as arthritis, Type 2 diabetes, depression, asthma and osteoporosis.

Diet is a very common risk factor for chronic disease, with over 90% of Australians failing to consume the recommended amounts of vegetables each day, and only half consuming enough fruit.

'This is important because we know that people with low fruit and vegetable intake have higher risks of chronic diseases such as heart disease and Type 2 diabetes', said AIHW spokesperson Ann Hunt.

The report also found that around 60% of Australians do not do enough physical activity to gain sufficient health benefits.

As a person's number of risk factors increases, so too does their likelihood of having some chronic diseases. For example, men with five or more risk factors are twice as likely to report depression than men with two or fewer risk factors. Similarly, women with five or more risk factors were three times more likely to report stroke, and two and a half times more likely to report depression, than women with two or fewer risk factors.

The report also shows that certain risk factors commonly occur together.

'People who consume alcohol at risky levels are more likely to report daily smoking than those who don't, and daily smoking is also more commonly reported by those who have insufficient levels of physical activity', Ms Hunt said.

Source: AIHW, media release, 27 March 2012.

Cardiovascular disease (CVD)

Cardiovascular disease (CVD) refers to damage to, or disease of, the heart, arteries, veins and/or smaller blood vessels.

Cardiovascular disease (CVD) has been identified as a health priority area because it is a major health and economic burden on Australia. It is one of the leading causes of sickness and death in Australia (36 per cent of all deaths in 2010), although there are significant differences in the incidence and prevalence of the disease among population subgroups. Males are more likely than females to die from the disease, for example, and indigenous people die from the disease at twice the rate of the total population.

Cardiovascular disease can be attributed to a number of modifiable risk factors. The potential for change is evident and recent statistics reveal a decline in the death rate from coronary heart disease.

The nature of cardiovascular disease

Cardiovascular disease is a general term covering all diseases of the heart and circulatory system. The three major forms of this disease are:

- *coronary heart disease* — the poor supply of blood to the muscular walls of the heart by its own blood supply vessels, the coronary arteries
- *stroke* — the interruption of the supply of blood to the brain
- *peripheral vascular disease* — diseases of the arteries, arterioles and capillaries that affect the limbs, usually reducing blood supply to the legs.

Atherosclerosis is the build-up of fatty and/or fibrous material on the interior walls of arteries.

Cardiovascular disease is most evident as stroke, heart attack, angina, heart failure and peripheral vascular disease. **Atherosclerosis** is the underlying cause of most of these conditions.

Atherosclerosis

Atherosclerosis is the build-up of fatty and/or fibrous material on the interior walls of arteries. This build-up hinders the flow of blood to the body's tissues and also acts to increase blood pressure. Often, the build-up occurs in patches known as **atheroma** or plaque, and is characterised by the presence of **cholesterol**. The development of atheroma tends to decrease the elasticity of the arteries and limits the flow of blood.

Atheroma is a thickened area of fatty and fibrous deposits on the inside surface of arteries, resulting in atherosclerosis.

Cholesterol is a fatty substance contained in all animal cells.

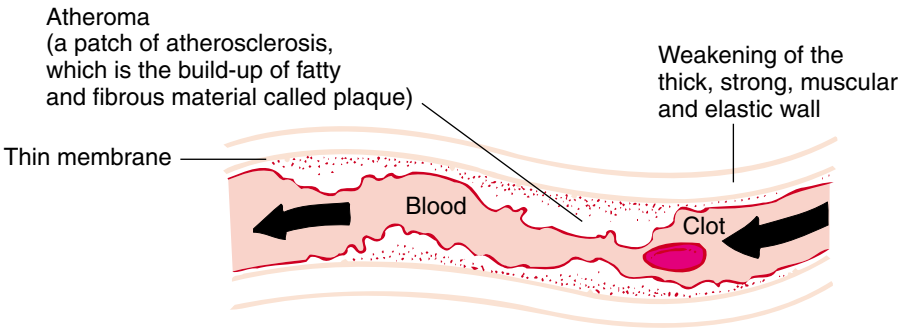


Figure 2.8: Atherosclerosis. The narrowing of the artery (due to fat deposits on the inside of the walls) makes it more difficult for blood to pass through the artery. A clot may form or lodge at that point.

The development of atherosclerosis may occur in any artery in the body, but it is of greatest threat to an individual's health when it is present in the arteries leading to the brain, the eyes or legs, or the heart. The major function of the heart is to supply the body with oxygen-rich blood. To perform continual intense exercise, the heart requires a supply of oxygenated blood, which it receives via its own blood supply vessels — the **coronary arteries**. The presence of atherosclerosis in the coronary arteries reduces the much needed supply of blood, depriving the muscle of oxygen and hindering the functioning of the heart. High blood pressure, smoking and a diet rich in fat accelerate the development of atherosclerosis.

Coronary arteries are the blood vessels that supply blood to the heart muscle.

Arteriosclerosis

Arteriosclerosis (the hardening of the arteries) is a degenerative disease that affects most people to some extent as part of the process of ageing. It often begins in childhood. A form of atherosclerosis, it develops as the fatty or fibrous deposits build up and the arteries become harder and less elastic.

Arteriosclerosis is the hardening of the arteries whereby artery walls lose their elasticity.

Coronary heart disease

Coronary heart disease (also called ischaemic heart disease) manifests as a heart attack or angina.

Heart attack

A heart attack is also known as **myocardial infarction**, **coronary thrombosis** and **coronary occlusion**. Generally caused by the complete closure of a coronary artery by atherosclerosis, it may also occur when a blood clot forms and blocks a narrowed artery (thrombosis).

Myocardial infarction is a heart attack that is usually due to the complete blockage of a coronary artery and results in the death of some heart tissue.

Coronary thrombosis is the formation of an obstructing clot within a coronary artery that is narrowed by atherosclerosis, possibly leading to a heart attack.

Coronary occlusion is a heart attack (or myocardial infarction) caused by the sudden and complete blockage of blood and oxygen to the heart muscle, leaving the heart muscle damaged.

The efficient functioning of the heart relies on a regular oxygenated blood flow, so the cessation of the flow to any part of the heart results in tissue death. This is a heart attack. It can result in sudden death or the impaired function of the heart muscle, such as occurs with arrhythmia (that is, the disturbed rate and rhythm of the heartbeat). Alternatively, the area of damage may be minimal and the individual can resume everyday activity. During the healing

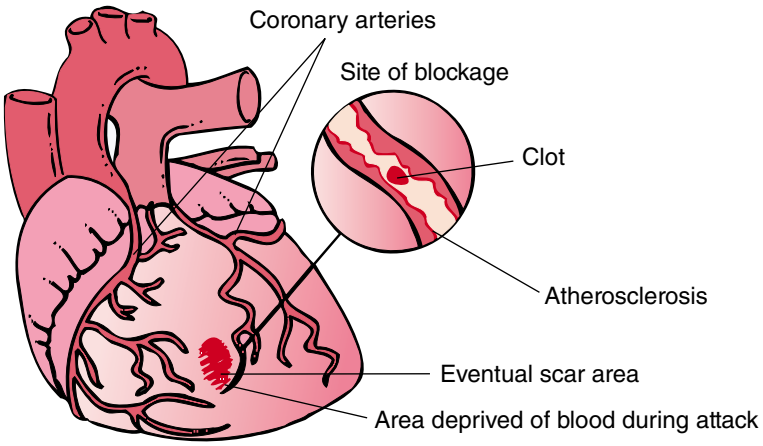


Figure 2.9: Blockage or closure of an artery leads to a heart attack.

process following a heart attack, nearby arteries grow new branches to supply the damaged tissue.

Common symptoms are associated with heart attacks. They include:

- sudden collapse or unconsciousness
- shortness of breath, nausea, vomiting, excessive sweating
- chronic pain, lasting for hours or days
- acute pain, extending to the shoulders, neck, arms and jaw
- pain felt as a burning sensation in the centre of the chest, between the shoulder blades or behind the breast bone.

Some of these signs may also be associated with other illnesses and they are often mistaken for indigestion, for example.

Some sufferers may not exhibit the typical signs. They may not experience any pain or discomfort and this type of attack is referred to as a **silent infarction**, which can be diagnosed by electrocardiograph (ECG) readings.

Silent infarction is a heart attack without the typical symptoms.

Angina pectoris

Angina pectoris is the medical term used to describe the chest pain that occurs when the heart has an insufficient supply of oxygenated blood. Therefore, angina is not really a disease but, rather, a symptom of oxygen deprivation.

Angina pectoris refers to chest pain that occurs when the heart has an insufficient supply of oxygenated blood.

The pain of angina may be experienced by a heart attack sufferer or someone who has never had, and never will have, an attack. Angina is generally caused by coronary atherosclerosis. The narrowed arteries allow enough oxygenated blood to flow to the heart to enable everyday activity, but chest pain or tightness occurs when the heart becomes overloaded by exertion, excitement or overeating. In most cases, rest relieves the pain and the heart muscle recovers without permanent damage.

Angina varies in the degree of attack intensity and the sufferer's future health is affected by the seriousness of the attack. Most people are able to continue with their everyday activities. Some may restrict the amount of physical activity they perform, to avoid the pain; others are not even aware they have a heart problem.

Stroke

A **stroke** may occur in a similar fashion to a heart attack. Known medically as a cerebrovascular accident, a stroke occurs either when the blood supply to the brain is interrupted by a clot or atherosclerosis, or when a burst blood vessel haemorrhages into the brain.

A **stroke** results from a blockage of the blood flow to the brain.

An **aneurysm** is the ballooning of the arterial wall due to thinning and weakening. It often results from constant high blood pressure and can lead to a stroke.

Hypertension is a risk factor for a stroke. Blood vessels directly damaged as a result of high blood pressure tend to either rupture more easily or result in an **aneurysm** (which may eventually result in a rupture). The bleeding following the rupture increases the pressure within the cranium and may lead to the death of some tissue due to lack of oxygen.

The effect of a stroke on the functioning of the body can be severe, even though the damaged area appears to be quite small. If the affected artery is large, then paralysis of one side of the body may occur; on the other hand, if the damage occurs in the dominant hemisphere of the brain, then the individual may lose the ability to speak.

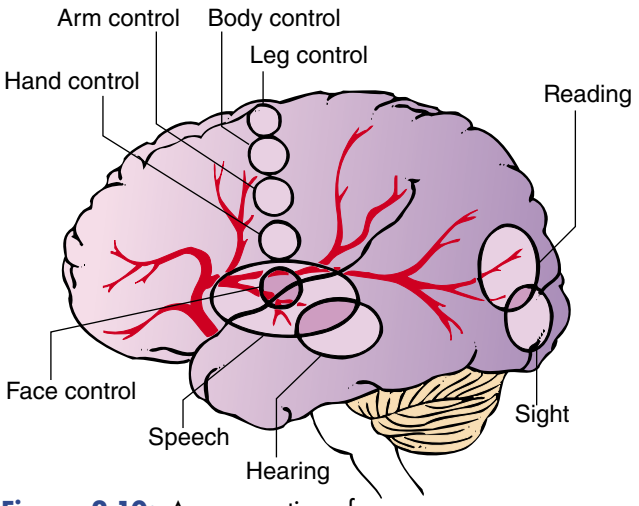


Figure 2.10: A cross-section of the brain, showing which bodily functions can be affected according to the area of the brain that is deprived of blood

In many strokes and heart attacks, the actual breakdown is the end product of many years of fatty and fibrous tissue build-up associated with atherosclerosis. This underlying cause may have gone unnoticed for up to 40 years.

Heart failure

Heart failure is a reflection of the heart's inability to cater for the demands placed on it during everyday life. Atherosclerosis, heart attacks, high blood pressure, defective heart valves and infections of the heart may mean the heart cannot contract sufficiently to supply the body with its oxygen requirements. Such a condition generally occurs because the heart is unable to compensate for the damage caused by one of the above problems.

The term *heart failure* may be misleading because it implies that the heart has stopped beating. This is not the case. The ventricles of the heart may not be affected equally or simultaneously. The extent of the damage is determined by the cause of the heart failure. Failure in the left side of the heart is most often the result of a heart attack, although continual high blood pressure may also be a cause. Blood accumulates in the lungs and the sufferer may experience repeated breathlessness, which is a major symptom.

Failure in the right side of the heart causes pressure to build up in the right atrium, so blood cannot return to the heart from the body in the usual way. Blood may accumulate in the veins and an excess of fluid accumulates in the body's tissues. The parts of the body most obviously affected are the legs and the liver.

Strain and distress in one side of the heart is closely followed by failure of a similar degree in the other side. The symptoms are compounded and the sufferer generally experiences an overall feeling of fatigue because the heart is unable to supply the body's muscles with an adequate supply of oxygenated blood.

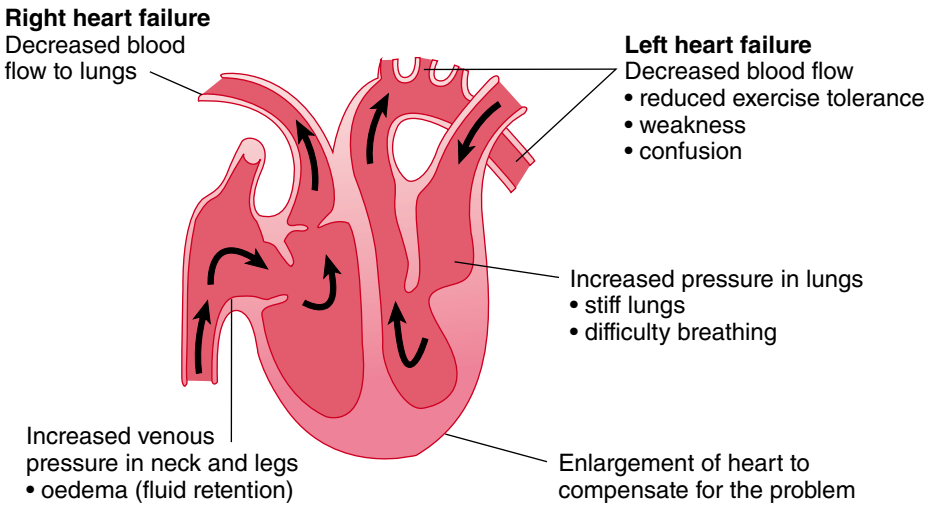


Figure 2.11: The effects of heart failure

Peripheral vascular disease is the result of reduced blood flow to the legs and feet, usually due to atherosclerosis and/or arteriosclerosis.

Peripheral vascular disease

Peripheral vascular disease usually affects the arteries, arterioles and capillaries of the legs and feet. The blood supply to the muscles of the legs or to the skin is damaged by atherosclerosis and/or arteriosclerosis. Given a slowed flow of blood to the leg muscles, walking results in a cramping feeling.

The warning signs of impaired circulation to the legs and feet are tingling sensations in the feet and tightness (cramping) in the legs and buttocks, particularly after exercise. In extreme cases the disease can lead to gangrene and subsequent amputation of the foot or limb. Significantly, nine out of 10 people with peripheral vascular disease are smokers.

The extent of cardiovascular disease in Australia

The *National health survey* 2007–2008 found that 3.4 million Australians have a cardiovascular disease and it is a leading cause of death. This disease group is the most costly for the nation, at $5.9 billion or 11 per cent of total health expenditure.

Mortality

Cardiovascular disease accounted for 32 per cent of all deaths among Australians in 2010. The mortality rates for Australians reveal:

- ischaemic heart disease (also known as coronary heart disease) is the leading cause of death in both males and females. It accounted for 15.9 per cent of all deaths in males and 14.3 per cent of all deaths in females in 2010.
- cerebrovascular disease or stroke is the next leading cause of all death, accounting for 5.9 per cent of all deaths in males and 9.8 per cent of all deaths in females in 2010.
- other heart disease accounted for 4.7 per cent of all deaths in males and 6.0 per cent of all deaths in females in 2010.

Death rates in Australia from cardiovascular disease have declined considerably over recent decades and show signs of continuing to fall. Death rates from cardiovascular disease have dropped from 42 per cent of all deaths among Australians in 1996 to 32 per cent in 2010. There has been a decline in mortality from stroke in recent decades for both males and females. Strokes largely occur in people aged 60 years or older.

The declining prevalence of cardiovascular disease is mainly due to:

- *a reduction in the levels of risk factors*. The implementation of prevention strategies has led to a reduction in smoking levels, increased monitoring of hypertension levels and diet modifications, for example.
- *improved medical care and treatment*, which have led to reduced mortality and improved quality of life.

SNAPSHOT

Cardiovascular disease: most deaths and highest costs, but situation improving

Cardiovascular disease (CVD) causes the most deaths in Australia and is our most costly disease, but some improvements have been identified, according to a report, *Cardiovascular disease: Australian facts 2011*, released by the Australian Institute of Health and Welfare (AIHW). CVD also imposes a burden of disease, measured in terms of disability and premature death, that is second only to cancer.

However, death rates for all the major types of CVD — coronary heart disease, stroke, heart failure, rheumatic heart disease and peripheral vascular disease — have fallen significantly in the past 20 years. 'The overall death rate for CVD has fallen by about 80% since the 1960s and continues to fall,' Ms Moon said.

The main risk factor for CVD is age, with older people having much higher hospitalisation and death rates than younger people. The modifiable risk factors include smoking, being overweight, excessive alcohol use and poor diet. All can be changed to reduce the risk of CVD.

Source: AIHW, media release, 17 March 2011.

INQUIRY

Trends in CVD

Read the snapshot 'Cardiovascular disease: most deaths and highest costs, but situation improving', then answer the following questions.

1. How is 'burden of disease' measured, and where does CVD rank compared to other diseases using this measure?
2. Is the death rate from CVD increasing or declining?
3. What are the health risk factors for CVD that people can modify to reduce the risk of CVD?

Morbidity

Cardiovascular disease is a leading cause of disability, with around 1.4 million Australians estimated to have a disability associated with cardiovascular disease. Cardiovascular disease accounted for six per cent of hospitalisations in 2007–08. Of these, 34 per cent were due to coronary heart disease, 10 per cent to heart failure and five per cent to peripheral vascular disease.

Risk factors and protective factors for cardiovascular disease

The major risk factors for developing cardiovascular disease include some that cannot be controlled or modified. These include:

- *a family history* of heart disease. People with a family history of heart disease tend to be more likely to develop cardiovascular disease.
- *gender*. The cardiovascular disease death rate in men aged up to 50 years is higher than that in women. This difference is thought to be related to female hormones. It is thought that the hormone oestrogen is a protective factor for cardiovascular disease. Protection is not so apparent after menopause when oestrogen levels drop.
- *advancing age*. The risk of cardiovascular disease increases with age.

Major risk factors that can be reduced or eliminated by lifestyle changes or medical treatment include:

- *smoking*. This is the most significant modifiable risk factor. The risk of heart attack and stroke is doubled by heavy smoking. The risk of sudden cardiac death is also higher. These risks decrease when smoking stops and as the non-smoking period lengthens.
- *raised blood fat levels*. Generally, the higher the blood cholesterol and triglyceride levels, the higher the risk of heart disease. A diet high in saturated fat can raise blood cholesterol levels.
- *high blood pressure*. The risks of heart disease, stroke and heart failure all increase with hypertension. High blood pressure can overload the heart and blood vessels, and speed up atherosclerosis.
- *obesity and overweight conditions*. These are thought to increase directly the risk of heart disease. They also contribute to other risk factors such as high blood pressure, high blood cholesterol and diabetes. Seventy per cent of Australian males and 56 per cent of Australian females were overweight or obese in 2007–2008. Twenty-five per cent of children in Australia were overweight or obese in that period.
- *abdominal obesity*. This is measured by the waist-to-hip ratio. A ratio of 1.0 for men and 0.9 for women indicates excessive abdominal obesity. It is a good indicator of an individual's risk of developing coronary heart disease.

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- *physical inactivity*. The association of inactivity with obesity, high blood pressure and high fat levels makes it a significant contributor to the development of heart disease.

Other risk factors also exist, but are not considered to be as important because either they occur in a minority of cases or the evidence connecting them to cardiovascular disease is inconclusive. These factors include:

- *diabetes*. This condition generally damages blood vessels and the arteries tend to develop atherosclerosis as a result.
- *the contraceptive pill*. Use of the pill can increase a woman's risk of heart and blood vessel disease. This risk particularly applies to those women using the contraceptive pill who also smoke, have high blood pressure, have diabetes, are aged 35 years or more, or have a family history of the disease.

Excessive alcohol consumption (which contributes to excessive weight) and uncontrolled stress can also increase the disease risk by influencing the other risk factors indirectly.

The major factors that reduce the chance of developing cardiovascular disease include:

- regular physical activity
- eating a diet low in saturated fat and cholesterol
- low consumption of alcohol
- consuming a diet low in salt
- maintaining a healthy weight
- appropriately managing stress
- avoiding exposure to tobacco smoke.

Table 2.1: The sociocultural, socioeconomic and environmental determinants of cardiovascular disease

Sociocultural determinants	• People with a family history of CVD are more at risk. • Asians are less prone to getting CVD due to a generally low-fat diet. • Aboriginal and Torres Strait Islander peoples are more at risk as they are associated with having a lower socioeconomic status and lower education levels. • Media exposure of the effects of smoking on health have led to a reduction in smoking rates and therefore a declining trend for CVD rates.
Socioeconomic determinants	• People with a low socioeconomic status or who are unemployed have higher death rates because income can limit health choices, such as purchasing fresh fruit and vegetables and using exercise facilities. • People with low education levels are more at risk as poor education is linked to poor health choices and less knowledge about how to access and use health services.
Environmental determinant	People living in rural and remote areas are more at risk, as they tend to have less access to health information, health services and technology, such as **electrocardiogram** monitors.

An **electrocardiogram** is a graphical recording of the cardiac cycle produced by an electrocardiograph.

Groups at risk of developing cardiovascular disease

The groups that have the greatest risk of developing cardiovascular disease include:

- tobacco smokers
- people with a family history of the disease

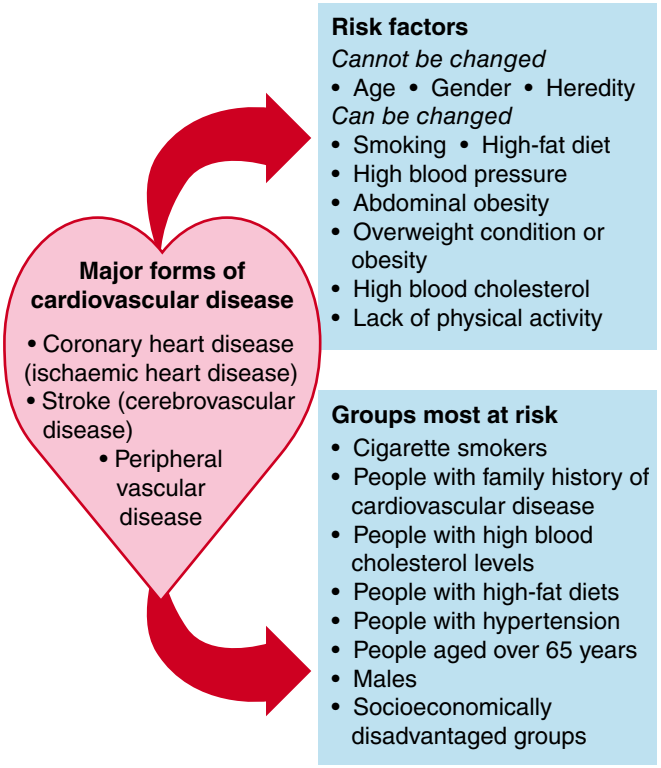


Figure 2.12: Cardiovascular disease — a summary of the risk factors and groups at risk

- people with high blood pressure levels (hypertension)
- people who consume a high-fat diet (which leads to raised blood cholesterol and triglyceride levels)
- people aged over 65 years
- males
- blue-collar workers (labourers and tradespeople who may have higher levels of smoking, alcohol consumption and high-fat diets).



Cardiovascular disease

1. Identify the three most common forms of cardiovascular disease.
2. Outline how arteriosclerosis contributes to cardiovascular disease.
3. What are the major sociocultural, socioeconomic and environmental determinants of cardiovascular disease? Present your response in a mind map.



Health data shows need for urgent action

Read the snapshot 'Health data shows need for urgent action', then answer the following questions.

1. Identify the health risk factors for CVD discussed in the snapshot.
2. Why is it important to reduce the amount of salt in the diet of Australians?
3. What is the source of high levels of salt in the diet of Australians?
4. Identify one way in which governments and health organisations are trying to improve the diet of Australians.

Health data shows need for urgent action

The National Heart Foundation of Australia said today that data released by the ABS has confirmed the urgent need to improve our food supply to reduce deaths from cardiovascular disease.

The Australian Health Survey report, released today, shows that nearly two-thirds (63 per cent) of Australians are now classified as overweight or obese, a key risk factor for cardiovascular disease.

'Men were more likely to be overweight or obese (70 per cent) than women (56 per cent) while one-quarter (25 per cent) of our children are overweight or obese,' Dr Lyn Roberts, National CEO of the Heart Foundation, said today in Canberra.

'While we're pleased to see that smoking rates are down across all age groups, unfortunately even more of us are at risk of eating ourselves to death,' she said.

"The report also showed that just over 3.1 million people aged 18 years and over (21.5 per cent) had measured high blood pressure.

'High blood pressure is an important risk factor for heart disease, stroke and other cardiovascular diseases. For those Australians with high blood pressure, reducing salt intake is essential.

'Sadly, while many of us have removed salt from the dinner table, the amount we eat in processed foods like bread, breakfast cereals and canned goods is alarming.

'We need to find ways to reduce the amount of salt and saturated fat in our food supply so the food we eat is made less likely to cause cardiovascular disease before it even gets into the fridges and pantries of Australian families.

'This is possible — if Australian governments, food companies and health organisations put their best efforts into the Food and Health Dialogue, a body which seeks agreement across the food supply to improve the health quality of our food.'

More than 46 000 Australians die from cardiovascular disease each year, which makes it the number one cause of death in Australia.

Source: National Heart Foundation, media release, 29 October 2012.

Cancer

In 2012, the Cancer Council of Australia estimated that 120 710 new cases of cancer would be diagnosed in that year. Although survival rates are improving due to early detection strategies and improved treatments, the incidence of several types of cancer is increasing.

The nature of cancer

Cancer refers to a large group of diseases that are characterised by the uncontrolled growth and spread of abnormal cells.

A **tumour** is a swelling or enlargement caused by a clump of abnormal cells.

A **neoplasm** is an abnormal mass of cells that forces its way among healthy cells and interferes with their normal functioning.

Metastases are secondary or new tumours, which may develop some distance from the original malignant tumour.

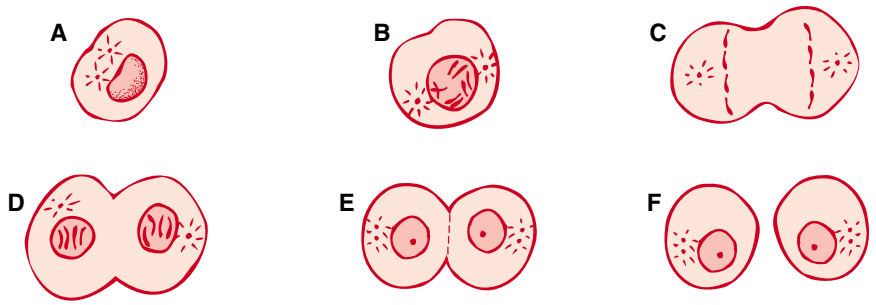
Cancer refers to a diverse group of diseases with a common feature — the uncontrolled growth and spread of abnormal body cells. It involves a mutation and is believed to originate from a single cell whose genetic material has been influenced or damaged by some foreign agent. The changed cell divides and multiplies uncontrollably, transferring its damaged genetic material to its offspring cells. Eventually, a **tumour** develops and cells that would normally work together for the benefit of the tissue continue to multiply independently, starving other nearby cells of nourishment. This group of cells is now referred to as a **neoplasm**.

There are two quite different types of tumour.

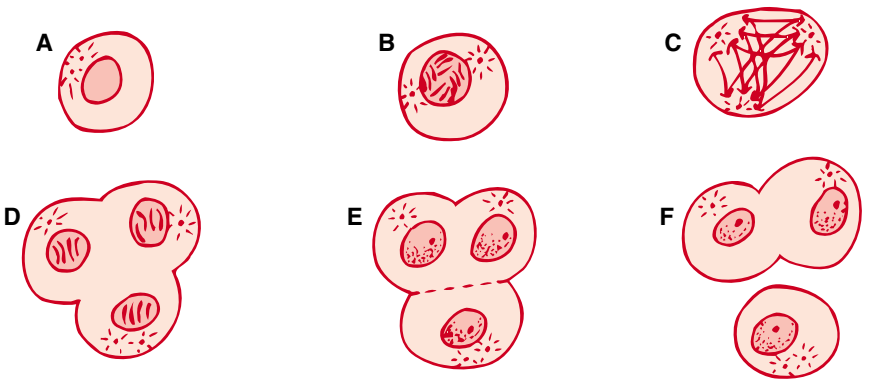
1. *Benign tumours* are not cancerous. They generally grow slowly, surrounded by a capsule that tends to control their spread. Usually, the cure is surgical removal. Benign tumours may cause some damage by robbing surrounding tissue of necessary nutrients, or interfering with the function of vital organs.
2. *Malignant tumours* are cancerous. Without the restraints of a controlled capsule, they can spread to other parts of the body, starve surrounding tissue of necessary nutrients and invade healthy tissues. These tumours cause sickness and death.

Metastases are secondary or new tumours. They may develop some distance from the original malignant tumour, because the malignant tumour has

the ability to invade surrounding tissues, blood vessels and lymphatic channels, spreading into either the bloodstream or lymph fluid and travelling to other parts of the body. Both metastases and malignant tumours are then capable of spreading to many sites throughout the body, thus affecting the whole body with the disease.



(a) An example of normal cell division



(b) An example of abnormal cell division

Figure 2.13: Differences between the formation of normal and cancerous cells

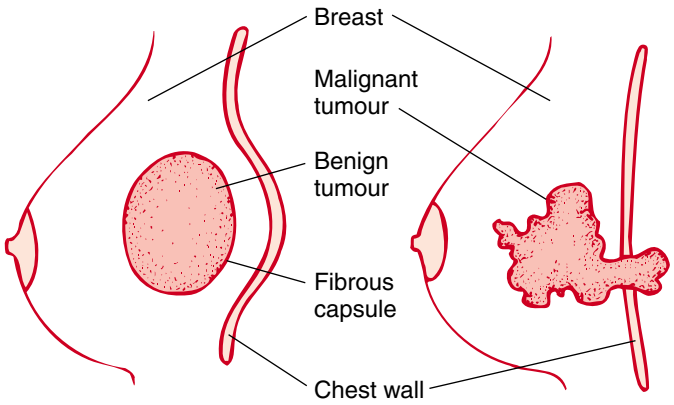


Figure 2.14: Malignant and benign tumours in the breast

Cancers are often incorrectly assumed to have their own peculiar cause, but this is not the case. Cancer can evolve from a variety of cell types, and affects many tissues and organs throughout the body.

Cancer is generally classified according to the type of cell in which it originates. Medical experts suggest that around 90 per cent of cancers are products of an individual's environment and lifestyle. **Carcinogens** are agents that are known to cause cancer. They include chemicals, pollution, radiation, cigarette smoke, dietary factors and alcohol. But the precise causes of cancer remain a mystery. Different countries experience different degrees of incidence of cancer in different body sites. Varying environmental factors from one country to another may play a major role in this variation in incidence.

Carcinogens are cancer-causing agents such as chemicals, pollutants, radiation, cigarette smoke and alcohol.

Table 2.2: Cancer classifications and sites

Classification	Site
Carcinoma	Skin; membranes lining the respiratory, gastrointestinal and urinary tracts; the breasts
Sarcoma	Bones; cartilage; muscles
Leukaemia	Blood-forming organs such as bones; the liver; the spleen
Lymphoma	Infection-fighting organs (glands and the spleen)

The extent of cancer in Australia

The prevalence of cancer in the Australian population is increasing. At current estimates, one in two males and one in three females will develop cancer before the age of 85.

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Incidence

Cancer is the only major cause of death in Australia that is increasing in incidence in both sexes. The most significant increases in the past two decades have been for breast cancer, skin cancer and melanoma (malignant skin cancer) and prostate cancer. The main reasons for the increases in incidence are:

- the ageing of the population
- better detection of cancer
- new diagnostic technology and screening programs
- better reporting of cancer (which is mandatory by health-care personnel).

The most common cancers in Australia are non-melanoma skin cancers, which are often self-detected and usually removed by a general practitioner. The most frequently occurring life-threatening cancers include:

- prostate cancer, colorectal cancer, melanoma and lung cancer in men
- breast cancer, colorectal cancer, melanoma and lung cancer in women.

Cancer occurs more frequently in males than in females, except among young and middle-aged women. The cancer rate in women in the 25–54 years age group is almost three times that in males in this age group, reflecting the prevalence of female cancers (cancers of the cervix, breast, ovary and uterus).

Mortality

Cancer accounted for 30 per cent of all deaths in Australia in 2010 — 33.1 per cent of male deaths and 26.5 per cent of female deaths. In 2010 the major types of cancer that account for deaths in Australia include lung, bowel, prostate, breast and pancreatic cancers.

Lung cancer is the major cause of cancer death. Lung cancer death rates have declined in men and increased in women (reflecting the rising number of female smokers since the 1940s), yet the male rates are still three times those of women.

The overall cancer mortality rate fell slightly from 1991–2010. The age standardised death rate for all cancers decreased by 17 per cent from 210 per 100 000 in 1991 to 174 per 100 000 in 2010. Cervical cancer rates have dropped significantly as a result of the success of the National Cervical Cancer Screening Program. There has been no change in death rates for prostate cancer and skin cancer. Cancer mortality rates could be reduced by changes to lifestyle (for example, not smoking and eating a balanced diet), increased knowledge and awareness of risk factors and symptoms, effective screening programs and early detection.

Men have a higher risk of being diagnosed with cancer and a higher risk of dying of cancer than women, largely reflecting the different gender patterns of food, tobacco and alcohol use. Men generally eat less nutritious diets, smoke and drink more than women, and work in more 'at risk' environments with greater exposure to environmental hazards.

The risk of developing cancer also increases with age, so Australia — with its ageing population and decreased total mortality rates — can expect the number of cancer cases to continue to rise. In 2010 the average age of death from cancer in Australia was 73, for both men and women.

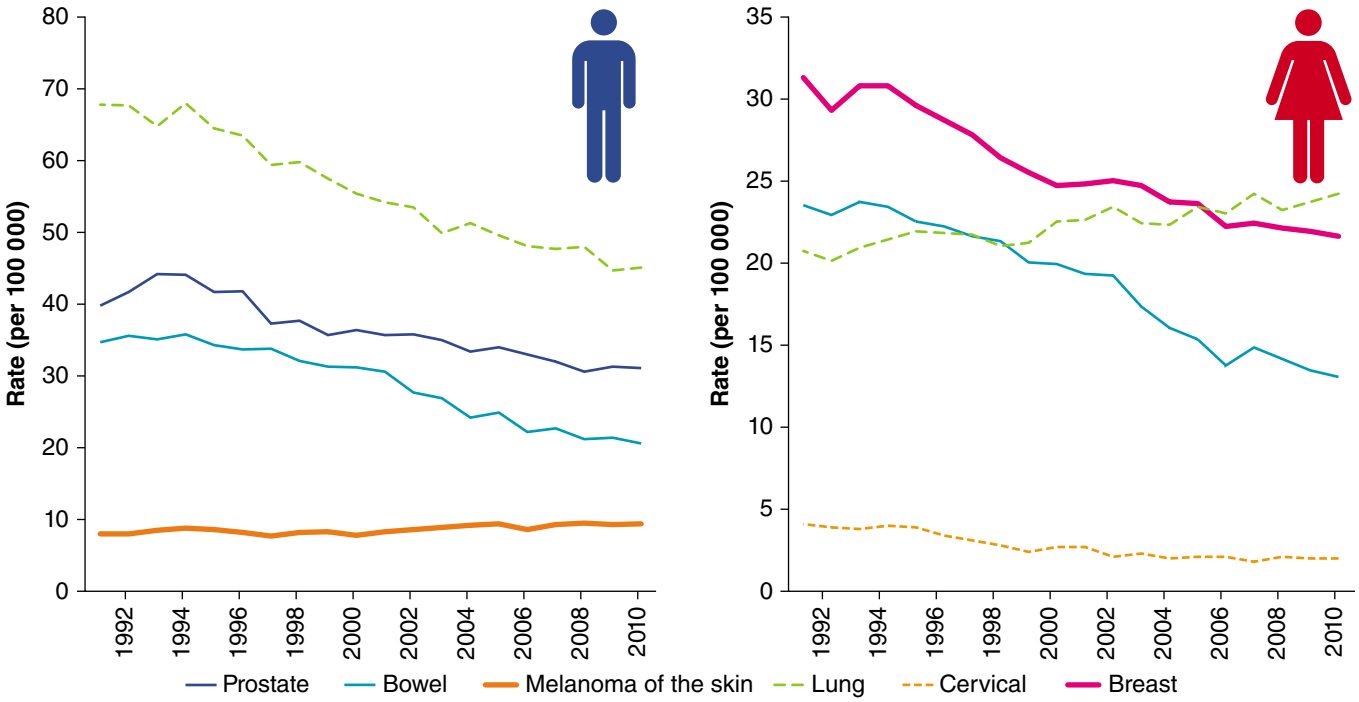


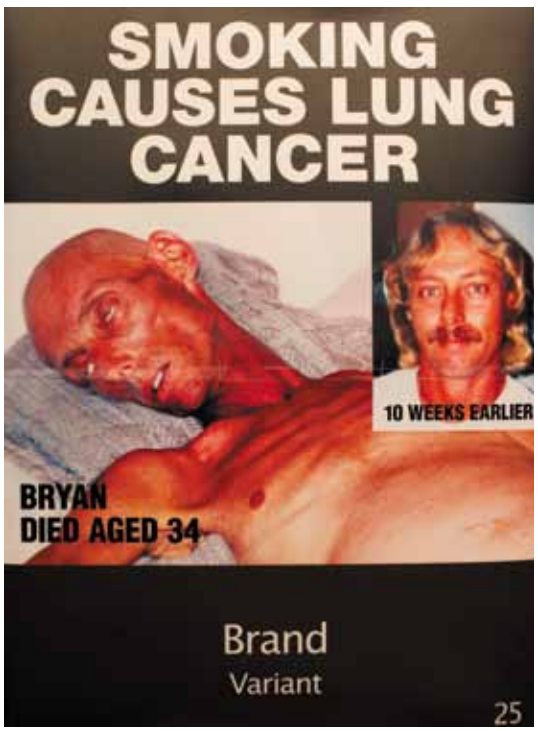
Figure 2.15 Trends in mortality, selected cancers 1991–2010 (*Source:* AIHW, *Cancer in Australia in brief 2012*, p. 18.)

INQUIRY

Cancer mortality trends

Examine the graphs on mortality from cancers in figure 2.15.

Write a paragraph to describe the trend in cancer deaths or men and women in Australia.



Lung cancer

Lung cancer is currently the leading cause of cancer deaths in Australia for men and women, yet it is largely preventable. It is the most commonly occurring type of cancer (apart from non-melanoma skin cancers). The female death rate, while considerably lower than that of men, is increasing. The number of females smoking has fallen only slightly in the past few years, so the future incidence of lung cancer in women is unlikely to fall as much as it has in men. Most lung cancers take considerable time to develop, but then the mortality rate is high once lung cancer has been detected. A large proportion of people die within the first five years of diagnosis.

The risk of developing lung cancer is 10 times higher among smokers than among non-smokers. The risk increases with the number of cigarettes smoked and the length of time a person has smoked. Young children and adolescents are particularly at risk because lung tissue is easily damaged by cigarette smoke.

Figure 2.16: An example of a recent health warning on a cigarette packet

Less than 10 per cent of all cases of lung cancer occur in non-smokers. In these cases, occupational hazards, air pollution and other environmental factors are linked to the incidence of lung cancer. However, these risk factors are minor compared with cigarette smoking.

Breast cancer

Breast cancer is the second most common cause of cancer-related death in Australian women, exceeded only by lung cancer. It was identified as the underlying cause of death in 2007 for 2680 women. Breast cancer affects one woman in 15 in Australia. As women grow older, both the risk and the incidence of breast cancer rises.

There is no known cause of breast cancer, yet a number of factors increase the risk — increasing age, a family history of breast cancer, a diet high in fat, obesity, menstruation starting at an early age, late menopause, and a late first pregnancy or not having children. If breast cancer is detected at an early stage, it is easier to treat and the woman has a better chance of survival. Regular **breast self-examination** for all women (especially those aged over 30 years) and **mammographic screening** every two years for women aged over 50 years are vital to reduce mortality from breast cancer.

Breast self-examination is a preventative action that involves palpating the breast with flat fingers to detect changes or abnormalities in the breast tissue.

Mammographic screening is a process of using a special x-ray of glands, fat and blood vessels under the skin of the breast to identify any variations from the normal or healthy tissue.



INQUIRY

Breast cancer survival

Read the snapshot 'Breast cancer survival improving, but 37 women still diagnosed each day', then answer the following questions.

1. In which age group are the majority of breast cancer cases diagnosed?
2. Why is the number of breast cancer cases expected to rise?
3. What is the current 5-year relative survival rate for breast cancer, and why has it improved over the last 30 years?

SNAPSHOT

Breast cancer survival improving, but 37 women still diagnosed each day

Survival rates for breast cancer nationally are improving, however, 37 Australian women are diagnosed with breast cancer each day, according to a report released today by the Australian Institute of Health and Welfare (AIHW) and Cancer Australia. The report, *Breast cancer in Australia: an overview,* shows the number of new breast cancer cases more than doubled from around 5300 to 13 600 cases between 1982 and 2008.

Breast cancer is the most common cancer in Australian women and the majority of cases (69%) are diagnosed in women aged 40–69. 'The number of women diagnosed with breast cancer is expected to rise in the future due to the ageing population. Our projections indicate that in 2020 about 17 200 new breast cancers will be diagnosed in Australia This would equate to 47 women being diagnosed every day,' Ms Bech said.

'Importantly, the report also shows that survival from breast cancer continues to improve in Australia, with these improvements due to both earlier diagnosis and better treatments,' Cancer Australia CEO Dr Helen Zorbas said. Between the periods 1982–1987 and 2006–10, 5-year relative survival from breast cancer increased from 72% to 89%.

Around 2700 women died from breast cancer in 2007 making it the second most common cause of cancer-related death for Australian women.

'Although survival rates are improving, the impact on the lives of Australian women is high with 7 women still dying each day from breast cancer,' Dr Zorbas said.

Source: AIHW, media release, 4 October 2012.

Basal cell carcinoma is a surface skin cancer that originates from the basal cells that underlie the surface cells. It is the most common type of skin cancer.

Squamous cell carcinoma is a surface skin cancer that originates in the squamous or surface cells. It is the fastest growing form of skin cancer.

Malignant melanoma is a cancer of the body cells that contain pigment (melanin) and mainly affects the skin.

Skin cancer

Skin cancer and sunspots (solar keratoses) are the most common of all skin diseases affecting Australians and our skin cancer rates are the highest in the world. The most common cancer in Australia in terms of incidence, skin cancer, is due to prolonged exposure to ultraviolet radiation. Its incidence has almost quadrupled in the past two decades. Approximately 50 per cent of lifetime exposure occurs in early childhood and adolescent years. The more common types include **basal cell carcinoma** and **squamous cell carcinoma**, which are not usually fatal (referred to as non-melanoma).

However, a significant number of deaths from **malignant melanoma** skin cancers could be avoided through skin protection and early detection. Melanoma of the skin is most common in both males and females aged 10–59 years. Malignant melanoma behaves like an internal cancer, and will spread to other parts of the body unless detected early and treated.

According to the Cancer Council of Australia, over 1400 Australians die from melanoma and non-melanoma skin cancer each year. In the majority of cases, the condition could have been avoided by using more rigorous sun protection strategies.



Figure 2.17: Basal cell carcinoma



Figure 2.18: Squamous cell carcinoma



Figure 2.19: Malignant melanoma

APPLICATION

Analysing skin cancers

Using the internet, research the most common types of skin cancer. For each type, write a short report outlining the:

(a) characteristics of the skin cancer

(b) common sites where it occurs

(c) strategies for its prevention.

SNAPSHOT

Men urged to watch their backs

Cancer Council Australia is issuing a stark warning to Australian blokes; every day, two men aged 45 or over die of melanoma. Men aged 45 and over are at more than double the risk of dying of melanoma than women the same age and yet they're still failing to take sun protection seriously.

Cancer Council research released today from the National Sun Protection Survey shows only 24 per cent of men aged 45–69 reported wearing sunscreen and 12 per cent — the equivalent of almost 400 000 men — still believe a tanned person is actually healthier.

Although melanoma can develop anywhere on the body, around 1 in 3 cases in men occur on the back.

Cancer Council Australia CEO Professor Ian Olver said this group were risking their lives.

'The earlier a skin cancer is caught, the less likely it is to have spread so getting someone to help check your whole body, including your back, is vital,' Professor Olver said. 'But older men can't afford to forget sun protection and just get checked — it's never too late to prevent further damage.'

'Men don't notice their skin the way women do and are less likely to visit their GP,' he said. 'So partners need to watch their men's backs — figuratively and literally.'

Melanoma patient Garry Callaghan, 60, from Loftus, NSW, agrees. 'I had a lump on my back that was irritating me and I could feel something rough next to it, so I asked my wife to have a look. She thought it looked abnormal and encouraged me to see a doctor.

'I was incredibly lucky to have found it in its early stages. I still have ultrasounds every three months to check it hasn't spread, but it looks as though it was caught early enough to save my life.'

Source: Cancer Council Australia, media release, 21 November 2012.

INQUIRY

Skin cancer prevention

1. Read the snapshot 'Men urged to watch their backs'. In small groups, discuss the issue of sun danger and how it relates to the incidence of skin cancer, particularly among men in Australia. List some actions that Australians can take to help reduce the high death rates from melanoma.
2. A health study by the New South Wales government in 2006 found that, at the state's high schools, only one in three boys and fewer than half the girls frequently used sunscreen. Examine the following table that summarises the findings and comment on the trends shown. Discuss the implications of the findings and any strategies that might help to address the problem.

High school students who stated frequent use of sunscreen

	1993	2002	2005
Males	54%	35%	36%
Females	71.5%	46%	49%

Risk factors and protective factors for cancer

The following summary lists the major risk factors for the most common cancers.

1. Lung cancer:
   - tobacco smoking
   - occupational exposure to cancer-causing agents (carcinogens such as asbestos)
   - air pollution.
2. Breast cancer:
   - a family history or personal history of the disease
   - a high-fat diet
   - early onset of menstruation
   - late menopause
   - obesity
   - benign breast disease
   - late age at first full-term pregnancy or childlessness.
3. Skin cancer:
   - fair skin that burns rather than tans
   - fair or red hair and blue eyes, combined with residence in high sun exposure areas
   - a high number of hours of bright sunlight at place of residence
   - prolonged exposure to the sun, especially as a child and adolescent
   - the number and type of moles on the skin.

Tobacco causes an estimated 30 per cent of all deaths from cancer, diet causes 10–70 per cent, sexual reproductive patterns cause seven per cent, occupational factors cause four per cent and alcohol causes four per cent.

Table 2.3: The sociocultural, socioeconomic and environmental determinants for cancer

Sociocultural determinants	• People with a family history of cancer are more at risk. • The incidence of lung cancer and cervical cancer is higher for Aboriginal and Torres Strait Islander peoples, as they tend to have higher rates of smoking at an earlier age and less access to health services than other Australians. • If your family practises health-promoting behaviours, such as adopting healthy eating habits, the risk of cancer is reduced.
Socioeconomic determinants	• People with a low socioeconomic status or who are unemployed have higher death rates because income can limit health choices, such as purchasing fresh fruit and vegetables. • People in occupations involving repeated exposure to carcinogens, such as asbestos, are more at risk of lung cancer. • People working outdoors, such as lifeguards, are more prone to getting skin cancer. • Those with a low socioeconomic status or who are unemployed have higher death rates as income can limit health choices, such as purchasing fresh fruit and vegetables and using exercise facilities. • People with low education levels are more at risk as poor education is linked to poor health choices and less knowledge about how to access and use health services.
Environmental determinant	People living in rural and remote areas are more at risk, as they tend to have less access to health information, health services such as Pap smears, and technology, such as breast screening devices.

The factors that protect an individual against the most common types of cancer include the following.

1. Lung cancer
   - Avoid exposure to tobacco smoke.
   - Avoid exposure to hazardous materials such as asbestos.
2. Breast cancer
   - Consume a diet high in fruits and vegetables, and low in fat.
   - Practise self-examination.
   - Have regular mammograms if over the age of 50 years.

3. Skin cancer
   - Avoid sunlight.
   - Reduce exposure to the sun by wearing a hat, sunscreen, protective clothing and sunglasses.

Groups at risk of developing cancer

Cancer, unlike cardiovascular disease, is a significant cause of death in all age groups. The following summary lists the groups at higher risk of developing various cancers.

1. Lung cancer:
   - cigarette smokers
   - people exposed to occupational or environmental hazards (asbestos, for example)
   - people working in blue-collar occupations
   - men and women aged over 50 years.
2. Breast cancer:
   - women who have never given birth
   - obese women
   - women aged over 50 years
   - women who have a direct relative (mother or sister, for example) with breast cancer
   - women who do not practise self-examination
   - women who start menstruating at an early age
   - women who have late menopause.
3. Skin cancer:
   - people in lower latitudes
   - people with fair skin
   - people in outdoor occupations
   - people who spend too much time in the sun without protection such as hats and sunscreen.



INQUIRY

Cancer

1. Explain the nature of cancer.
2. What are the trends in the morbidity and mortality rates of cancer? Discuss.
3. Predict the disease trends for lung, breast and skin cancer for males and females over the next 10 years. Consider current information and statistics.
4. Select one type of cancer. What are the risk factors for that cancer? What are strategies to reduce these risks?
5. What are the environmental determinants of cancer?

Injury

Governments and health authorities have paid particular attention to the area of injuries as this area affects all age groups and is often preventable. It places an economic, social and physical burden on the individual and the community. The consequences of injury can be short term or long term; for example:

- loss of physical function, permanent disability or death
- loss of productivity in the workplace
- emotional trauma for both the individual and their family
- reduced earning capacity
- the financial burden of medical and rehabilitation costs.

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The nature of injuries in Australia

Injuries are a major cause of preventable mortality and morbidity in Australia. Resulting from many different causes, they include:

- transport-related injuries
- suicide and self-inflicted injury
- interpersonal violence
- residential injuries as a result of falls, drownings, poisonings, burns and scalds
- industry-related injuries
- consumer product injuries
- sport and recreation-related injuries.

The extent of injuries in Australia

The impact of injury in Australia is revealed in the following profile.

- In 2010, deaths from injuries accounted for 6.2 per cent of all deaths in Australia.
- Nearly half of all deaths of people aged 1–44 were due to injury.
- It is the main cause of premature deaths, accounting for more potential life lost under 65 years than any other cause.
- Injuries accounted for over one in twenty of all hospitalisations in 2009–2010.
- It predominantly affects males (except in younger age groups). The male mortality rate from injury is more than twice the female rate.
- Death rates from unintentional injuries are declining but those from intentional injuries are increasing (see the section on suicide, page 60).

Table 2.4: Hospitalisations and hospitalised cases due to injury, 2009–2010

	Males		Females		Persons	
External cause of injury	**Number**	**Per cent**	**Number**	**Per cent**	**Number**	**Per cent**
Unintentional						
Falls	68645	28.3	86332	48.3	154977	36.8
Transportation	36139	14.9	16679	9.3	52818	12.5
Poisoning, pharmaceuticals	2993	1.2	3156	1.8	6149	1.5
Exposure to heat, fire, smoke and hot substances	3776	1.6	2042	1.1	5818	1.4
Poisoning, other substances	1644	0.7	1089	0.6	2733	0.6
Drowning and submersion	351	0.1	178	0.1	529	0.1
Other unintentional(d)	94118	38.8	39118	21.9	133237	31.6
Total unintentional	*207666*	*85.6*	*148594*	*83.1*	*356261*	*84.5*
Intentional						
Self-inflicted	9537	3.9	16148	9.0	25685	6.1
Inflicted by another person	17165	7.1	5798	3.2	22963	5.5
Total intentional	*26702*	*11.0*	*21946*	*12.2*	*48648*	*11.6*
Undetermined intent	3031	1.3	2608	1.5	5639	1.3
Other and missing	5079	2.1	5438	3.0	10517	2.5
Total	**242478**	**100.0**	**178586**	**100.0**	**421065**	**100.0**

*Rates = number of deaths per 100 000 persons

Source: AIHW, *Australia's health 2012*, p. 291.

Suicide, transport injury and falls are the leading causes of injury death. Other injuries were due to violence, drownings, poisoning, fires, homicide and machinery injury.

Transport injuries

Deaths due to traffic accidents have declined substantially since the 1970s. Transport injury deaths of males fell from 53 deaths per 100 000 males in 1970 to 13.1 deaths per 100 000 in 2004–2005 (and from 14 female deaths per 100 000 females in 1970 to 4.6 per 100 000 females in 2004–2005). The 15–24 years age group has the highest risk of death from motor vehicle accidents and males of these ages are at greater risk of dying than are females. People in this age group die primarily as drivers and passengers in motor vehicles and as motorcyclists.

Hospital admission rates from injury peak among those aged 15–19 years, whereas fatalities peak among those aged 20–24 years. Blood alcohol levels over the legal limit, driving speed and driver fatigue have been associated with many of the deaths of car drivers and motorcyclists.

Road users aged 0–14 years die primarily as passengers in motor vehicles, pedestrians and cyclists. Many victims in this age group died as a result of either the incorrect use of restraints or no use of restraints or helmets. People in older age groups are more likely to be killed indirectly, as pedestrians for example.

Not only are the premature deaths and the loss of many 'potential life years' of concern. Many young people in traffic accidents are afflicted with chronic disabilities such as head and spinal injuries. The resulting cost can be both economic — where the individual occupies a hospital bed and requires medical treatment — and social — where the individual, their family and their friends endure great emotional suffering.

Government legislation of seatbelts (compulsory since 1970), speed limits and drink driving laws (with random breath testing from 1982), for example, have contributed to a substantially reduced road toll. Other factors contributing to the decline include improved vehicle safety, better road engineering, motorcycle and bicycle helmet legislation, more restrictions on P plate drivers and better road safety education.



APPLICATION

Compiling a table

Research current data on transport-related injury as a leading cause of injury, death and disability. Compile a table of information, including:

(a) the type of accident/injury (for example, injury of driver, passenger or pedestrian)
(b) the morbidity and mortality rates
(c) the age group at risk
(d) risk factors for each identified age group.



INQUIRY

Transport-related injury

1. Discuss the reasons for the high incidence of specific transport-related injuries.
2. What social factors have an impact on transport-related injury among those aged 15–24 years? Discuss.
3. Why has the injury death rate fallen since the mid-1980s?
4. What health promotion strategies have contributed to the reduction in transport-related injuries? Discuss.
5. How has public policy influenced mortality rates from injury? Provide examples.

Childhood injuries

Children are exposed to a variety of settings where there is a risk of injury or poisoning, including school, home, streets, neighbourhoods and sporting

environments. Injury, encompassing accidents, poisoning and violence, is the major cause of death for 0- to 15-year-olds. Fifty per cent of childhood injury deaths occur to children aged under 5 years.

The childhood death rate attributable to poisoning, motor vehicle accidents and drowning has fallen significantly over recent years. This reduction reflects health promotion campaigns that have raised public awareness about correct and safe behaviours and advocated changes in public policy (such as a lower speed limit in school zones).

Transportation injuries are the most prominent type of injury in childhood. Drowning, burns and scalds also occur in high numbers in the 0–4 years age group, while suicide and sporting injuries are prevalent among 10- to 14-year-olds.



INQUIRY

Childhood injury

1. What factors contribute to the high incidence of transport-related injury in childhood? Discuss.
2. Explain the reasons for the reduction in motor vehicle injury and drowning statistics. Discuss strategies that could be used to further reduce these statistics.
3. Why are children aged 0–4 years so vulnerable to injury?

Risk factors and protective factors for injury

The New South Wales Joint Standing Committee on Road Safety suggested in its STAYSAFE report that the following major factors are among the contributors to unsafe driving and high rates of crashing by novice drivers.

1. *Competing objectives*. Drivers trade safety for other benefits such as mobility, comfort and status — for example, carrying more passengers than the number of seatbelts allows.
2. *Complacency or impunity*. A feeling that 'it won't happen to me' is common.
3. *Power and encapsulation*. A car's power can be misused by some drivers to 'show off', and car occupants can distract the driver, discouraging awareness of other road users.
4. *Lack of judgement*. Many novices underestimate risk and overestimate their driving ability in overtaking, for example. They tend to attribute accidents to other people or bad luck rather than their own inexperience.
5. *Overload*. In complicated situations when a number of things happen at once, novices tend to respond with bad decisions and erratic manoeuvres.
6. *Traps in the system*. The road system is complicated. Novices are particularly vulnerable to the difficulties of the many and varied rules and traffic conditions.
7. *Social and psychological problems*. Novice drivers are more at risk, given factors such as a strong peer influence, their attitudes towards risk, their social immaturity and their physical mobility.
8. *Social norms*. Social norms such as drinking alcohol, speeding and not wearing seatbelts, which are defined by parents, adults and hero figures, may encourage dangerous behaviour.

The factors that protect against motor vehicle accidents include:

- adhering to road safety rules
- not driving when fatigued or under the influence of any drugs, including alcohol

- obeying laws such as using seatbelts and driving at or below the speed limit
- regular road and vehicle maintenance
- reducing distractions in the car such as mobile phones and loud noise.

The risk factors for childhood injuries include:

- inadequate child supervision
- an unsafe environment, such as a lack of adequate pool fencing and exposure to poisons
- not adhering to road safety rules.

Protective factors for childhood injuries include:

- wearing seatbelts and restraints when in motor vehicles
- adequate child supervision
- pedestrian safety
- wearing helmets when riding bikes
- maintaining a safe home environment, such as keeping poisons away from children.

When serious injury occurs, the availability of effective care and rehabilitation services can increase chances of survival and promote a faster recovery for the individual affected.

Table 2.5: The sociocultural, socioeconomic and environmental determinants for injury

Sociocultural determinants	• Injury hospitalisation rates are higher for indigenous children compared to non-indigenous children. • An indigenous person is three times more likely to die in an accident than a non-indigenous person, due to less access to treatment and low education levels. • Media exposure of laws relating to road use and consequences of road trauma has helped reduce injury rates from traffic accidents.
Socioeconomic determinants	• Males aged 25–64 years from areas of most disadvantage are 2.2 times more likely to die in traffic accidents and 1.6 times more likely to die from suicide compared to those living in areas of least disadvantage. For females, it is 2.2 times more for traffic accidents and 1.3 times more from suicide. People with less income are more likely to engage in risk-taking behaviour and are less likely to be able to afford vehicle maintenance. • People who are unemployed, or who have less income, may not be able to afford safety devices in the home to help prevent childhood injuries.
Environmental determinants	• People working in rural areas are more at risk of workplace injuries, as they are more exposed to dangerous machinery. • People in rural areas are more at risk of suicide, due to lower employment rates in remote areas and less access to support networks.

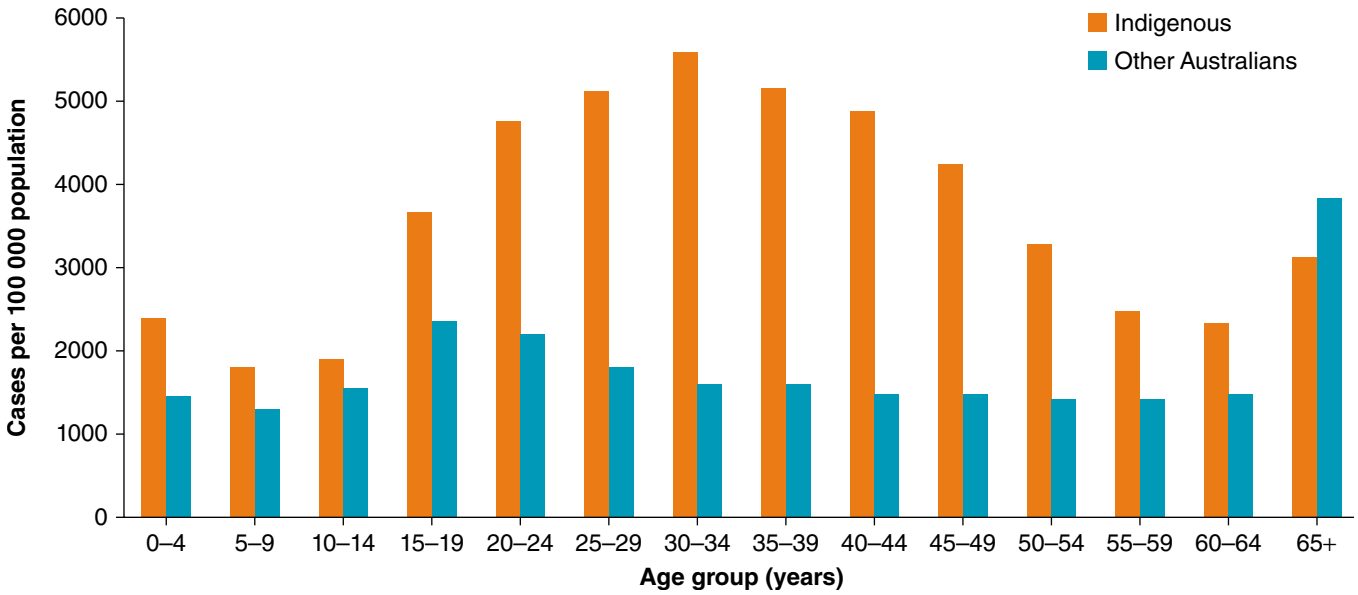


Figure 2.20: Hospitalised injury by indigenous status and age, 2009–2010



APPLICATION

Determinants for injury

Choose a type of injury besides transport and childhood injuries. Research the relevant sociocultural, socioeconomic and environmental determinants for your chosen type of injury and compile them in a table.

Groups at risk

Certain groups are more prone to certain injuries. These include:

- the elderly (at risk of falls)
- children (at risk of poisoning, road trauma, drowning, violence, burns and scalds)
- adolescents (at risk of suicide and traffic-related injuries)
- people living in rural and remote areas (at risk of workplace accidents).

Mental health problems and illnesses

The impact of mental illness on people's level of health and well-being was underestimated until recently. Previously, the stigma and suspicion attached to the notion of mental illness have been barriers to the effective treatment and prevention of this widespread problem.

The nature of mental illness

Examples of mental health problems and illnesses include depression, **schizophrenia**, personality disorders, major depression and post-traumatic stress disorder. These illnesses cause much suffering for those directly affected and often for their family/carers and social network.

Schizophrenia affects the normal functioning of the brain. It is characterised by psychotic symptoms and a reduced range of expressions of emotion.

Poor mental health in childhood and adolescence may underpin a lack of self-care in adulthood. Drug abuse, physical neglect and early pregnancy are examples of poor health choices that may result. Mental health disorders in children and young people are a strong indicator of poor mental health in adulthood.

SNAPSHOT

Your mental health

Your mental health is a state of coping, feeling good and being in control of your life. The US Surgeon General describes mental well-being as 'the successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with adversity'. If you start to feel frayed around the edges, swamped with work and responsibilities, or emotionally flat and uninterested in the world around you, your mental health is suffering. 'Mental health' means an absence of mental 'illness' but there is much more to it — it is about living life to your full potential, even when you do have a diagnosis of mental illness.

Humans are complex beings, with a variety of emotional, physical and spiritual capacities and needs. Because of the pressures and stresses of life, it is often difficult to maintain our balance by nurturing those capacities and needs. As a result, we may neglect important parts of ourselves, sometimes our feelings, sometimes our bodies, sometimes our minds. All of us, whether we have been diagnosed with a mental illness such as depression or anxiety, or if we experience stress and the blues occasionally, need to be aware and take responsibility for our mental health.

Various factors either contribute to or challenge our ability to look after our 'whole person'. These factors include our degree of self-discipline, how aware we are of our feelings and thoughts, how well

(continued)

we know ourselves. Factors outside ourselves include the nature of our home and work environment, our financial situation, the current state of our relationships with important people in our lives — friends, partners, families and work colleagues. The quality of our mental health varies depending on our experience and circumstances. Periods of emotional or financial stress can take their toll on mental health. Working our way through life's difficulties can help us to grow in our emotional life and self-esteem, so that we are even better prepared for future challenges.

If the tension gets too much for us to cope with, however, it can cause us to 'break down' emotionally or mentally, that is, not be able to carry on our lives in health. At these times, we may need to ask for help or support while we adjust. Many people live with disability, including physical illness or mental illness, and cope in a healthy way. The challenge for all of us is to search out new ways to cope.

Try this quiz about your mental health

How many of the following do you experience in your life at the moment?

- The ability to love and be loved
- A feeling of security and belonging
- Spontaneity and a range of emotional responses
- The ability to trust
- The ability to take responsibility for your own feelings and behaviour
- The ability to accept criticism
- A rich fantasy world enabling creativity to flourish
- A degree of self-knowledge to enable the repair of the self, following harm
- The ability to learn from experience
- The ability to express thoughts and feelings
- The ability to risk enchantment and a sense of awe
- A feeling of comfort with your sexuality
- A sense of humour to help savour the joy of living and to compensate for pain and loss.

The essence of mental health is hard to define as it involves so many aspects of ourselves and differs for all of us. However, healthy people generally have some of the above . . .

An important factor in maintaining good mental health is 'resilience' — the ability to cope with difficulties and 'bounce back'.

Here are some ideas on things you can do to maintain your mental health.

Talk

Talking to friends, family or a counsellor about your thoughts and feelings can help sort out problems. It can also help relieve stress and anxiety if you are experiencing them.

Eat, sleep and exercise properly

When anxious or under stress, we often neglect ourselves. We don't eat nutritious food, don't exercise and don't sleep properly.

Relax

Most of us need to learn how to relax. There are a number of techniques, and you may choose which one most suits your personality and lifestyle. There are plenty of books, tapes and courses available on relaxation.

Seek help

Sometimes a problem is hard to solve alone or with the help of friends and family. At these times it can be important to get professional help or advice. There are many people you can turn to — your family doctor, community groups, psychiatrists, nurses, occupational therapists, a member of your local church, psychologists, social workers or counsellors.

Think and feel

We are bombarded daily with many demands and sometimes we don't take time to think. Some pause for reflection each day helps us to get to know ourselves, to gain some perspective on life and to develop a positive outlook. It is also important to acknowledge our feelings and not be afraid of them.

Read a book

In recent years, many books on personal growth have made best-seller lists. These books challenge and educate us to learn more about ourselves and to review how we look at the world and how we relate to others. For some people, reading these books can be a life-altering experience leading to more fulfilling relationships and richer lives.

Source: Extracts from a fact sheet produced by the Mental Health Information Service NSW (1300 794 991).

The information provided is to be used for educational purposes only. It should not be used as a substitute for seeking professional care in the diagnosis and treatment of mental health disorders.

The extent of mental illness in Australia

The scope of mental illness in Australia was estimated in 2007 in the National Survey of Mental Health and Wellbeing as part of the National Mental Health Strategy. According to the survey:

- an estimated 20 per cent of Australian adults had experienced the symptoms of a mental disorder in the 12 months prior to the survey
- another 25 per cent of Australian adults had experienced a mental disorder at some stage in their life
- women were more likely than men to have had symptoms of anxiety disorders
- men were more than twice as likely as women to have symptoms of substance use disorders
- young adults aged 16–24 years had the highest prevalence of mental disorder (26 per cent), which could be related to high rates of substance abuse
- the prevalence of mental disorders decreased with age (except for mental disorders such as dementia and **Alzheimer's disease**, which have a high prevalence in the aged population)
- women were more likely than men to have mood disorders such as depression, particularly women aged 18–24 years.

Alzheimer's disease is a progressive mental illness that results in communication blockage between nerve cells, disrupting brain function and corroding memory.

More recent data were obtained by the Australian Bureau of Statistics for the *National health survey* 2004. Some of the results are shown below. Note, however, that respondents to this survey based responses to some degree on self-diagnosis; that is, they had not necessarily been diagnosed with a mental health condition by a medical practitioner.

- About 3 million (or 13.6 per cent) of Australians said they suffered from a long-term mental or behavioural problem. Mood disorders, such as depression, were most prevalent, reported by 2.1 million or 9.7 per cent of the population. By age group this represented:
  – 6.2 per cent of children under 15 years
  – 13.2 per cent aged 15–24 years
  – 27.3 per cent for people aged 65 and over.
- About 13.8 per cent of respondents aged 0–34 and 32.6 per cent aged 35–44 said they used medication for mental well-being.

According to the AIHW (in the *National Mental Health Report 2007*), around 13 per cent of the disease burden was due to mental illness. It ranks third after heart disease and cancer as the largest disease burden. It is a national health priority area because of the extent of its impact and because it is possible to reduce this impact through prevention and treatment.

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INQUIRY

Mental health problems and illnesses

1. In the past, mental health problems and illnesses were often ignored or hidden. Mental health is now identified as a priority for action by governments and health authorities. What do you think may be the reasons for this change in attitude and understanding?
2. List some types of mental health problems.
3. How prevalent is mental illness in Australia?
4. What strategies could be used to reduce the prevalence of mental health issues? Discuss.

Suicide is an intended self-inflicted injury that is fatal.

Parasuicide is an attempted suicide that is not fatal and is often impulsive.

Suicide

Suicide is an intended self-inflicted injury that is fatal. For the person who takes their life, suicide is a perceived solution to a seemingly unresolvable problem. Drugs or violence is usually involved in this premeditated act.

Parasuicide is attempted suicide that is non-fatal; it is often impulsive and usually involves a drug overdose.

The following profile is an overview of suicide in Australia.

- Suicide is now the leading cause of fatal injury in Australia, having overtaken motor vehicle accidents in 1991. It accounted for 25 per cent of all injury deaths in 2010.
- Australia has the highest rate of youth suicide recorded in industrialised countries and suicide is the leading cause of death (after transport accidents) of people aged 15–24 years in this country (23 per cent of deaths of 15–24 year olds).
- Suicide or intentional self-harm was the cause of death of 1814 males in 2010 (2.5 of all male deaths).
- Rural male youths have significantly higher rates of suicide than those of urban youths.
- The male age groups with the highest rates of suicide are the 15–24 years and 25-34 years age groups.
- Female deaths from suicide (545 in 2010) appear to have remained fairly stable over the past two decades. Yet, the data may not reflect the true situation. Women tend to favour non-violent forms of attempted suicide, which have an increased chance of discovery and effective intervention. In 2009–2010, the highest rate of hospitalisations due to intentional self-harm were of females aged 15–19 years (371 per 100 000 persons). For males, the highest rates were in the 30–34 age group.
- The number of recorded suicides has shown a downward trend since 1997. However, the number recorded is likely to be lower than the actual figure because suicides are often undercounted and are sometimes recorded under other causes of death (such as road accident or alcohol/drug-related deaths).



INQUIRY

Suicide risk factors

Read the snapshot 'Suicide the main cause of death for Australians aged 15 to 34', then answer the following questions.

1. Which groups of Australians are most at risk of dying from suicide?
2. What is the trend for suicide rates, and what is the likely reason for this trend?
3. Identify the key factor in suicides among children and adolescents.

SNAPSHOT

Suicide the main cause of death for Australians aged 15 to 34

by Natasha Bita

Young Australians are more likely to kill themselves than die from an illness or accident, the Health Department has told a Senate inquiry into suicide. And most suicides among children and teenagers appear to be 'copycat' killings. Indigenous people are three times more likely than other Australians to commit suicide, and residents of remote areas are twice as likely to kill themselves than big-city residents.

The number of suicides has plunged 30 per cent in a decade — yet more people kill themselves each year than die of skin cancer or in car crashes. In its submission to the Senate inquiry, the Health Department says suicide is the main cause of death for Australians aged 15 to 34. Men account for three in every four suicides. Suicide rates have fallen 30 per cent, due to firearm controls, detoxification of domestic gas supplies, the phasing out of barbiturate drugs and a reduction in the toxicity of car exhaust fumes from new cars with catalytic converters.

In Aboriginal communities, 3.7 per cent of deaths are through suicide — triple the rate among the non-indigenous population.

'There is an acute and chronic need for targeted programs that address the circumstances of indigenous Australians,' Associate Professor Ted Wilkes, of the institute's Aboriginal research team, says in a submission.

'Of particular concern and cost to indigenous communities is the presence of contagion effects which can result in suicide clusters.'

Queensland's Commission for Children and Young People and Child Guardian — a state government agency — has told the Senate inquiry that 'contagion', or copycat suicide, is a key factor in 60 per cent of suicides among children and adolescents, who took their own lives after the suicide or attempted suicide of a friend, relative or community member.

Source: *The Australian*, 21 December 2009.

Depression

Depression is one of the most common types of mental illness, and it is something that many people suffer from at some time in their lives. Depression is diagnosed according to a range of signs and symptoms. It is characterised by overwhelming feelings of sadness and despair, and can range in severity from mild depression to major depression.

We all suffer from normal depressed moods throughout our lives. These moods occur as a result of negative experiences such as relationship break-downs, loss of a loved one, or personal or work-related stress. We react to these negative experiences in a normal way by feeling sad, upset, angry, anxious or lethargic. Generally, though, we recover from these experiences. It is when these negative feelings persist that mild chronic depression may result. Mild depression is characterised by:

- chronic depressed mood
- poor self-esteem
- loss of interest
- decreased energy
- feelings of sadness
- low-level symptoms of major depression.

Major depression is characterised by:

- feelings of despair and hopelessness
- loss of interest in life
- inability to feel pleasure
- loss of appetite or weight
- irritability or agitation
- insomnia
- feelings of guilt
- difficulties with decisions
- poor concentration.

Risk factors and protective factors for mental health

Suicide is a particularly complex problem. Many reasons for suicide have been suggested, including:



Figure 2.21: Mental health disorders can include short-term anxiety and depression.

- *depression*, possibly associated with perceived failures, difficulties in personal relationships, unemployment and family dysfunction among younger people
- *mental illness*, such as schizophrenia
- *physical illness*, such as terminal illnesses in the aged
- *marginalisation of some groups*, such as people in prison custody
- *social isolation*.

Attempted suicide is considered to be a precursor to completed suicide and thoughts of suicide (including an expression of intent) are a strong risk indicator for attempted suicide.

The protective factors for suicide include:

- effective clinical care for mental, physical and drug abuse problems
- easy access to a variety of clinical interventions and support groups
- strong family connections or connections with others such as friends or work colleagues
- enhancing **resilience** and skills in problem solving
- early detection and treatment for mental health problems
- restricted access to means of harming yourself, such as prescription medications and firearms.

Resilience is the capacity to recover quickly from depression, illness or misfortune.

Depression can be triggered by a number of factors, both physical and psychological. These include:

- mental illness
- chemical changes within the brain
- drug and alcohol abuse
- life stresses such as loss of a loved one or work stress
- high anxiety
- negative experiences.

Often, major depression can occur without any triggering factors. People with major depression suffer unbearable misery and are at risk of suicide. Statistics reveal that an estimated 25 per cent of sufferers of major depression attempt suicide.

Depression is a major health concern that is treatable. Because the symptoms are many and varied, it takes professional judgement to diagnose depression. Depression can be treated with prescribed antidepressants or psychological therapy.

Organisations such as beyondblue (www.beyondblue.org.au) and its youth program Ybblue (www.ybblue.com.au) provide information and raise awareness of depression as an illness that can be successfully treated. In addition, strong peer networks and family relationships foster a sense of belonging and tend to act as effective protective factors for depression.



Figure 2.22: Good relationships in families can be a protective factor against depression.

Table 2.6: The sociocultural, socioeconomic and environmental determinants for mental health problems

Sociocultural determinants	• Aboriginal and Torres Strait Islander peoples are more at risk of suicide and depression, due to higher levels of drug and alcohol abuse, compared to other Australians. • People with a family history of mental illness are more at risk. • People who have had a falling out with peers, or who have been exposed to bullying, are more at risk.
Socioeconomic determinant	People with a low socioeconomic status or who are unemployed have higher rates of mental health problems, as these groups tend to engage more in substance abuse, compared to those of a higher socioeconomic status.
Environmental determinant	Rural, young males are at a higher risk of suicide than urban, young males because they have less access to support services and fewer job prospects.

Groups at risk of suicide

The following groups are at risk of suicide:

- people suffering chronic depression
- elderly people
- people with a physical illness, particularly a terminal illness
- alcoholics
- people who have made previous suicide attempts
- people who talk about ending their lives
- teenagers, particularly those for whom life seems to be worthless
- young gay and lesbian people.

Diabetes

There are several types of diabetes but they are generally characterised by the body's inability to break down and use sugar. The incidence of diabetes in Australia has increased over the past 10 years.

The nature of diabetes

Diabetes mellitus is a condition affecting the body's ability to take glucose from the bloodstream to use it for energy.

Diabetes (also called **diabetes mellitus**) is a condition affecting the body's ability to take glucose (sugar) from the bloodstream to use it for energy. The human body converts sugar into glucose, which under normal circumstances the body uses as energy. To perform everyday activities, the body needs a constant supply of glucose circulating in the blood. The body is generally able to maintain this glucose level within acceptable limits. The glucose must be both in the circulating blood and able to pass into the body's cells. The pancreas produces a chemical called **insulin** to enable glucose to pass into our cells. If the pancreas functions poorly, then it produces insufficient insulin and glucose cannot enter the cells. The glucose then builds up in the blood, finally passing into the urine (via the kidneys) and thus eventually leaving the body.

Insulin is a hormone produced by the pancreas that helps glucose to enter the body cells and be used for energy.

People who suffer from diabetes are referred to as diabetics and they must deal with their body's inability to produce either enough insulin or any at all. Sufferers can have either insulin-dependent diabetes (type 1) or non-insulin-dependent diabetes (type 2).

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Insulin-dependent diabetes mellitus — type 1

In this type of diabetes, the body produces minimal amounts of insulin or none at all. Sufferers can control this condition by injecting an artificial supply of insulin. Symptoms of this form of diabetes include unusual thirst, excessive passing of urine, weight loss, and weakness and fatigue. Children and young adults who develop diabetes generally develop this type. The exact causes of diabetes are unknown. Type 1 diabetes is an autoimmune disease (when the body starts attacking its own tissues), which may be triggered by a virus or environmental factors.

Non-insulin-dependent diabetes — type 2

In this type of diabetes, the pancreas has the ability to produce insulin but the amount is insufficient and/or the insulin is less effective. The treatment for this type of diabetes can be achieved through healthy eating, regular exercise and, where required, medication and/or insulin injections.

Type 2 diabetes most commonly occurs in adults over the age of 50 years but is increasingly being found in younger people, including adolescents. This is thought to be related to lifestyle factors, including inactivity and unhealthy food choices. Type 2 diabetes sometimes presents no symptoms and can remain undiagnosed for years. Excess weight seems to play a vital role in the development of this form of diabetes. When the body weight is in the normal weight range, the pancreas appears to produce sufficient insulin. Excess body mass places greater strain on the bank of insulin and the amount produced is generally insufficient to cope with the increase in demand.

Physical activity and healthy eating may keep most cases under control. However, tablets and/or insulin injections may become necessary to help control the condition. The tablets are not an insulin substitute and cannot be used by an individual suffering from type 1 diabetes.

Gestational diabetes is a form of diabetes that occurs in pregnancy and in most cases disappears after the birth, but the woman has an increased risk of developing diabetes later in life.

The extent of diabetes in Australia

Recent trends illustrate the impact of diabetes in Australia.

- The incidence of diabetes has risen significantly over the past 20 years. In 2007–08, 898 800 people or 4.1 per cent of the Australian population reported that they had medically diagnosed diabetes. This increase is thought to be due to an increased prevalence of obesity in Australia.
- The prevalence of diabetes increases with age.
- Australia's diabetes prevalence is high compared with that in other countries — we rank seventh among 30 countries.
- The rate for diabetes was higher for males than females in most age groups.
- Aboriginal and Torres Strait Islander peoples have one of the highest prevalence rates of type 2 diabetes in the world. Available data suggest that the overall prevalence among adults is between 10 and 30 per cent of the Aboriginal and Torres Strait Islander population.

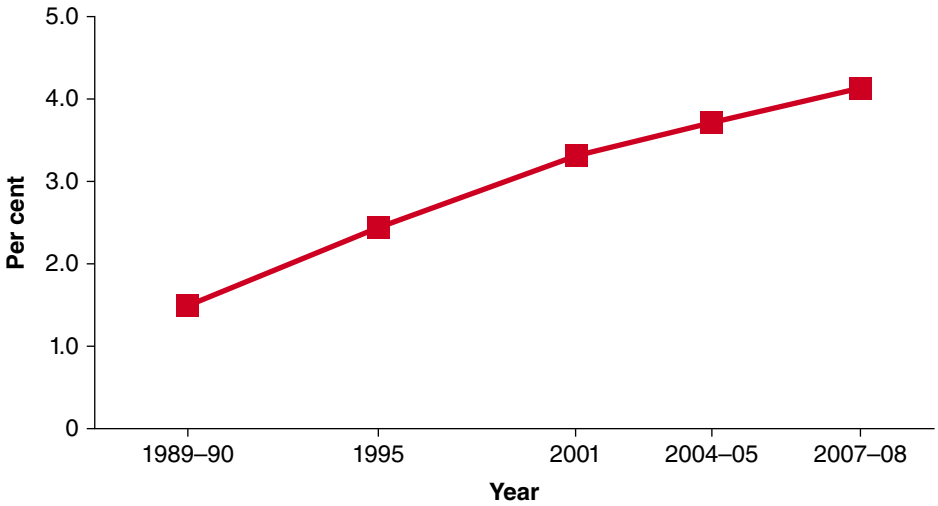


Figure 2.23: Trends in the prevalence of self-reported diabetes, 1989–90 to 2007–08 (*Source:* AIHW, *Australia's health 2012*, p. 302.)

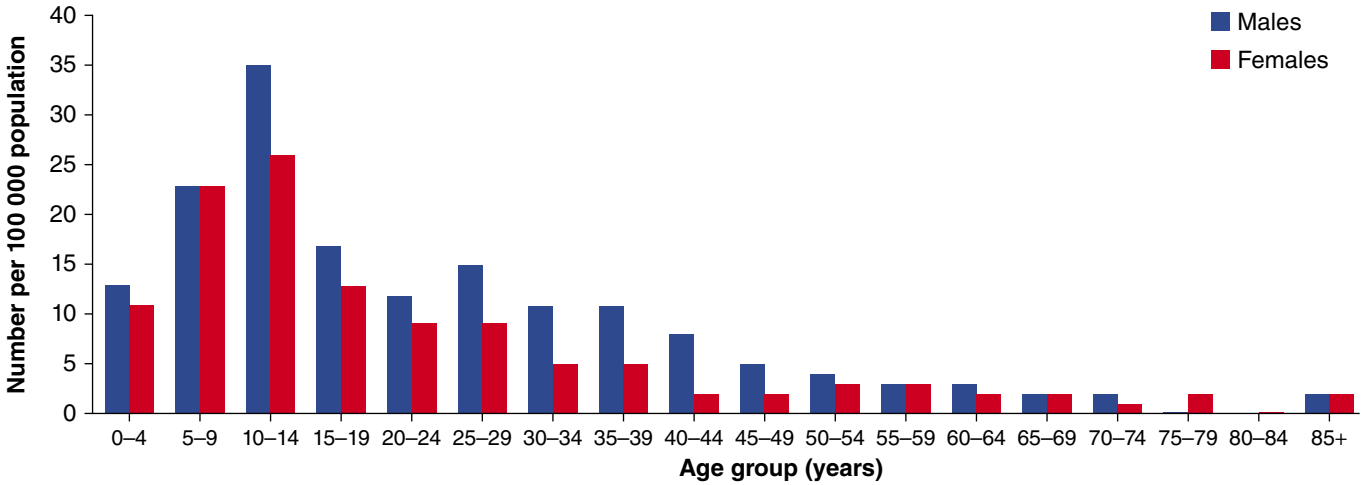


Figure 2.24: Incidence of Type 1 diabetes, by age at first insulin use and sex, 2009 (*Source:* AIHW, *Australia's health 2012*, p. 300.)

- People with diabetes experience reduced life expectancy and are more likely than people without diabetes to experience major health complications involving the eyes, kidneys, nerves and arteries.
- Diabetes can contribute to coronary heart disease, stroke and vascular disease. Female diabetics are four times more likely than non-diabetics to develop coronary heart disease and male diabetics are two times more likely. Strokes are four times more common in diabetics than in non-diabetics.
- Diabetes is also a major contributing factor to blindness, cardiovascular disease, kidney failure and limb **amputation**.
- Women who develop diabetes during pregnancy have an increased risk of developing diabetes in later life. They also have an increased risk of stillbirths and congenital malformations if the diabetes is not controlled during the pregnancy.
- Seventy-seven per cent of diabetics have type 2 diabetes, the onset of which is related to lifestyle factors such as body weight, dietary intake and physical activity.
- Diabetes may be under-reported on death certificates, especially for older people with circulatory diseases.

Amputation is the surgical removal of all or part of a limb.



Figure 2.25: People with insulin-dependent (type 1) diabetes must check their blood glucose levels several times a day as part of the management of their condition.

Risk factors and protective factors for type 2 diabetes

Non-insulin-dependent diabetes (type 2) is associated with:

- being over 45 and having high blood pressure
- being over 45 and overweight
- being over 45 and having one or more family members with diabetes
- being over 55
- having had heart disease or a heart attack
- having had diabetes during pregnancy (gestational diabetes)
- having a borderline high blood glucose test or impaired glucose tolerance (IGT)
- having polycystic ovary syndrome (PCOS) and being overweight
- being over 35 and being an Aboriginal person or Torres Strait Islander
- being over 35 and having a Pacific Island, Indian or Chinese cultural background.

People in the above categories are encouraged to undertake a healthy lifestyle to reduce their risk and to speak to their doctor about a blood test.

The number of people being diagnosed with type 2 diabetes is growing and it is being diagnosed at a younger age, even in teenagers. Maintaining a healthy body weight and achieving a healthy lifestyle, in particular a balanced diet and regular physical activity, can assist in reducing the risk of developing type 2 diabetes.

Healthy eating advice for both the prevention and management of diabetes is the same as that for all Australians — that is, a diet low in saturated fat, high in fibre and based on a wide variety of nutritious foods. The Australian dietary guidelines (below) provide the foundation for a healthy diet.

- Enjoy a wide variety of nutritious foods
- Eat plenty of breads and cereals (preferably wholegrain), vegetables (including legumes) and fruits.
- Eat a diet low in fat and, in particular, low in saturated fat.
- Maintain a healthy body weight by balancing physical activity and food intake.
- If you drink alcohol, limit your intake.
- Eat only a moderate amount of sugars and foods containing added sugars.
- Choose low-salt foods and use salt sparingly.
- Encourage and support breastfeeding.

It is also important to eat foods containing calcium (particularly for girls and women) and to eat foods containing iron (particularly for girls, women, vegetarians and athletes).

Regular physical activity can also help, as type 2 diabetes occurs more often in people who are physically inactive. The physical activity guidelines listed below refer to the minimum levels of physical activity required for good health.

- Think of movement as an opportunity, not an inconvenience.
- Be active every day in as many ways as you can.
- Put together at least 30 minutes of moderate intensity physical activity on most, preferably all, days.
- If you can, also enjoy some regular, vigorous exercise for extra health and fitness.

SNAPSHOT

More Australians using insulin to manage diabetes

Over 220 000 Australians began using insulin to treat diabetes between 2000 and 2009, according to a report released by the Australian Institute of Health and Welfare (AIHW).

Incidence of insulin-treated diabetes in Australia, 2000–2009, shows that 77% of these people had Type 2 diabetes, 12% had gestational diabetes and 10% had Type 1 diabetes. The remaining 1% had other types of diabetes.

Type 1 diabetes is usually diagnosed in childhood and insulin replacement is required to survive. In children aged 0–14 the incidence of Type 1 diabetes increased from 19 cases per 100 000 children in 2000 to 25 per 100 000 children in 2004. But since 2004 the rate of new cases has remained stable.

Type 2 diabetes, which is the most common form of diabetes, occurs when the body becomes resistant to the insulin it produces or does not produce enough insulin to meet the body's needs. Not all people with Type 2 diabetes require insulin to manage their diabetes. Lifestyle modifications — such as improved diet and exercise habits, along with medication — are often sufficient. The rate of new cases of insulin-treated Type 2 diabetes increased from 74 per 100 000 in 2000 to 117 per 100 000 people in 2009.

Source: AIHW, media release, 13 February 2012.

INQUIRY

Managing diabetes

Read the snapshot 'More Australians using insulin to manage diabetes', then answer the following questions.

1. What is the trend for the incidence of:
   (a) Type 1 diabetes in children aged 0–14?
   (b) Type 2 diabetes?
2. Is insulin replacement required for all types of diabetes? Explain why or why not.

Table 2.7: The sociocultural, socioeconomic and environmental determinants for diabetes

Sociocultural determinants	• Indigenous Australians are more at risk, compared to other Australians, due to less education about the risk factors and less access to medical services. • Having a Pacific Island, Indian or Chinese cultural background puts one at risk of diabetes. • People with a family history of diabetes are also at risk. • Australia's incidence of type 1 diabetes among those aged 0–14 years is one of the highest among other OECD countries, probably due to the general Australian diet being high in saturated fat and sugar.
Socioeconomic determinant	Those with a low socioeconomic status and who are less educated are more at risk as they are more likely to consume higher levels of alcohol, be physically inactive and consume diets high in fat and sugar.
Environmental determinant	A greater access to technology has led to higher levels of physical inactivity and therefore a greater risk of diabetes.

Groups at risk

The groups at risk of developing diabetes include:

- women who had diabetes during pregnancy
- people aged over 45 years
- people with a family history of diabetes
- overweight people
- people who consume a diet high in sugar
- Aboriginal and Torres Strait Islander peoples.

Respiratory disease

Respiratory disease is highly prevalent and affects the quality of life for many Australians. The illnesses and conditions classified as respiratory disease can range from mild to life-threatening. This group of diseases offers significant potential for prevention.

The nature of respiratory diseases

Respiratory diseases refer to a group of diseases that affect the respiratory system, including the lungs, lower and upper airways, nose and throat. Examples include:

- asthma
- chronic obstructive pulmonary disease (COPD)
- hay fever
- chronic bronchitis
- chronic sinusitis.

COPD is a progressive disease where the lung tissue becomes damaged and the air passages become narrow, which obstructs oxygen intake, leading to shortness of breath. The lung damage is often due to inhaling irritant gases and particles, such as tobacco smoke.

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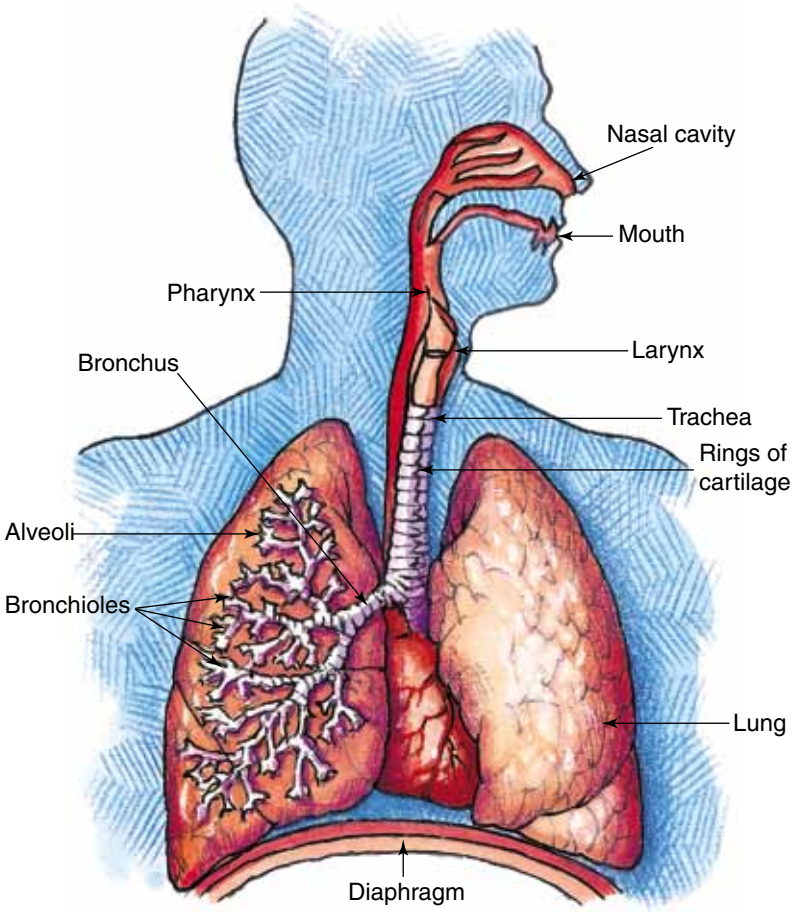


Figure 2.26: The respiratory system

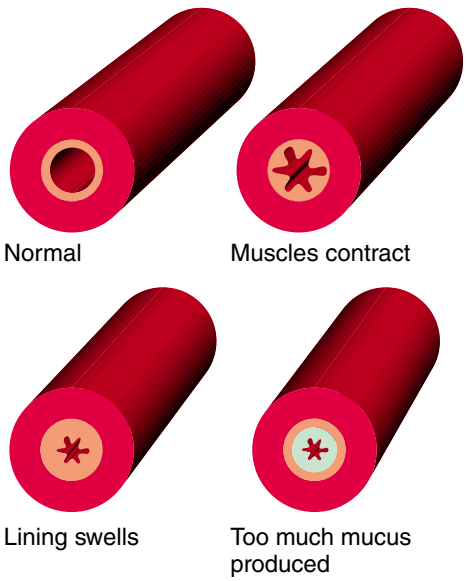


Figure 2.27: The narrowing of the airways caused by asthma

Asthma is a chronic disease of the respiratory system or airways. It affects a person's ability to carry air in and out of the lungs. The inside walls of the airways become narrow, making it hard to breathe because:

- the muscle walls of the airway contract
- the inside lining of the airway becomes inflamed and mucus is produced (see figure 2.27).

The inflammation makes the airways sensitive and they then react to certain triggers, making it difficult to breathe. When this happens, the airways get narrower and less air flows to the lungs.

This causes a number of symptoms including:

- wheezing — a whistling sound when breathing
- coughing — often worse at night or early morning
- chest tightness
- difficulty breathing
- shortness of breath.

When these symptoms worsen, an asthma attack can occur. In severe asthma attacks, the airways may close so much that there is not enough oxygen reaching vital organs. This is a medical emergency and immediate treatment is required.

The extent of respiratory disease

Around six million Australians across all age groups have a long-term respiratory illness and this places a heavy burden on the health-care system. The prevalence of some conditions in the respiratory disease group is decreasing and this can be largely attributed to a decline in smoking,

particularly in males. The high prevalence of asthma in Australia, especially among children, is a significant concern for the health-care system.

COPD

COPD is more common among older people. It is difficult to precisely determine the number of people with COPD. The National Health Survey 2007–2008 estimated that 5 per cent of Australians who were 55 and older had some form of COPD. Other studies estimate prevalence in this age group closer to 10 per cent.

Overall, the death rate for COPD fell between 1970 and 2009. More males than females die from COPD.

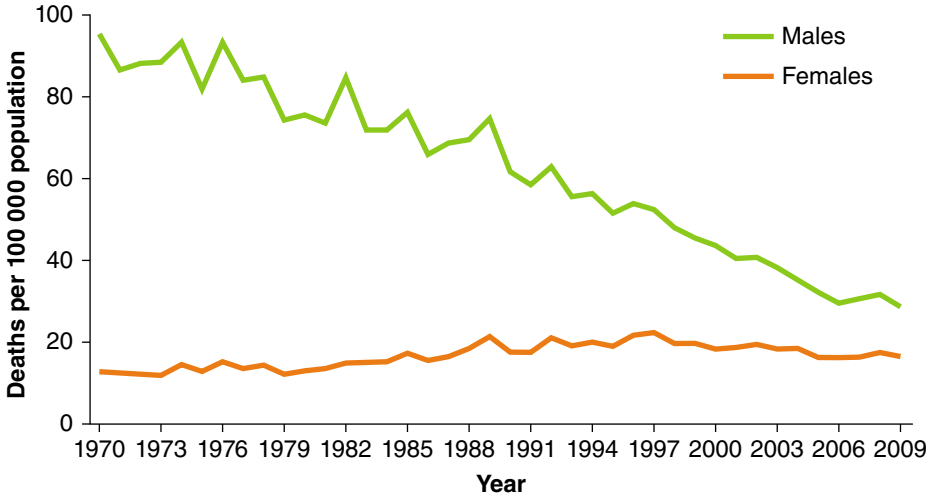


Figure 2.28: Trends in COPD death rates, by sex, 1970–2009 (*Source:* AIHW, *Australia's health 2012*, p. 285.)

Asthma

In 2007–08, 10 per cent of all Australians reported that they had asthma. Females tend to have slightly higher rates of asthma than males. The highest prevalence occurs in the 5–9 years age group. In comparison with other countries, the prevalence of asthma in Australia is high. Asthma rates are higher in the female indigenous population.

Mortality rates from asthma in Australia are characterised by the following:

- comparatively low death rates compared with other diseases
- high death rates compared with international standards
- deaths from asthma occur in all age groups
- the risk of dying from asthma increases with age
- the overall death rate from asthma has decreased significantly over the past 15 years.



INQUIRY

Asthma rates in children and young people

Read the snapshot 'Asthma rates drop among Australian children and young people' then answer the following questions.

1. What is the trend for:
   (a) the prevalence of asthma in children and people up to age 34?
   (b) the mortality rate due to asthma?
   (c) the mortality rate due to COPD for people aged 55 and over?
2. Which indicator points to inequity in health status in some groups, and what is the trend for this indicator?
3. What is the main cause of COPD in Australia?

Asthma rates drop among Australian children and young people

The prevalence of asthma among children and young adults has decreased over the past decade, according to a report released by the Australian Institute of Health and Welfare (AIHW). *Asthma in Australia 2011*, was launched by Professor Guy Marks, Director of the Australian Centre for Asthma Monitoring (ACAM) at the Woolcock Institute of Medical Research in Sydney.

'Between 2001 and 2007–08, the prevalence of asthma declined in people aged 5 to 34 years by over one quarter, but remained stable in adults aged 35 years and over,' Professor Marks said.

The report also shows a decrease in deaths from asthma, with the mortality rate due to asthma dropping by 45% between 1997 and 2009. 'Despite these improvements, asthma prevalence and mortality rates in Australia remain high on an international scale,' Professor Marks said.

In 2007–08, the prevalence of asthma in Australia was estimated to be about one in ten — equivalent to about 2 million people. 'People with asthma also smoke at least as much as people without asthma, despite the known adverse effects,' Professor Marks said.

Rates of hospitalisation for asthma among adults are higher in Indigenous people compared with other Australians. Also, people living in areas of lower socioeconomic status are more likely to be hospitalised for asthma than those living in areas of higher socioeconomic status and this gap has widened in recent years.

The report includes a focus on chronic obstructive pulmonary disease (COPD) — a serious long-term lung disease that mainly affects older people and is often difficult to distinguish from asthma. In Australia, smoking is the main cause of COPD. Among people aged 55 years and over, deaths and hospitalisations are much more commonly caused by COPD than by asthma.

'However, the good news is that between 1997 and 2007, the death rate attributed to COPD among people aged 55 years and over decreased by 65%,' Professor Marks said.

Source: AIHW, media release, 18 October 2011.

Risk factors and protective factors for asthma

It is not known what causes asthma, but if you have a family history of asthma you are more likely to develop it. Asthma symptoms and attacks can be triggered by:

- colds and flu
- tobacco smoke
- inhaled allergens such as pollens, animal hair, dust mites
- air pollution
- strong odours and scents
- cold air or changes in temperature
- certain drugs such as aspirin
- food preservatives, flavourings and colourings
- exercise.

People with asthma should consult their doctor to find out how best to prevent an asthma attack, and how to manage and treat their asthma when an attack occurs. (A fact sheet is shown in chapter 11, page 409.) As people with asthma can experience different symptoms and different degrees of symptoms, it is important to consult a doctor who will be able to develop a prevention and management plan specific to the needs of that person. Asthma cannot be cured, but it can be effectively managed so that people with asthma can lead healthy and active lives.

INQUIRY

Most people with asthma enjoy generally good health

Read the snapshot 'Most people with asthma enjoy generally good health', then answer the following questions.

1. 'Even though people with asthma generally feel good about their quality of life, the disease can have other effects on their lives.' Explain.
2. Explain how asthma can best be managed.
3. Why is asthma a national health priority issue in Australia?

SNAPSHOT

Most people with asthma enjoy generally good health

The majority of people with asthma are generally in good health, but use the health-care system more and experience more long-term health conditions than those who have never had asthma, a report from the Australian Institute of Health and Welfare (AIHW) finds.

The report, *Statistical Snapshots of People with Asthma in Australia 2001*, looks at health-related characteristics of people with asthma and those who have never had asthma, and finds that the majority of people with asthma are more likely than not to:

- feel good about their quality of life
- have health the same or better than they did a year ago
- have no days of reduced activity due to illness over any given fortnight
- have no days away from work or school or study due to illness or injury
- have received all recommended childhood immunisations.

Nevertheless, more than half of people with asthma:

- have consulted a doctor within a three-month period
- use at least one medication for asthma
- have at least three long-term health conditions.

Report author Dr Perri Timmins, of the AIHW's Asthma, Arthritis and Environmental Health Unit, said that 16 out of the 22 long-term conditions examined in the report are more likely to be present among people with asthma than among people who have never had asthma.

'Allergic and inflammatory conditions such as hay fever, allergy, chronic sinusitis, bronchitis and emphysema are consistently more common among people with asthma.

'Migraine, back pain, depression, and anxiety-related conditions are also more frequent among people with asthma,' Dr Timmins said.

According to the report, people with asthma are slightly more likely than those who have never had asthma to experience psychological distress, miss days of work or school, or reduce their level of activity due to their asthma. They are also more likely to be overweight.

'It should be stressed however, that despite the difference in health-related characteristics between people with asthma and those who have never had asthma, the majority of people with asthma consider themselves in generally good health,' Dr Timmins said.

Source: AIHW, media release, 9 February 20072.

Table 2.8: The sociocultural, socioeconomic and environmental determinants for respiratory disease

Sociocultural determinants	• Indigenous Australians are more at risk due to higher rates of smoking. • People with a family history of allergies are more prone to developing asthma.
Socioeconomic determinants	• People with less income are more likely to smoke and have less money to spend on treatment. • People who are repeatedly exposed to hazardous chemicals at work are more at risk.
Environmental determinant	People living in rural and remote areas have less access to emergency services. This has led to a higher death rate from asthma in these areas, compared to urban areas.



APPLICATION

High levels of chronic disease, injury and mental health problems

eBookplus

Select one specific example of a chronic disease, injury or mental health problem.

1. Use the **AIHW** weblink in your eBookPLUS to find information on your chosen disease or health problem. Create a mind map, summarising the:
   (a) epidemiological trends
   (b) risk factors
   (c) sociocultural, socioeconomic and environmental determinants
   (d) major groups at risk.
2. Identify examples of health initiatives to reduce the incidence of your chosen disease or illness.



A GROWING AND AGEING POPULATION

Net overseas migration is the difference between total arrivals and total departures.

Natural increase is the difference between the number of live births and deaths over a year.

Australia's population is on the rise, reaching 23 million in April 2013. Australia's population growth rate is 1.7 per cent compared to a world rate of 1.1 per cent. This growth in the population is being driven by **net overseas migration** rather than **natural increase**. The proportion of net migration to our population growth has increased to 60 per cent of current growth, an increase of 6 per cent from 2012–13. The ABS estimates that if current migration and birth rates do not change, Australia's population will be 35 million in 2056, and 44 million in 2101.

Australia's population is also ageing. Around nine per cent of our population is aged 70 years or older. This is expected to increase to 13 per cent by 2021 and to 20 per cent in 2051. These expectations are the consequence of sustained low fertility levels and increasing life expectancy at birth.

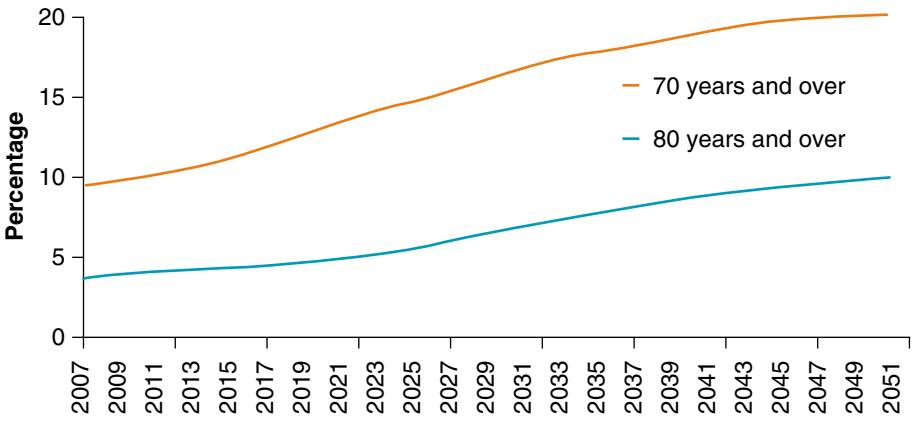


Figure 2.29: Australian population growth 2007–51: people aged 70 and over and 80 and over as a percentage of the total population (*Source:* Data from the Department of Health and Ageing, 8 September 2008.)

study on

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Practice HSC exam questions

Healthy ageing

As a consequence of our ageing population, the government has responded by encouraging people to plan for financial security and independence for their later years in life. The government has provided the elderly with a wide variety of services and support, depending on their needs. In addition, the government wants to ensure that the workforce is as productive as possible.

With our ageing population, it has become a priority for the government to encourage healthy ageing to enable people to contribute for as long as possible. If people are unhealthy later in life due to sickness or injury, their working years are likely to be shortened, resulting in a reduction in economic growth.

Governments are promoting good health throughout life, as well as disease prevention. People who achieve and maintain good health are less likely to access health and aged care services later in life. The government has appointed an Ambassador for Ageing, who is responsible for:

- promoting positive and active ageing
- encouraging the contributions made by older people
- promoting community government programs and initiatives to the public
- assisting older people to access these programs.

The national research priority 'Promoting and maintaining good health' includes a national research goal known as 'Ageing well, ageing productively'. This goal focuses on issues such as disease prevention, reducing illness periods, and maintaining economic and social participation. Such initiatives ultimately lead to better health outcomes for older Australians, therefore reducing the economic burden on the government.



INQUIRY

Healthy ageing

1. Outline the reasons why Australia's population is ageing.
2. In what ways does the government encourage people to plan for financial security and independence for their later years in life?
3. Research three initiatives undertaken by the government to promote and enhance positive ageing. Present your findings to the class in an oral presentation.

SNAPSHOT

Tracking the growing path to ageing and aged care

There are over 2 million Australians aged over 70 years — and this figure is growing.

An ageing population means an ever-growing need for specialist services for older Australians, and increasing government and community interest in the funding and provision of those services.

Residential aged care

When older Australians can no longer remain in their own homes, they may move into residential aged care facilities where their care needs can be better provided for.

Residential aged care facilities provide suitable accommodation, as well as services such as meals, laundry and cleaning. If needed, residents can also receive nursing care and equipment.

At 30 June 2009, there were almost 162 300 people in mainstream residential aged care services. Females made up the majority of the residents — more than double the number of males (about 114 600 females and 47 700 males). The highest proportion of residents in residential aged care was aged 85–89 years, making up 28 per cent of residents.

Community aged care packages

Community aged care packages allow individuals to receive the care they require without relocating — that is, they are able to remain in their own homes, neighbourhoods, and communities. Services may include meals, cleaning, transport, home and garden maintenance, and assistance with personal care. For people with greater needs, in-home nursing, counselling and therapy may also be provided.

At 30 June 2009, there were over 44 000 people using community aged care packages in Australia, with most requiring a relatively low level of care. Women outweighed men in all service categories. This discrepancy can be mostly attributed to a trend which sees Australian women generally living longer than their male counterparts.

Source: AIHW, *Access Online Magazine*, issue no. 29, March 2011.

INQUIRY

Aged care in Australia

Read the snapshot 'Tracking the growing path to ageing and aged care', then answer the following questions.

1. What services are provided by:
   (a) residential aged care facilities?
   (b) community aged care packages?
2. (a) How many people were using these services in 2009?
   (b) Estimate the proportion of Australians aged 70 and over who use these services.
3. Why do females who use these services outnumber males?

Increased population living with chronic disease and disability

As well as significant improvements in the number of people surviving heart attacks, strokes and cancers, our ageing population has led to an increase in the number of Australians with a chronic disease or disability. Chronic, non-communicable diseases account for approximately 80 per cent of the total burden of disease in Australia and it is estimated that they will be responsible for about three-quarters of all deaths by 2020. The future levels of chronic diseases could be reduced if younger people control the more significant risk factors for developing chronic disease, such as smoking, obesity, excessive drinking, and physical inactivity. Obesity, for example, is a major risk factor for diabetes.

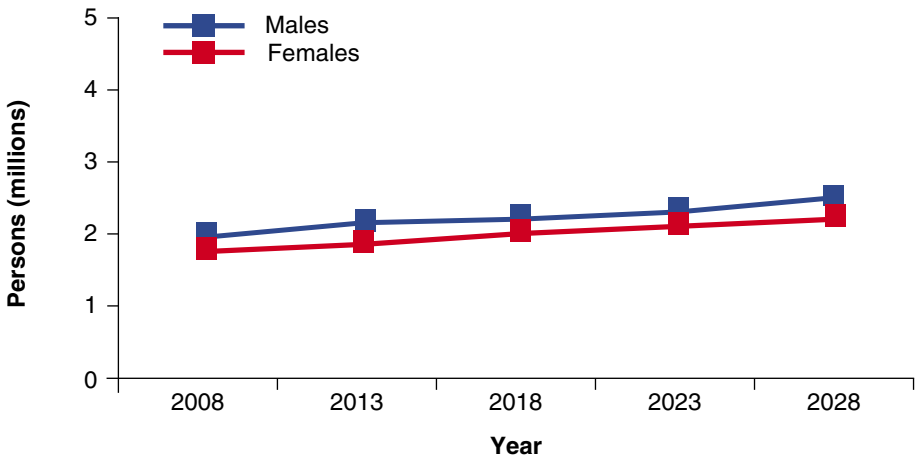


Figure 2.30: A major increase in the prevalence of obesity is projected.

APPLICATION

Living with chronic diseases and disabilities

1. Choose one of the following chronic diseases:
   - heart disease
   - cancer
   - asthma
   - depression.

Using the internet, research your chosen disease and answer the following questions.

(a) Outline the nature of the disease.
(b) Identify the modifiable and non-modifiable risk factors.
(c) Explain the factors that have contributed to a rise in the Australian population living with the disease.
(d) Why has the government identified this disease as a health priority?
(e) Outline strategies for the prevention of the disease.

2. Present your findings to the class in PowerPoint presentation.

SNAPSHOT

People with chronic disease work less — depression, arthritis and asthma key culprits

A report released today by the Australian Institute of Health and Welfare shows that chronic diseases are associated with more days off work and/or being out of the workforce, and some of the biggest culprits are depression, arthritis and asthma.

The report, *Chronic disease and participation in work*, looked at selected chronic diseases to provide an estimate of the loss to the Australian economy due to reduced participation in work among people who have chronic disease.

Report author, Karen Bishop, said, 'As one might expect, chronic diseases are associated with lower participation in the labour force and more missed days of work'.

'Even after adjusting for age, people with chronic disease were 60 per cent more likely to not be in the labour force than people without chronic disease. They were also less likely to be employed full-time, and more likely to be unemployed,' she said.

People with chronic disease who were in the labour force had, on average, about a half a day off work in the previous fortnight due to illness, compared with about a quarter of a day on average for those without chronic disease.

Of approximately 10.5 million Australians aged 25–64 years, about 33 per cent reported at least one of the following chronic diseases: arthritis, asthma, heart disease, chronic obstructive pulmonary disease (COPD), depression, diabetes and osteoporosis.

The report also found that men with chronic disease were more than twice as likely to be out of the labour force, whereas women with chronic disease were 20 per cent more likely not [to] participate in the labour force.

'This difference may reflect the different labour force distribution for males and females. Males are more likely to be in the labour force, and females more likely to be out of the labour force for a number of reasons, including caring and parenting,' Ms Bishop said.

Deaths of working age people from chronic disease also decreased the potential workforce. Loss due to deaths could be primarily attributed to cancers (52 per cent) and heart attacks (19 per cent).

The report estimates a loss of nearly 540 000 full-time workers associated with the presence of chronic disease.

'Given that in 2004–05 the Australian full-time workforce numbered 5.7 million, a loss of half a million people represents nearly 10 per cent of the full-time workforce,' she said.

Source: AIHW, media release, 11 February 2009.



INQUIRY

Impact of chronic diseases and disabilities on the workforce

Read the snapshot 'People with chronic disease work less — depression, arthritis and asthma key culprits' and answer the following questions.

1. Identify common chronic diseases affecting Australians, as suggested in the article.

2. Describe the trends and statistics outlined in the article.
3. How can these trends be reversed?
4. Assess the impact of chronic diseases and disabilities on the workforce.

Demand for health services and workforce shortages

As a consequence of an increase in the Australian population living with a chronic disease or disability, the demand for health and aged care services has risen. The government has recently proposed a number of initiatives to meet the needs of older Australians, including:

- increased residential aged care places
- more funding for dementia care in aged care
- attracting, retaining and training aged care workers

In addition, there has been a concern that many people suffering poor health are unable to contribute to the workforce, thus leading to general shortages of labour. The government has taken action in response to this concern by improving Australia's retirement income system in the following ways.

- A means-tested age pension is available to provide income for people after retirement.
- All Australian employers are required to provide compulsory superannuation cover for all eligible employees. Under the superannuation guarantee, the minimum level of superannuation cover made by employers is nine per cent of an employee's gross salary.
- Voluntary, private superannuation contributions and other forms of private savings, made by employees, are also encouraged.

Such initiatives encourage people to plan for financial security and independence for their late years of life to reduce the economic burden on the government as Australia's population ages.



Figure 2.31: The ageing population creates additional demands for health care and services.

Availability of carers and volunteers

A **carer** is a person who, through family relationship or friendship, looks after an older person or someone with a disability or chronic illness.

A **volunteer** is a person who offers to perform a service for the community on a voluntary basis.

Australia's workforce consists not only of paid workers, but also **carers** and **volunteers**, who are ageing with the rest of the population. Older Australians can contribute to society in myriad ways, such as by being paid workers, carers, volunteers or family members. Caring and volunteering are recognised as productive activities. Australians over the age of 55, for example, contribute approximately $75 billion per annum in unpaid caring and volunteering activities. Over 50 per cent of this amount is contributed by people aged over 65.

Such data demonstrates that caring and volunteering activities are beneficial to the economy and that older Australians make a substantial contribution as volunteers and carers. In 2010, 2.9 million Australians over 65 volunteered. As such, the paid and unpaid work of older Australians is essential to a well-functioning and caring society, which ultimately enhances the quality of life for all Australians.

It is projected that there will be little growth in the number of available carers, compared to the anticipated rise in demand for home-based support. This is likely to result in a shortage of carers in the future.

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Practice HSC exam questions



INQUIRY

Carers and volunteers

1. Assess the impact of a growing and ageing population on carers of the elderly and volunteer organisations.
2. Investigate reasons for the projected shortage of carers in the future.
3. Suggest measures that could be taken to encourage people to carry out caring and voluntary activities.
4. Investigate three types of carer or volunteer organisations available to meet the needs of Australia's ageing population. Two examples are Carers NSW and Volunteering Australia.

SUMMARY

- Particular groups in our society experience inequities in health. These include Aboriginal and Torres Strait Islander peoples, socioeconomically disadvantaged people, people from rural and remote areas, Australians born overseas, older people and people with disabilities.
- Aboriginal and Torres Strait Islander peoples are more likely to die at a younger age and are more likely to experience a reduced quality of life.
- Cultural, economic and environmental factors (determinants of health) contribute to inequities in the levels of health among individuals and subgroups of the Australian population.
- The most prevalent chronic health problems in Australia include cardiovascular diseases, cancer, diabetes, respiratory diseases, injuries and mental health illnesses. Each of these areas has the potential for early intervention and prevention, so the burden of these health problems can be reduced.
- Cardiovascular diseases include coronary heart disease, stroke and peripheral vascular disease.

- Mortality rates from cardiovascular disease are slowly declining, but remain a leading cause of sickness and death in Australia.
- The risk factors for cardiovascular disease include family history, gender, advancing age, smoking, raised blood-fat levels, high blood pressure, obesity and lack of physical activity.
- Cancer refers to a diverse group of diseases characterised by the uncontrolled growth and spread of abnormal body cells.
- The most frequently occurring life-threatening cancers for men are prostate, colorectal, lung and melanoma. For women, breast, colorectal, lung and melanoma are the most life-threatening.
- The major risk factors for cancer are specific to each type of cancer. Lung cancer risk factors include smoking, air pollution and asbestos. Breast cancer risk factors include family history, a high-fat diet, the early onset of menstruation, late menopause and obesity. Skin cancer risk factors include prolonged exposure to ultraviolet rays and fair skin.
- Groups at risk of developing cancer are specific to each type of cancer.
- Injuries are a major cause of preventable mortality and morbidity.
- The incidence of motor vehicle accidents has declined slowly. But 15- to 24-year-olds still have the highest risk of injury from motor vehicle accidents.
- Mental illnesses include depression as well as schizophrenia and personality disorders.
- An estimated 18 per cent of Australian adults have experienced symptoms of a mental disorder.
- Diabetes is a condition in which the body is unable to break down and use sugar.
- The two types of diabetes are insulin-dependent and non-insulin-dependent diabetes.
- The incidence of diabetes has increased over the past 10 years.
- The risk factors for diabetes are high blood pressure, high blood sugar levels, inactivity, obesity and advancing age.
- Asthma and chronic obstructive pulmonary disease (COPD) are examples of diseases of the respiratory system.
- Although mortality rates for asthma have decreased with improved medications and management techniques, the incidence of asthma in Australia is still high compared with international standards.
- Mortality rates for COPD are decreasing.
- Australia's population is growing and ageing. The ageing population is the consequence of sustained low fertility levels and increasing life expectancy at birth.
- With our ageing population, there has been an increase in people living with chronic diseases and disabilities, a higher demand for health services and workforce shortages. It has therefore become a priority for the government to encourage healthy ageing to enable people to contribute for as long as possible and to reduce the burden on our health system.
- Caring and volunteering activities are beneficial to the economy, and older Australians make a substantial contribution as volunteers and carers. It is projected that there will be little growth in the number of available carers, compared with the anticipated rise in demand for home-based support. This is likely to result in a shortage of carers in the future.

QUESTIONS

Revision

1. Describe the three major forms of cardiovascular disease. (H1) (3 marks)
2. Examine the extent of cardiovascular disease as a major cause of sickness and death. Why is cardiovascular disease a health priority issue for Australia's health? (H2) (5 marks)
3. Identify and explain the modifiable and non-modifiable risk factors of cardiovascular disease. (H1) (5 marks)
4. Identify and discuss the sociocultural and socioeconomic determinants that affect the prevalence of cardiovascular disease. (H3) (5 marks)
5. How could an individual reduce their risk of developing cardiovascular disease? (H3) (3 marks)
6. Describe the nature of cancer. (H1) (3 marks)
7. Justify cancer being a priority issue for Australia's health. (H1) (7 marks)
8. Why has there been a recent reduction in injury caused by motor vehicle accidents? (H2) (3 marks)
9. Explain why people aged 15–24 years are at greatest risk of injury from motor vehicle accidents. (H2) (4 marks)
10. Justify injury being a health priority issue for governments and health authorities. (H1) (7 marks)
11. Why is mental health an area of concern for Australia's health? (H2) (3 marks)
12. What is mental illness? Who is at risk? (H1) (3 marks)
13. Identify the determinants of mental health problems and illnesses. (H3) (3 marks)
14. What are the two types of diabetes? Describe each type. (H1) (2 marks)
15. Examine the extent of the problem of diabetes in Australia. (H2) (4 marks)
16. Who is at risk of developing diabetes? (H2) (3 marks)
17. Justify diabetes being a health priority issue. (H1) (7 marks)
18. Justify the inclusion of respiratory disease as an area of concern for Australia's health. (H1) (7 marks)
19. Describe recent trends in the incidence of asthma and chronic obstructive pulmonary disease in Australia, and identify the main risk factors. (H2) (5 marks)
20. Discuss the determinants of respiratory disease. (H3) (5 marks)
21. Assess the impact of Australia's growing and ageing population on our health system and the health service workforce. (H2) (8 marks)

Extension

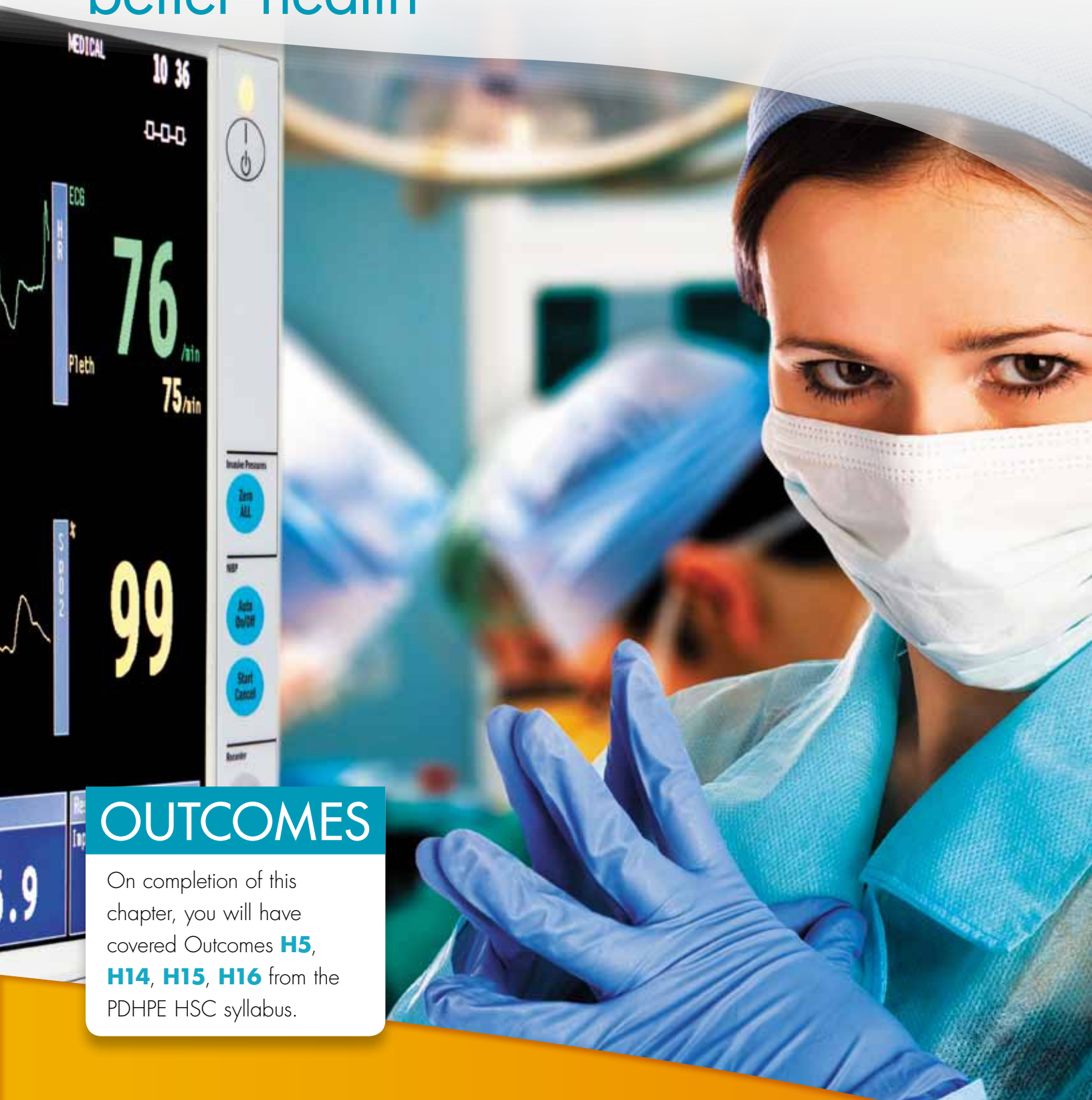
1. Research and analyse one type of cancer. Discuss how this type of cancer could be prevented. (H1, H3) (8 marks)
2. From your research and analysis of the national health priority areas in this chapter, identify the area that you believe is of most concern. Explain your reasons for selecting this area. (H1) (5 marks)
3. Choose one type of injury and create a mind map showing the sociocultural, socioeconomic and environmental determinants of that injury. (H3) (5 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 3

Role of health-care facilities and services in achieving better health



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H5**, **H14**, **H15**, **H16** from the PDHPE HSC syllabus.

Health-care facilities and services play a vital role in achieving better health for all Australians. They provide the essential services of diagnosing, treating and rehabilitating the ill and injured, as well as preventing illness and promoting health. Traditional health facilities such as hospitals and doctors' surgeries are increasingly being used to provide accurate health information to the public. In addition, the state and territory governments provide services specifically aimed at both the prevention of disease and the promotion of health — for example, immunisation programs, anti-smoking campaigns, and school medical and dental health services.

However, the health of Australians depends not only on the provision of quality health-care services and facilities, but also on factors such as housing, employment, education, hygiene, income and environmental safety. For health-care services and facilities to be effective in both curing and preventing disease, the health-care sector must develop partnerships with other sectors of the community to implement health-related activities that promote health.



Figure 3.1: Health-care facilities and services provide a vital role in achieving better health outcomes for all.



HEALTH CARE IN AUSTRALIA

The health-care system involves complex interrelationships between:

- Commonwealth, state and local governments
- health insurance funds
- public and private providers of services; for example, doctors
- institutions; for example, hospitals
- other organisations, such as community health services.

The system is both extensive and diverse in nature. Traditionally, it has provided:

- diagnosis
- treatment
- rehabilitation
- care for people with long-term illness or disability.

However, since the mid 1990s, the Australian government has strengthened its commitment to involving the wider health-care system in improving health outcomes and health gains (illness prevention and health promotion), rather

than simply providing health-care services. The current role of the health-care system in Australia is to provide quality health facilities and services to meet the health needs of all Australians. Health services are organised, financed and delivered by both public (government) and private (fee-for-service) sources.

Health care is dominated by medicine in Australia. Emphasis has been placed on the diagnosis and treatment of illness by the medical profession. This medical governance means medical professionals largely control and deliver health care. Some medical practitioners have acknowledged the potential positive impact of complementary and alternative health-care approaches and have referred patients.

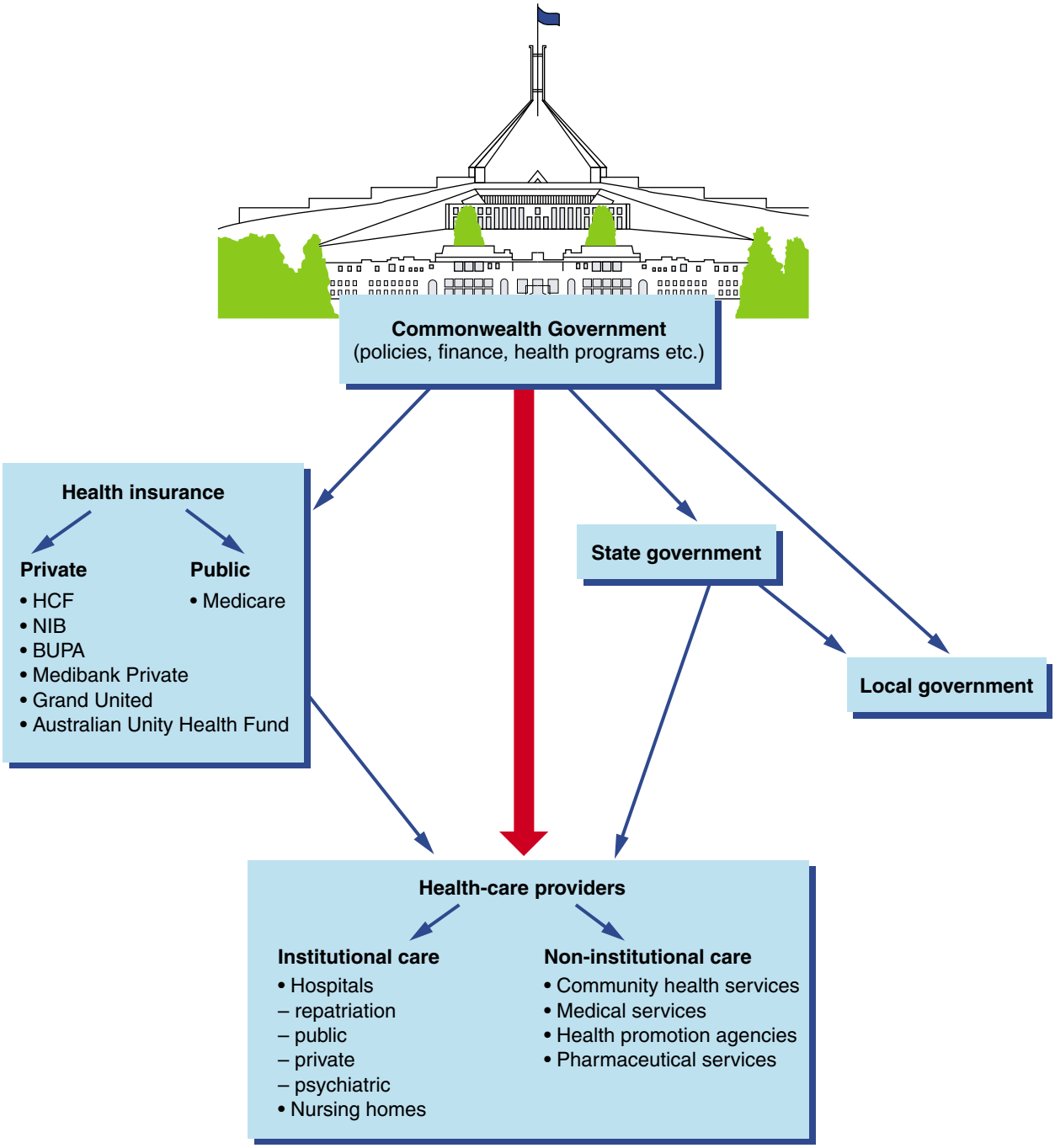


Figure 3.2: The health-care system in Australia involves the interrelationship of many government and non-government bodies.

Health care within Australia is mostly about clinical diagnosis, treatment and rehabilitation. Historically, health has lacked a preventative focus, but the emphasis began to change with the new public health approach. In recognition that lifestyle diseases are the major causes of illness and death, prevention programs have gained prominence in recent years. The influence of the media, together with increased emphasis on health education and promotion, have led to a greater understanding of personal responsibility for health and the importance of health within the community. Furthermore, health practitioners are now recognising the importance of their role in health education, community empowerment, **advocacy** and public health policy.

Advocacy is the act of championing or arguing for a particular issue or cause.

study on
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Practice HSC exam questions

Range and types of health-care facilities and services

The many health-care facilities and services provided in Australia can be divided into two broad types: institutional and non-institutional. These are illustrated in figure 3.3.

Institutional care	Non-institutional care
• Hospitals — public — private — psychiatric • Nursing homes • Other services such as ambulance	• Medical services such as those provided by medical practitioners and specialists • Health-related services; for example dental, optical, pharmaceutical, physiotherapy • Community and public health services such as supplying health equipment, aids and appliances • Research organisations such as the National Health and Medical Research Council (NHMRC)





Figure 3.3: Institutional and non-institutional care in Australia

Hospitals — public and private

In Australia, hospitals provide most institutional care. Hospitals are classified as either public or private, and the majority are accredited with the Australian Council on Healthcare Standards (which monitors the quality of care provided and the health outcomes of patients).

Public hospitals are operated and financed by the state governments and the Commonwealth Government. They serve a greater proportion of elderly and very young patients. Public hospitals also appear to provide more highly specialised and complex services, such as heart and lung transplants in the large teaching hospitals. They also provide same-day surgery and take most of the non-admitted patients (outpatients).

Private hospitals are owned and operated by individuals and community groups. They also provide same-day surgery and perform more short-stay surgery, **elective procedures** and less complex procedures requiring less expensive equipment, such as operations on the eye, ear, nose, mouth, throat, musculoskeletal system and breast.

Elective procedures are those operations that are not classified as emergencies.

Patients in all hospitals are classified as being either private or public, according to their choice of service. If they choose to be in a public ward in a public hospital, then they are allocated a doctor by the hospital and provided with a bed — all free of charge. If they choose private treatment, either in a public or private hospital, then they may choose their own doctor but must pay for the service and accommodation provided by the hospital and the doctor. Medicare and any private health insurance of the patient will refund much of this expense.

Equity is the allocation of resources according to the needs of individuals and populations. The goal is to achieve equality of outcomes.

The issue of **equity** of access to public hospitals has been debated in recent years. Some evidence suggests that private patients have more rapid access to elective surgery (such as plastic, ear, nose and throat, and orthopaedic surgery) than do public patients. Urgency categories have therefore been applied to patients' conditions.



INQUIRY

Access to hospitals

For elective surgery, access to private hospitals is almost immediate. Yet some waiting lists for elective surgery in public hospitals are over a year long.

As a class, debate equity of access to public and private elective surgery in terms of social justice principles. Access the **Waiting times** weblink in your eBookPLUS and comment on waiting times for various elective surgery procedures.

eBook*plus*



Nursing homes

Nursing homes provide care and long-term nursing attention for those who are unable to look after themselves — the aged, the chronically ill, people with dementia and people with a disability. Some nursing homes cater specifically for young people with a disability. There are three types of nursing home — private charitable, private for profit and state government — but the Commonwealth Government assumes responsibility for most of the financial cost of running nursing homes in Australia.

Figure 3.4: Nursing homes are an important health-care facility for the aged, the chronically ill and people with a disability.

Aged-care assessment teams have been established to ensure only highly dependent people are placed in residential care. They also recommend the placement of a large proportion of clients in accommodation outside of institutions, such as hostels. Hostels provide long-term accommodation and a basic level of health care for young people with a disability, and the aged and frail.

Psychiatric hospitals

Treatment of people with severe mental illness has changed over recent years, moving away from institutional care to a system of care that integrates both hospital services and continuing care within community settings. Given the resulting reduction in extended hospitalisation of people with mental illness, the number of public **psychiatric hospitals** has fallen. At the same time there has been a corresponding increase in the number of beds in community-based residential services. The range of service providers for mental health care today includes general practitioners (GPs), private psychiatrists, community-based public mental health services and specialised residential mental health-care facilities.

Psychiatric hospitals care for patients diagnosed with mental illness.

Medical services

Doctors, specialists and other health professionals provide a number of services. The most extensively used service is that of the GPs who diagnose and treat minor illnesses. According to the *Patient Experience Survey 2010–11*, an estimated 14.5 million people aged 15 years or over (82% of the population) had seen a GP at least once in the previous year.

GPs work in medical centres, hospitals and many private surgeries throughout Australia. Under Medicare, all Australians are eligible to claim refunds for their payments for medical services outside hospitals (and for services as private patients in hospitals). The whole or part of the cost of a GP consultation is reimbursed by Medicare.



The number of consultations with GPs has increased over the last two decades. This can be attributed to improved access to doctors and the increased promotion and awareness of individual illness prevention strategies, such as immunisation, Pap smears and general health checkups.

General practitioners sometimes refer their patients to specialists, who have particular skills in a field of medicine as well as the usual medical training. Examples of specialists are allergists (treat allergies), cardiologists (treat heart conditions) and gynaecologists (treat disorders of the female reproductive system).

Figure 3.5: Doctors, specialists and health professionals provide important services including diagnosis and treatment of illnesses.

Health-related services

Chiropody involves diagnosis and treatment of disorders of the foot, ankle and lower leg.

Optometry is a health-care profession that addresses problems with eyes and vision.

Health-related services include ambulance work, **chiropody**, dentistry, health inspection, nursing, occupational and speech therapy, pharmacy, physiotherapy, **optometry**, radiography, counselling, social work, and dietary planning and advice. The number of dental services has risen in recent years as an increasing number of people retain their natural teeth, and also as a result of the trend towards preventative dental care.

Pharmaceuticals

In Australia, pharmaceutical drugs are supplied through hospitals and doctors by private prescription and over the counter in shops. Over-the-counter medicines account for about one-third of all sales.

The **Pharmaceutical Benefits Scheme (PBS)** is a Commonwealth Government program that provides subsidised prescription drugs to Australian residents, ensuring affordable access to a range of essential medicines.

The **PBS Safety Net** caps the amount a family will pay for PBS subsidised medications in a calendar year.

Most prescription drugs sold in Australia are subsidised through the Commonwealth Government's **Pharmaceutical Benefits Scheme (PBS)**. Through this scheme, the government subsidises the cost of a wide range of prescription medicines. The amount of subsidy depends on a patient's level of eligibility. From 1 July 2012, the patient contribution under the general rate is a maximum of $36.10 for each medicine. The patient contribution for concession card holders, such as low-income earners, war veterans and invalids, is $5.90.

Some people who are chronically ill or require regular long-term medications are protected from excessive cost by the **PBS Safety Net**. The aim of the Safety Net scheme is to ensure no-one is precluded for financial reasons from access to the medicines they need. People who do not have a government concession card become eligible for the Safety Net card when $1390.60 (in 2013) has been spent on PBS medicines. Pharmaceutical Benefits Scheme medicines can then be purchased at $5.90 per prescription for the rest of the year. If the person holds a government concession card they are eligible for a Safety Net card when they have spent $354.00 (2013) on prescriptions. All PBS medicines for the rest of the year are then free.



Figure 3.6: Pharmacists dispense drugs prescribed by general practitioners. Most drugs are subsidised under the PBS.

INQUIRY

Equity in purchasing prescription drugs

eBookplus

Access the PBS weblink in your eBookPLUS. Use the information on the website and in the preceding text to determine the maximum price in each of the following scenarios that a person would pay for prescription drugs.

1. A teenager is prescribed a weight reduction drug costing $46. The drug is not on the PBS list.
2. An adult needs blood pressure tablets that are on the PBS list.
3. An adult has already spent $1370 on prescription drugs during the year and now requires an additional script.
4. A concession card holder spent $350 on prescription drugs in the previous year.
5. A single mother needs a special drug for her five-year-old son. The drug costs $110 each visit to the chemist because it is not on the PBS list.

Evaluate each of the scenarios in terms of access, equity and social justice principles.

Community supports

Community supports are a significant factor in the provision of an environment that is conducive to positive health. These supports promote health but are not a recognised part of the health-care system. The food industry, for example, implements policies to ensure the production and delivery of food that meets health regulation and food safety standards, and displays nutrition information on food packaging to inform the public about nutrition. As another example, town planners and engineers have a role in providing infrastructure that is safe and promotes positive health — for example, safe roads, adequate sanitation and sewerage facilities, areas for physical activity such as playgrounds and sports fields, and the clear signage of environmental hazards.

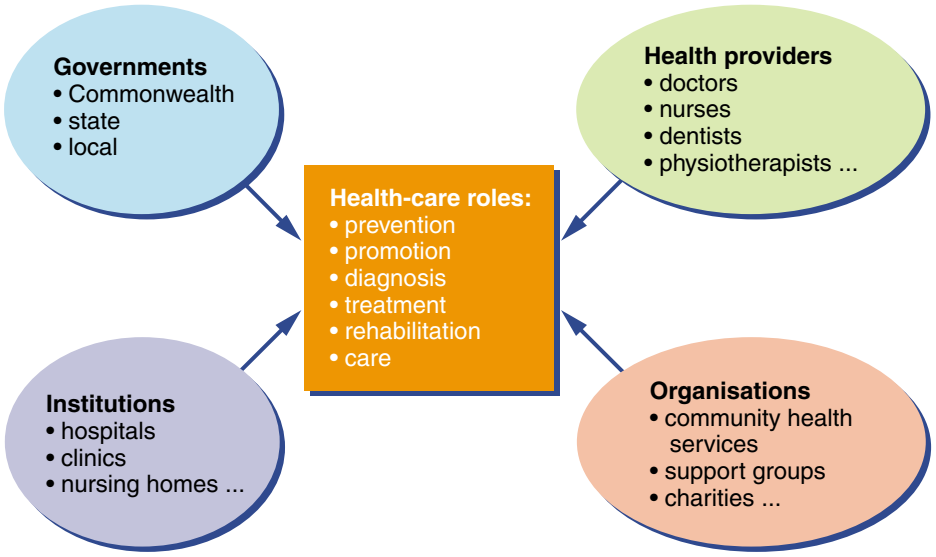


Figure 3.7: Features and roles of the health-care system

INQUIRY

Health-care facilities and services

1. Considering the health-care facilities and services that are available to you, which is most relevant to you? Why?
2. Critically analyse the accessibility of this health-care service to you.
3. Would this health-care service be useful to all members of the community? Why?

4. Explain the factors that could act as barriers to access to this facility.
5. Is this service specifically aimed at curing illness or does it also provide health promotion information?
6. Outline the features of an effective community health-care service.

study on
Concept code: PDH-022
See more
Federal Government responsibilities
See more
State, Territory and local government responsibilities
Do more
Health facilities

Responsibility for health-care facilities and services

Health-care facilities and services in Australia are provided by government organisations and a range of private and community groups. There are five levels of responsibility:

- Commonwealth Government
- state and territory governments
- private sector
- local government
- community groups.

Commonwealth Government

The Commonwealth Government is predominantly concerned with the formation of national health policies and the control of health system financing through the collection of taxes. It provides funds to the state and territory governments for health care, and influences their health policy making and delivery.

The Commonwealth Government also has direct responsibility for special community services, such as health programs and services for war veterans and the Aboriginal community.

The Commonwealth Government contributes major funds to:

- high level **residential care**
- medical services
- health research
- public hospitals
- public health activities.

Pharmaceuticals are funded by both the Commonwealth Government and non-government sources.

Residential care refers to care given to a patient away from their home. It takes into account the needs and wishes of the person. An example of high level residential care is a clinic that provides help and treatment to sufferers of anorexia.

State and territory governments

The various state and territory governments have the prime responsibility for providing health and community services. The principal functions of state and territory health authorities include:

- hospital services
- mental health programs
- dental health services
- home and community care
- child, adolescent and family health services
- women's health programs
- health promotion
- rehabilitation programs; for example, following heart surgery
- regulation, inspection, licensing and monitoring of premises, institutions and personnel.

The state and territory governments also contribute major funds to:

- community health services
- public hospitals
- public health activities.

Private sector

The private sector provides a wide range of services, such as private hospitals, dentists and alternative health services (for example, chiropractors). Privately owned and operated, these services are approved by the Commonwealth Department of Health and Ageing. Many religious organisations, charity groups and private practitioners run such services. Some private organisations, such as the National Heart Foundation and the Cancer Council, receive funding from both state governments and the Commonwealth Government.

Local government

The health responsibilities of local governments vary from state to state, but mainly concern environmental control and a range of personal, preventative and home care services. They include the monitoring of sanitation and hygiene standards in food outlets; waste disposal; the monitoring of building standards; immunisation; Meals on Wheels; and antenatal clinics. The state health department controls some of these services (immunisation, for example), while local councils are responsible for implementing them.

Community groups

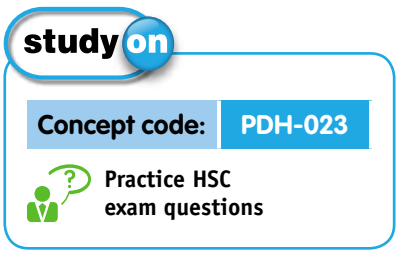
Many community groups also promote health. They are formed largely on a local needs basis and established to address problems specific to an area or region. However, where concerns exist nationally, groups are more extensive, usually highly structured and linked in the provision of information, knowledge and support. Examples of prominent community groups are Cancer Council, Cancer Support Groups, Carers Australia/NSW, Dads in Distress, Sexual Health Services and Diabetes Australia.



INQUIRY

Responsibility for health care

1. Identify the health services and facilities funded by the state or local government available in your local area.
2. Discuss the responsibility of the Commonwealth Government and state governments in providing adequate health-care services to the community.
3. Discuss equity of access and support for general health care for all sections of the community.
4. Discuss the level of responsibility that the community should assume for individual health problems.



Equity of access to health facilities and services

Access to health facilities and services is about the health system's ability to provide affordable and appropriate health care to people when they require it. Access also refers to equitable distribution of health-care facilities and services to all sections of the Australian population. An individual's ability to access health-care facilities and services can reflect their:

Socioeconomic status is a measure of an individual's place in society, based on their income, education, employment and other economic factors such as house and car ownership.

- **socioeconomic status**
- knowledge of available services
- geographic isolation
- cultural and religious beliefs.

Access might also be affected by issues such as:

- shortages of qualified staff
- lack of funding or equipment
- patient waiting lists for surgery or other treatment in public hospitals
- waiting times in outpatient clinics or emergency departments.

The majority of Australians have access to fundamental medical care through the national health insurance system — Medicare. However, this health insurance system does not cover all health services such as dental and physiotherapy. As a result, some health services are inaccessible to those who cannot afford them.

An individual's ability to access services and facilities can also be influenced by their knowledge and understanding of health information and the services available to help them. A knowledge gap may exist as a result of the individual's lack of education, their poor literacy skills or, in the case of migrants and some indigenous groups, a language barrier.



INQUIRY

Better access to mental health care

Read the snapshot 'Better access to mental health care', then answer the following questions.

1. Which health professionals are involved in the team approach to improving access to mental health care?
2. What did the Better Health Access initiative introduce?
3. What evidence is there that this initiative has improved access to mental health services?

SNAPSHOT

Better access to mental health care

Mental health-related services are provided in Australia in a variety of ways — from hospitalisation and other residential care, hospital-based outpatient services and community mental health care services, to consultations with specialists and GPs.

The first professional encounter for many people seeking help for a mental illness is usually their GP. Data from the *Bettering the Evaluation and Care of Health* (BEACH) survey of GPs estimated that there were 13.9 million mental health-related GP encounters in 2010–11. This corresponds to 620 encounters per 1000 population.

The introduction of the GP Mental Health Treatment Medicare items as part of the Better Access initiative in November 2006 meant that Medicare rebates are available to provide early intervention, assessment and management of patients with mental disorders. It promotes a team approach to mental health care, with GPs encouraged to work with psychiatrists, clinical psychologists and other allied mental health professionals to increase the available care. It has resulted in a noticeable growth in Medicare Benefits Schedule (MBS)-subsidised specific GP mental health services. Since 2007–08, when the Better Access initiatives were fully operational, there has been an average annual growth rate in services per 1000 population of 17.0%. In 2010–11, GPs provided 2.1 million MBS-subsidised mental health-related services to 1.2 million patients.

Source: Australian Government Department of Health and Ageing, media release, 9 October 2006 and AIHW, *Mental Health Services in brief 2012*, pp. 3, 4.



APPLICATION

Researching access inequities

Choose one population group that suffers inequities in health status, for example:

(a) Aboriginal and Torres Strait Islander peoples
(b) migrants
(c) rural dwellers
(d) people who are homeless.

Research information and statistics about your selected group's access to health-care facilities and services. Create a PowerPoint presentation or an oral report on the impact of the level of access on the health status of your selected population group. Present it to your class.



INQUIRY

Flying Doctor to Tackle Rural Health Inequality

Read the snapshot 'Flying doctor to tackle rural health inequality', then answer the following questions.

1. How does the Royal Flying Doctor Service address equity issues for rural and remote communities?
2. From a social justice issue, why is it important for services to be continued?
3. Identify the three health issues for rural and remote communities that have noticeably increased according to the 2011–12 statistics from the Royal Flying Doctor Service.

SNAPSHOT

Flying Doctor to tackle rural health inequality

Meeting today at its Broken Hill Base, the Board of the Royal Flying Doctor Service (RFDS) South Eastern Section will announce the operational statistics for 2011/12. They show an increase in many key areas. The highlights are:

- Patient contacts up to almost 42 000 in the year to June.
- Total number of GP Clinics, flown to remote communities up to over 4000.
- Other Clinics (mental health, dental, women and children's nurse, breast care nurse etc.) up 16% to 1663.
- Primary or Emergency evacuations up 11% to 770.
- Telehealth consultations for remote patients up 3% to almost 5500.

'Particularly noticeable is the increase in our "Other" clinics, which do vital work in supporting overall community health, with a focus on prevention,' said President of the RFDS South Eastern Section, Mr John Milhinch OAM.

'This increase is mostly a result of The Outback Oral Treatment and Health (TOOTH) dental program which takes a dentist and dental therapist to rural and remote communities in the Central West and a flying breast care nurse who is now offering support to women living with breast cancer in the Far West.'

'The increase in primary or emergency evacuations has been attributed to an increase in farming activity and vigorous vegetation growth in bush areas since the end of the drought, which has resulted in more accidents.'

More than 30% of Australians live in regional and remote areas, where many struggle to get access to the kinds of health services taken for granted in the city.

The emphasis on medical training and partnerships with universities (the University of Sydney's Department of Rural Health, Charles Sturt University and Griffith University) as well as Aboriginal Medical Services and in particular, Maari Ma Health Aboriginal Corporation, has enabled the RFDS to start training the next generation of doctors, dentists and allied health workers.

Source: Royal Flying Doctor Service, South Eastern section, media release, 31 August 2012.

INQUIRY

The issue of access

1. Critically analyse the differences in access to health facilities and services that exist between rural and metropolitan populations. You will find some information about equity of access to health care at the **Equity of access to health care** weblink in your eBookPLUS.
2. Explain how these differences in access have affected the health status of rural and metropolitan populations.
3. Access the **Rural health Alliance** weblink in your eBookPLUS. Use the information in the most recent Fact Sheets to explain why rural health warrants ongoing attention.
4. Discuss how the government's funding of health-care facilities and services affects access to our health-care system.
5. Explain why people from lower socioeconomic groups have lower levels of access to health-care facilities and services.
6. Access the **Rural and remote** weblink in your eBookPLUS. Use the information to explain the rural health access problems facing the Aboriginal community in Australia.
7. Use examples from the above questions to evaluate access to health care in terms of social justice principles.

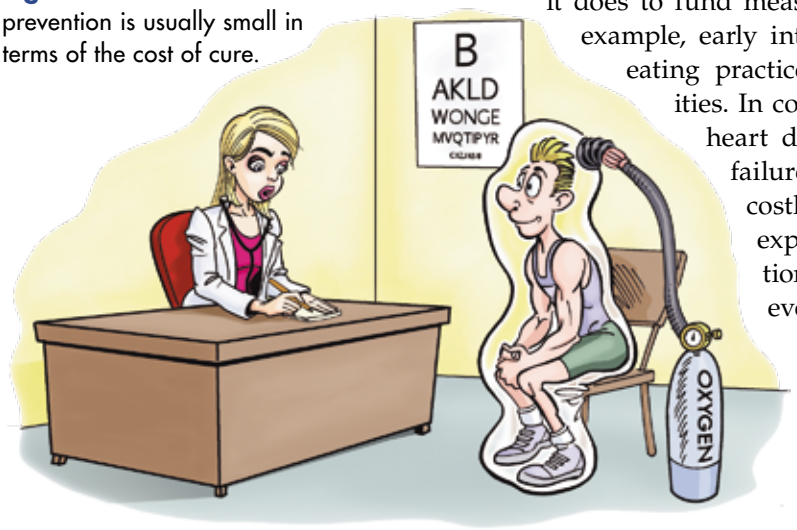
Health-care expenditure versus early intervention and prevention expenditure

Health-care expenditure is the allocation of funding and other economic resources for the provision and consumption of health services.

Health-care expenditure includes expenditure by Australian state and territory governments, as well as private health insurance, households and individuals. In 2009–10, expenditure was $121.4 billion, with more than two-thirds of this spending funded by governments.

Health-care expenditure has steadily been increasing and will continue to do so while the focus is on 'curative' medicine; that is, the focus is on curing a disease or illness, rather than preventing it. For example, it costs more to 'cure' a disease such as coronary heart disease once it has developed than it does to fund measures to prevent the illness occurring. In this example, early intervention might focus on education, healthy eating practices, weight control and active lifestyle activities. In contrast, curative measures such as treatment of heart disease, stroke, clogged blood vessels, kidney failure, blindness and foot/leg amputation are more costly and contribute considerably more to health expenditure. As a result, many feel that prevention is both undervalued and under-resourced, even though funding for health promotion and illness prevention has increased in recent years.

Figure 3.8: The cost of prevention is usually small in terms of the cost of cure.



'There's absolutely nothing wrong with you, so I'm writing a prescription for a puncture repair kit in case you get a leak in your bubble.'

Health-care expenditure in Australia still far exceeds expenditure on illness prevention and health promotion. This is due to an emphasis on medical treatments to cure illness dominating the allocation of public health resources and spending. The new public health model focuses on the social factors that lead to ill health. This model

places the emphasis on health promotion as the most cost-effective way in which to address the social issues of health.

Governments, individuals and communities are being made more accountable for their expenditures. Many people whose health is sound because they practise positive health behaviours (exercising, not smoking, healthy eating and so on) resent paying increased taxes to support those who choose inappropriate lifestyles. Insurance companies recognise the problem, and charge higher premiums for smokers who wish to be covered for life insurance. Lifestyle factors could cause up to an estimated 70 per cent of all premature deaths. Yet, more than 90 per cent of Australia's health expenditure is allocated to treating and curing illnesses.

Unfortunately, it often takes some years for prevention measures to translate into a reduction in the incidence of lifestyle-related diseases. However, preventative programs for cardiovascular disease, cancer and traffic accidents have been visible over the past two decades — for example, QUIT, SunSmart, national cervical and breast screening programs, Stop/Revive/Survive and drink-driving campaigns. Training programs for general practitioners have made them more aware of the importance of preventative health for their patients and promoting positive lifestyles. As 82 per cent of Australians see their GP at least once a year, this frontline advocacy is an important form of health promotion. Together with treatment, early intervention and prevention programs seem to have contributed to marked falls in mortality and morbidity rates from these problems.







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Figure 3.9: It may take some time to realise the benefits of expenditure on preventative programs.

Strategies that could be used to prevent illness and death in the community include:

- educating school children about positive health behaviours
- better coordination among the various levels of government
- restrictions on advertising
- legislation
- higher taxes on products such as alcohol and tobacco
- the provision of support programs to help people give up addictive habits such as smoking and high alcohol consumption.

There are strong arguments for increasing the funding and support for preventative health strategies.

1. *Cost-effectiveness* — preventing illness and injury would result in huge savings in funds and resources used for acute health care.
2. *Improvement to quality of life* — the positive health outcomes for individuals that result from prevention include improvements in morbidity rates and longevity — that is, a longer and healthier life.

3. *Containment of increasing costs* — prevention is the best way of containing the continually increasing costs of health care. Otherwise, these costs could result in adequate health care being unaffordable for ordinary Australians.
4. *Maintenance of social equity* — a policy of prevention helps to provide greater equity (in the health-care system), which otherwise would be under threat as health costs continue to rise significantly.
5. *Use of existing structures* — prevention activities use existing and accessible community structures (such as general practitioners) rather than relying on special services and technological procedures. General practitioners are in a good position to measure risk factors and educate their patients on illness prevention and health promotion.
6. *Reinforcement of individual responsibility for health* — the use of prevention strategies empowers individuals to take control of their personal health by modifying their behaviour.

The arguments for preventing various lifestyle diseases are convincing, but the quality of the extended life span experienced is an issue to be considered. Some researchers are investigating whether delaying the onset of illness through preventative strategies and extending the life span has the effect of increasing the rates of sickness and prolonging the period of illness in the later years of life.

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INQUIRY

Prevention is always better than the cure

Read the snapshots 'Prevention is always better than the cure' and 'The price of a life', then answer the following questions.

1. List the arguments presented in the articles that support greater health spending on health promotion and illness prevention.
2. What strategies are suggested for improving health prevention measures?
3. What attitudes, do the writers suggest, make it difficult for governments to spend a greater proportion of heath expenditure on preventing disease?
4. Do you think that spending on health promotion and illness prevention is a good investment for the Australian people? Why or why not?

SNAPSHOT

Prevention is always better than the cure

by Lewis Kaplan,
chief executive of General Practice NSW

The recent news about NSW not meeting federally imposed targets for waiting times in hospitals should cause us grave concern, but not for the reasons most reports have cited.

The NSW Minister for Health, Jillian Skinner, is damned if she does not increase the efficiency and effectiveness of hospitals' emergency departments and increase the number of hospital beds. She is also damned if she (and her federal counterpart, Tanya Plibersek) do not invest much more significantly in ways to keep people out of hospital in the first place, which is a much better and more rational use of scarce resources.

It is generally accepted that more resources in primary healthcare will reduce avoidable hospitalisations. The trouble is that this is not 'newsworthy' in the way that emergency department horror stories are. A recent report on a useful chronic disease management program run in NSW shows that participants experienced a third fewer avoidable hospitalisations as a result of the program over 18 months. We know that most avoidable hospitalisations are due to chronic disease, so it makes enormous sense to

(continued)

invest in this sort of program — and the investment is substantial: $177 million up to 2014–15.

But compared to the money going into hospitals to fund emergency and acute care, $177 million is a mere bagatelle, with little hope of stemming the tide of chronic disease, which can only happen if we give responsibility to the whole of government (not just health departments) to address lifestyle, from school age onwards.

Another problem lies in the way we fund our nation's healthcare: the federal government is responsible for 'primary care', GPs and specialists via Medicare, and medications via the Pharmaceutical Benefits Scheme. If the federal Health Department spends more on programs that keep people out of hospital, it is the state governments that stand to make, and keep, the savings. As there is no way for the federal government to claw back these savings, the nation's health suffers because bureaucrats' budget accountabilities live in silos.

Australians need to become involved in a conversation about why there is effectively bottomless funding for emergency and intensive care and why we (via the media) express such outrage when one person's healthcare experience in a hospital is not up to scratch, but there is relative community (and media) silence about preventable chronic diseases, such as the 100 000 people diagnosed with type 2 diabetes each year, of which fully 60 per cent is preventable.

Source: Sydney Morning Herald, 24 Dec. 2012.

SNAPSHOT

The price of a life

By Ruth Pollard

If we are not, as the poet John Milton wrote, to 'live a life half dead', how do we judge what a life is worth and how much should be spent to preserve it? As governments wring their hands over the spiralling cost of health care — now running at twice the rate of economic growth — the obvious but long-term brake that could be applied is the creation of a healthier population.

Chronic disease accounts for almost three-quarters of all health expenditure and that, along with the impact of ill health on labour force productivity, increases the real cost of poor health, at a personal and an economic level.

The bulk of health expenditure continues to be directed at the acute end of the health system, treating people after they get sick with expensive pharmaceuticals and diagnostic technology, rather than preventing the illness from occurring — or at least delaying its onset.

'We spend 2 to 3 per cent of our budget on 40 to 50 per cent of the disease burden, which is preventable,' says Dr Rob Moodie, the chief executive officer of VicHealth, the Victorian Health Promotion Foundation.

A classic example is the anti-smoking drug Zyban. When it first became available through the Pharmaceutical Benefits Scheme in 2000, Australia spent $83 million in one year with a very limited effect, Moodie says. A 2002 study found that while 10 per cent of smokers had tried Zyban since 2000, 80 per cent of people did not complete a full course of treatment.

Moodie argues the money could have been better spent — for example $10 million was invested in anti-smoking programs in 2000, resulting in 190 000 people quitting and saving 1000 people from dying, he says. 'Why is the system so skewed that money pours out to pharmaceutical interventions and not much to public health interventions that can reduce the disease burden?'

Health economists have worked out to the dollar what a life is worth. The answer? In Australia, $3.7 million, or $162 561 a year, says Lynne Pezzullo, a senior health analyst and associate director of Access Economics.

Taking into account factors such as what people are prepared to trade off for money — working in a risky profession or paying to install a smoke alarm, for example — along with potential earnings and other measures, the value of a life is an important figure to consider when working out how much to spend saving it.

Added to that, the World Health Organization has developed a standard for the amount of money governments should reasonably spend to gain one year of life, a 'quality-adjusted life year', or QALY. In Australia it is a minimum of $40 000.

'If we can purchase a quality-adjusted life year for less than $40 000 we will do it, almost always,' says Pezzullo.

That $40 000 is spent on anything from pharmaceutical interventions, to awareness programs, to Pap smear registers and reminder letters about breast checks.

The Prime Minister, premiers and chief ministers dipped their toes in the water last month, agreeing to focus on promoting healthy lifestyles and the early detection of chronic disease. 'There were good signs of there being more of an understanding that productivity is important and the link between health and productivity,' Pezzullo says.

'Unfortunately we still very much have a silo attitude, where only the savings you get in the health system are taken into account when funding interventions — clearly we need an economy-wide view.'

Pezzullo says health interventions such as counselling and support groups are highly cost-effective — every dollar spent saves $7. Vision loss — from cataracts, glaucoma and diabetic retinopathy — is another area where prevention programs can produce significant cost savings.

The most cost-effective move to make is to have an eye check, so diseases — 70 per cent of which are preventable — are picked up in the early stages. 'Visual impairment is linked to falls or getting hit by motor vehicles, as well as depression . . . there is higher comorbidity and death rates for people who are visually impaired.'

Giving up smoking, getting tested for diabetes, wearing sunglasses and using protective eyewear when playing sport all produce cost savings throughout the economy, Pezzullo says.

Society is happy about paying for prevention when it is based on a pill, because it doesn't require a lifestyle change, says Stephen Leeder, a professor of public health at the University of Sydney. 'Look at cholesterol-lowering drugs — there is no great objection I hear from people about taking a statin, there is no antipathy towards the notion of prevention but there is antipathy about changing your diet and lifestyle.'

A real preventive approach to health would look at the food we eat and ensure access to fresh fruit and vegetables was as easy and affordable as junk food. It would look at cities and towns and the way they are planned, ensuring they were designed to encourage people to walk, to make use of parks, and to meet as a community to look after our mental health, Leeder says.

A tiny 2 per cent of the public health budget is invested in health promotion; the rest goes on chronic care and the acute end of the health system.

Australia's lack of investment in physical activity will also come back to haunt us, says Moodie. 'We have done a terrific job in changing our behaviour on road trauma and tobacco use — these programs have really shifted the norms of behaviour and to say that it is not possible in other areas is tossing in the towel too early.'

But the prevention of obesity requires a significant investment in policy change, in media, in effective regulation and legislation and in research, monitoring and evaluation, he says.

Governments must invest, Moodie says, if not to avert spiralling health costs, then to improve labour market participation . . .

'It is really tough for health ministers — you have got communities demanding that they have hospitals open in small country towns, when it would be far better to invest that money in a community health centre to manage the diabetes before they end up in hospital.'

Source: *Sydney Morning Herald*, 2 March 2006, p. 11.

Impact of emerging new treatments and technologies on health care

Keyhole surgery is surgery performed through a very small incision (usually 0.5–1.5 cm), usually using a laparoscope or endoscope, devices for viewing inside the body.

Almost daily, we hear of new treatments and technologies that will improve healing and health care generally. Much of this relates to health technologies used in diagnostic procedures, such as ultrasound, **keyhole surgery** and magnetic resonance imaging (MRI). In Australia, non-invasive surgery (laparoscopy, for example) is preferred in many cases to conventional 'open' surgical procedures. It generally results in less pain, shorter hospital stays and faster

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recovery times. These advantages are particularly significant for the elderly, because they face reduced risks and improved recovery from surgery.

Examples of developments in emerging treatments and technologies include:

- advances in image technology used in keyhole surgery make operating procedures far more accurate and less risky for the patient. Laser-fitted flexible endoscopes penetrate very small incisions and make repairs to hernias, kidneys, knees and other structures with new levels of precision, leaving minimal scarring and tissue damage.
- progress is advancing in the treatment of eye conditions with drugs rather than lasers
- continual improvement in the materials, construction and compatibility of parts associated with hips, knees, heart valves and eye lenses, making operations safer and shorter
- making it easier to quit smoking by developing tablets that specifically target nicotine receptor subtypes
- administering **chemotherapy** through 'wafers' or dissolvable discs inserted into the brain at the time of the operation rather than through a vein, port or orally after the operation
- development of new drugs that assist treatment of HIV by stopping the virus from making copies of itself and its ability to bind to new cells. Many HIV sufferers can now look forward to a much longer life than anticipated 20 or so years ago.

Chemotherapy is the treatment of cancer using chemical agents or drugs that are selectively toxic to malignant cells.



Figure 3.10: Developments in technologies such as MRI scans are costly but contribute significantly to improving patient health outcomes.

- genetic testing, which could lead to finding a disease earlier and preventing death
- advances in developing prosthetics to replace missing limbs. Improved microchips are powering electronic attachments to muscles, enabling stronger, better controlled movements by patients.
- improvements in artificial organs such as kidney and heart machines responsible for keeping people alive until a real organ can be found. It is hoped that artificial organs will eventually be used extensively in organ transplants.

Unfortunately, all new technologies come at a price. In the context of a largely publicly funded health-care system, balancing the cost of new technologies, limited resources and the need to maintain health at an acceptable level is difficult. Research, development, testing, medical and specialist's fees and highly sophisticated equipment amount to millions of dollars, making some technologies unaffordable unless privately donated or subsidised by government.

Much research is currently being done on early detection because the benefits, both personal and financial, far outweigh surgery or other curative techniques. Regular mammogram testing for breast cancer, Pap smears and use of vaccines to prevent HPV (human papillomavirus) infection, PSA tests for prostate cancer and risk identification programs (smoking, blood pressure, cholesterol) are examples of early intervention programs.

Skin cancer is the most common form of cancer in Australia. As a result it is the target of considerable research. Discovery of a link between inherited genes, environmental influences and skin cancer is making the prospect of developing a screening program for early detection a real possibility. A genetic link that increases the chances of melanoma is also being investigated, making



Figure 3.11: Dental health, while not life threatening, does contribute to quality of life. Dental health can be improved through early detection.

the prospect of biological therapy in preference to surgery a more cost-effective and individually appealing option.

Early detection has considerable benefits for individuals. Screening programs are not as invasive as the surgery that might be required should the condition progress undetected. For example, a mammogram which involves an x-ray of the breast may reveal a tumour in the very early stages and require keyhole surgery. Without the benefit of early detection, the breast may need to be removed, a much more serious outcome for the patient both personally and financially.

Unfortunately, access may prevent some people from participating in early detection and treatment programs. Socioeconomic circumstances and geographic location may influence health care to the point where the diagnostic, treatment and/or rehabilitation processes are not fully utilised. For example, cardiac patients may have limited access to exercise facilities in some areas, socioeconomic conditions may inhibit families in poorly maintained houses from understanding and addressing childhood asthma, and some ethnic groups may have little knowledge and understanding of the importance of screening procedures and where they can be accessed.

Furthermore, issues relating to access to dental health are gaining prominence. While fluoride added to the water supply considerably improved dental health for a period of time, other factors such as the high cost of dentistry and widespread consumption of cordial drinks and mineral water (which does not contain fluoride) has meant that dental health problems are on the rise, with socioeconomically disadvantaged groups being the most affected.

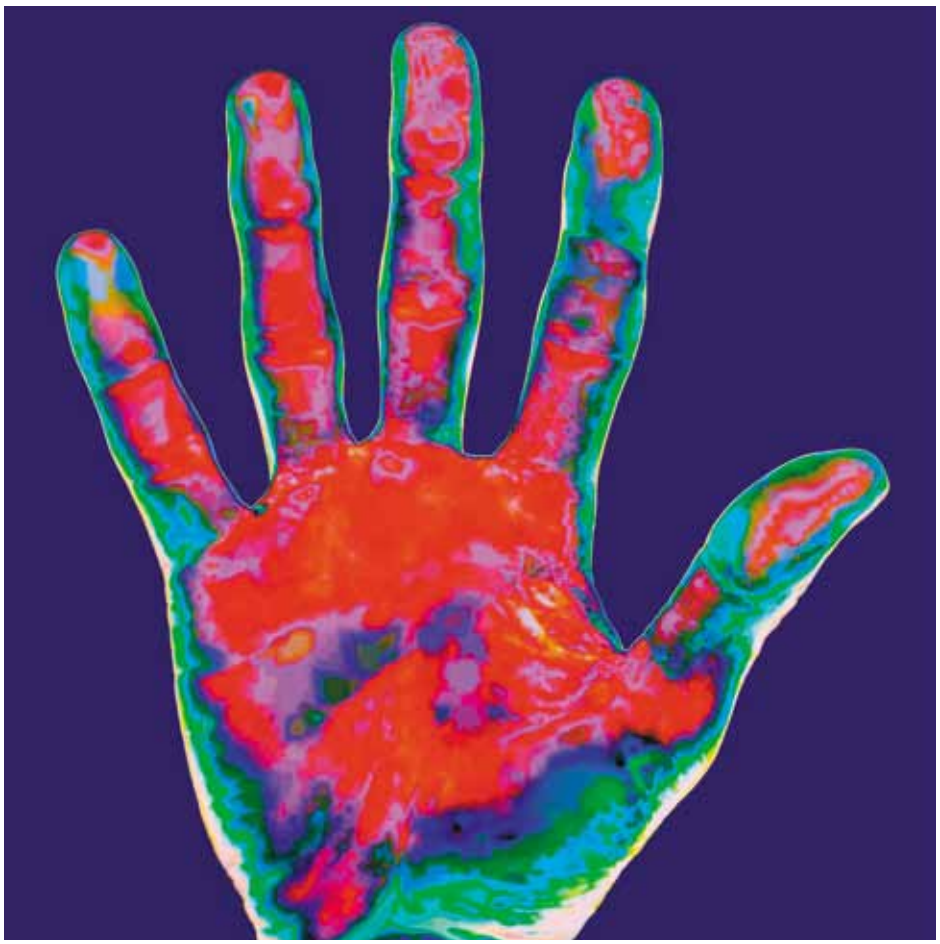


Figure 3.12: Thermal imaging is one of a number of methods used in early detection, but it is very expensive.

INQUIRY

Dental care targets the poor

eBookplus

Connect to the **Denticare** weblink in your eBookPLUS. Discuss how Denticare might assist access and address inequities in dental health in Australia.

Health insurance: Medicare and private

Accidents and illness can cost individuals a considerable amount of money. The Commonwealth Government is committed to providing equitable health services to all people, which it attempts to achieve through its basic health insurance scheme, Medicare (introduced in 1984).

Medicare

Medicare is Australia's universal system of health care that provides services that are accessible to all Australians.

Medicare is Australia's universal health-care system, established to provide Australians with affordable and accessible health care. The funds to operate the Medicare system are obtained from income taxes and the Medicare levy, paid according to income level. This is currently 1.5 per cent of a person's taxable income, but can vary according to individual circumstances. You can find further details by accessing the **Medicare levy** weblink in your eBookPLUS.

eBookplus

Medicare provides individuals with access to:

- free treatment as a public patient in a public hospital
- free or subsidised treatment by medical practitioners, including GPs, specialists, and some specified services of optometrists and dentists.

Regardless of what doctors or specialists charge, every Australian is covered for 85 per cent of an amount that is set down by the government as a common (scheduled) fee. Some doctors charge more than the scheduled fee. Many doctors **bulk bill** patients, which means the patient pays nothing and the doctor receives up to 100 per cent (85 per cent in the case of specialists) of the scheduled fee from Medicare.

Bulk billing is a payment option in the Medicare system. The service provider (doctor) bills Medicare directly for the consultation fee, thereby accepting the Medicare benefit as full payment for the service, and the patient pays no fee to the doctor.

Medicare benefits also cover optometrist services and oral surgery, but not private dentistry, physiotherapy, chiropractic treatment and appliances.

Private health insurance

Many people choose to 'top up' their health cover by taking out private health insurance. The extra insurance allows people to cover private hospital and ancillary expenses (such as dental, physiotherapy and chiropractic services) and aids and appliances (such as glasses).

People choose private health insurance for a number of reasons, including:

- shorter waiting times for treatment
- being able to stay in a hospital of their own choice
- being able to have a doctor of their own choice in hospital
- ancillary benefits, such as dental cover
- security, protection, peace of mind
- private rooms in hospital
- insurance cover while overseas.

Lower levels of private health insurance are found among the young, the elderly and other groups that have less available income. After the introduction of Medicare in 1984, many people opted out of private health insurance (see figure 3.13). The fall in the membership of private health insurance funds created pressures on the public health system, leading to lengthy debate by

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politicians and health authorities. The strain on the health system was caused mainly by the increasing demands for service from an ageing population and the increased numbers of 'free' Medicare patients. In 1998, to decrease this burden on the public health system, the Commonwealth Government introduced a rebate for people who have private health insurance. The rebate is income-tested, ranging from 10% to 40%. It also introduced a Medicare **levy** surcharge (on top of the 1.5 per cent Medicare Levy) on individuals who earn more than $84 000 (2012 amount) and families who earn $168 000 or more (2012 amount), and do not have an appropriate level of hospital insurance.

Levy is a payment collected by the government from a person's income.

A further change was the lifetime health-care incentive, which was introduced from 1 July 2000. This incentive gives lower lifetime premiums to people who join a health insurance fund early in life and maintain their hospital cover, compared with the premiums for someone who joins after age 30. These policies are aimed at attracting people to private health insurance.

Despite predictions of a fall, the number of Australians covered by private health insurance has risen from 43.4 per cent of the population in 2007 to 46 per cent of the population in 2011 (10.4 million people). This is the highest proportion of population covered by private health insurance since 2001. General trends in private health insurance are shown in figure 3.13.

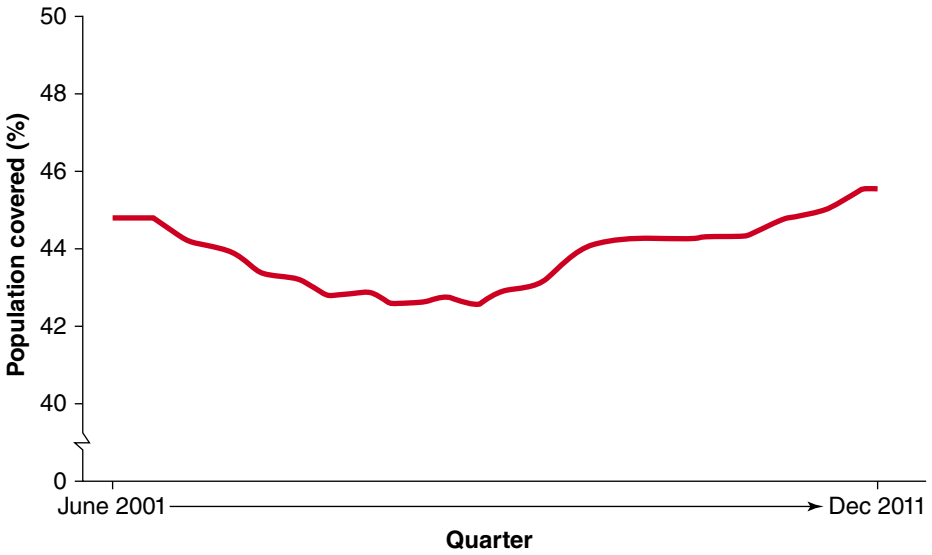


Figure 3.13: Population covered by basic private hospital insurance, 2001–2011

Table 3.1: A comparison of Medicare and private health insurance

	Medicare	Private health insurance
Who pays?	• Commonwealth Government • Taxpayers	• Commonwealth Government • Private contributors
How paid for?	• Levy or tax linked to salary	• Monthly premiums for various forms of cover
What benefits?	• Basic medical services (doctors and specialists) • Choice of general practitioner • Basic hospital services in public hospitals • Specialist health care • Cover for 85 per cent of the scheduled fee for medical services	• Hospital cover – hospital services – doctor of choice – hospital of choice – private or public hospital • Ancillary services — for example, dental, optical, chiropractic • Some special benefits — for example, sports equipment • Cover while overseas

INQUIRY

Medicare and private health insurance

1. Explain how the Medicare system of health insurance functions.
2. Outline the benefits of the Medicare system.
3. Explain how private health insurance might benefit some people.
4. Read the snapshot 'Private health insurance tips'. What are the advantages of having private health insurance?
5. Use figure 3.13 to describe trends in private health insurance.
6. Outline government strategies for attracting people to private health insurance.

SNAPSHOT

Private health insurance tips

Your health fund premiums went up for the last four years in a row. In the same period some funds have been cutting benefits and eroding the value of your cover. It is not all bad news because it is possible to save hundreds of dollars just by shopping around. A word of warning, however. Be cautious when changing funds — you may have to serve benefit limitation periods and waiting times.

It's important to remember that, under Medicare, all Australians are entitled to free treatment in a public hospital, regardless of their insurance status.

Private health insurance gives you:

- access to a private hospital, which might be more luxurious than a public hospital
- greater choice of doctor than you would get if you were treated in the public system
- possibly shorter waiting times for some forms of elective (non-urgent) surgery.

Three regulations affect how much health insurance costs you:

- **Private Health Insurance Rebate** paid by the government on your hospital and extras cover premiums. [The rebate] will be means tested from 1 July [2012]. Australians who earn more than $84 000 (single) or $168 000 (couple/family) in the next financial year will pay much more for hospital and extras insurance, as their rebate will be reduced.
- **Lifetime Health Cover (LHC)** is a surcharge that adds 2% to your premium for every year you don't have hospital insurance after age 31. It can add up to 70% and applies for the first 10 years of your hospital cover.
- **Medicare Levy Surcharge (MLS)** is an extra tax for high-income earners on top of the Medicare Levy that you can avoid by taking out hospital cover. You can choose cover with an annual excess of up to $500 (single) or $1000 (family). It was 1% for everyone above the cut-off, but from 1 July [2012] a stepped rate of 1–1.5% will apply.

Source: Report by *CHOICE* Online, Australian Consumers' Association, February 2007, www.choice.com.au.

INQUIRY

Medicare and private health insurance

eBookplus

1. The Commonwealth Government has established a website to help consumers understand and make decisions about health insurance. Use the **Health insurance explained** weblink in your eBookPLUS to access the website.
   (a) Access each of the links and evaluate the usefulness of the information.
   (b) Search the site for the Lifetime Health Cover Calculator, and use it to enter birth dates for a range of age groups to help understand how the Lifetime Health Cover loading is calculated.

eBookplus

2. Describe the role of the Private Health Insurance Ombudsman. You will find information at the **Private Health Insurance Ombudsman** weblink in your eBookPLUS.

3. Enlarge the following chart. Use the chart to summarise the advantages and disadvantages of Medicare and private health insurance, particularly in terms of cost, choice and benefits.

	Medicare	Private health insurance
Advantages		
Disadvantages		



COMPLEMENTARY AND ALTERNATIVE HEALTH-CARE APPROACHES

Complementary and alternative medicine (CAM) refers to healing practices that do not fall within the area of conventional medicine. It encompasses health areas such as hypnosis, homeopathy, naturopathy, meditation, herbalism and acupuncture. While many of these types of medicines and practices have existed traditionally as alternatives to mainstream medicine, more recently a growing acceptance of their role in supporting mainstream techniques has given rise to the term 'complementary'.

Alternative medicine has existed for many centuries, particularly in Asian countries. Traditional Chinese medicines account for 30–50 per cent of all medicines consumed in China. Japan has the highest consumption of herbal medicines in the world.

Populations of developed countries have steadily grown more interested in alternative treatments and medicines over the past decade. Herbal medicines are becoming a popular alternative to modern medicine in developed countries, resulting in an increase in international trade in herbal medicines. Each year, Australians spend over $4 billion on alternative medications or practitioners.

Practitioners of modern medicine are starting to recognise the value of alternative and complementary health-care approaches and are incorporating some of these into their treatments of clients. The World Health Organization supports countries in their development of national policies on alternative medicine to study its potential usefulness. Australians are increasingly buying herbal remedies and consulting alternative health-care practitioners such as chiropractors, homeopaths, naturopaths and Chinese herbalists.

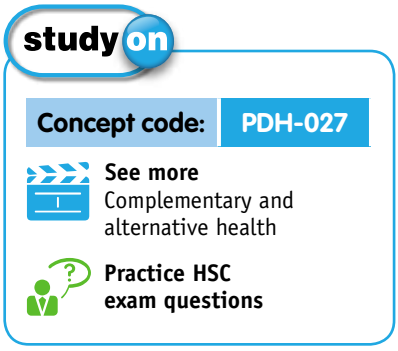


Table 3.2: Types of complementary and alternative medicine and examples

Types	Examples
Biologically based approaches	Diets Herbs Vitamins
Manipulative and body-based therapies	Massage Chiropractic Osteopathy
Mind–body interventions	Yoga Spirituality Relaxation
Alternative medical systems	Homeopathy Naturopathy Ayurveda
Energy therapies	Reiki Magnets Qigong

Source: Adapted from a diagram in M. Goldrosen and S. Straus, 'Complementary and alternative medicine: assessing the evidence for immunological benefits', *Nature Reviews Immunology*, November 2004.



For more information about CAM access the **CAM** weblink in your eBookPLUS.

Reasons for the growth of complementary and alternative health products and services

Government surveys show that two-thirds of Australians are currently using CAM treatments. The trend towards using CAM has a lot to do with social change. Greater globalisation and societal trends towards individualism have meant improved access to information worldwide and less acceptance of traditional medical practices. Many people see CAM as an opportunity to exercise choice, exerting greater control over their health through empowerment. The rise in consumption of **organic foods** is evidence of strengthening consumer confidence in aspects of health care over which they have control.

Organic foods are foods produced without using commercial chemicals such as pesticides and fertilisers.

Other reasons for the increasing popularity of complementary and alternative medicine generally include:

- World Health Organization recognition of the usefulness of many alternative approaches and its endorsement of a list of medicinal plants to be used in the preparation of herbal medicines
- recognition that alternative medicines are the traditional medicines of the majority of the world's population
- the effectiveness of treatment for many people for whom modern medicine has proved ineffective
- the desire of many people to have natural or herbal medicines rather than synthetically produced medicines
- the **holistic** nature of alternative medicine, which is attractive to many people
- the strength of traditional beliefs for many cultures
- increased migration and increased acceptance by Australians of the value of multicultural influences.

Holistic means focusing on the whole patient. Treatments involve the balance and interrelationship between a patient's physical, social, emotional and spiritual needs.

The growth in CAM adds another dimension to medical health in its direction and expectations. Consumers, aided by medical information readily available on the internet, have moved to exercise greater choice in addressing personal health care, particularly in areas where there appears an element of uncertainty with traditional approaches.

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Practice HSC exam questions

Range of products and services available

The following examples are from the wide range of alternative health-care approaches.

- *Acupuncture* is an ancient system of healing that has developed over thousands of years as part of the traditional medicine of Eastern countries. Acupuncture treatment involves inserting very fine needles into the skin. They are left in either briefly or for up to 20–30 minutes. Acupuncture is claimed to be effective in a wide range of conditions, stimulating the mind and the body's own healing response.

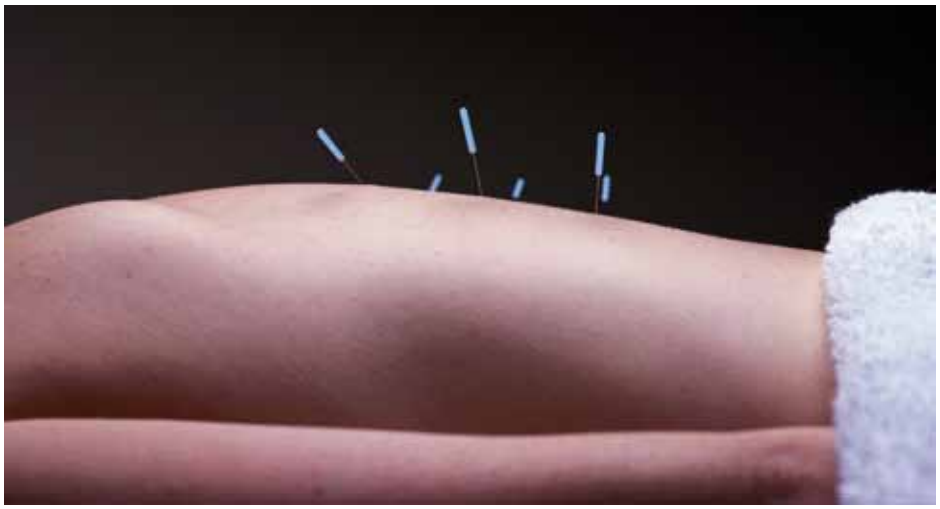


Figure 3.14: Acupuncture can assist with pain management.

- *Aromatherapy* is the use of pure essential oils to influence or modify the mind, body or spirit. Aromatherapy acts in accordance with holistic principles by strengthening the person's vital energies and self-healing capabilities, thus having a direct effect on the mind and body. Essential oils can be inhaled through vaporisers and applied through baths and massage. Aromatherapy is used in the treatment of depression, sleep disorders, stress symptoms and anxiety.
- The *Bowen Therapeutic Technique* is a system of muscle and connective tissue movements that gently realigns the body and balances and stimulates energy flow. This has the effect of supporting the self-healing properties of the body. The technique is believed to be effective in the treatment of soft-tissue injuries, musculoskeletal problems, back and neck aches, arthritic symptoms, stress, migraines, asthma, sinus and bronchial symptoms, and menstrual irregularities.
- *Chiropractic* is based on the relationship between the spine and the functioning of the nervous and musculoskeletal system. Chiropractors 'adjust' the spine, using specific rapid thrusts delivered by the hand or small instruments. The adjustments are aimed at correcting subluxations, removing interference to normal nervous system control over bodily function, and promoting healing and better health.



Figure 3.15: Herbalists use plants and herbs for their healing properties.



- *Herbalism* uses plants and herbs exclusively. The oldest form of medicine, it is still used as a primary source of medicine for over 75 per cent of the world's population. Herbalists use the whole plant form of a medicine rather than chemical extracts from plants. They believe that we have an innate ability to heal ourselves. Thus, herbal medicines are used to restore and support the body's own defence mechanisms. Herbal treatment is based on the individual's symptoms, lifestyle and overall health.
- *Homeopathy* is a system of medicine that recognises the symptoms unique to each person. It aims to stimulate the individual's healing powers to overcome the condition. Homeopathic medicines work gently and rapidly to alleviate symptoms.
- *Iridology* is the analysis of the human eye to detect signs of the individual's physical, emotional and spiritual well-being. A range of naturopathic treatments can then be prescribed to improve general and immune system health.
- *Massage* is one of the oldest and simplest forms of therapy. It is an excellent method of inducing relaxation. It helps reduce blood pressure, stress and anxiety levels, and overall it is beneficial to the immune system. Forms of massage include remedial massage, therapeutic massage, sports massage and Swedish massage.

Figure 3.16: The many forms of massage help to relax and reduce stress.

- *Meditation* is a state of inner stillness. It involves focusing on an object, breathing or verbally repeating a word (a mantra). With practice, the individual can reach a meditative state, in which they experience inner peace and stillness. The benefits of meditation include strengthening of the immune system, improved sleep, lower blood pressure and increased motivation and self-esteem.
- *Naturopathy* focuses on the holistic treatment of the individual by seeking to address symptoms of illness as well as resolving underlying causes of illness. Naturopaths recognise the importance of developing a partnership with their clients, because it is important for the individual to take responsibility for making positive lifestyle changes.

eBookplus

Access the **Health Insite** weblink in your eBookPLUS for more examples of products and services available in the area of complementary and alternative medicines.



Alternative health-care approaches

Choose one type of alternative health care. Use the internet to research it fully, using the following key words:

(a) history
(b) nature (including what it is, how it works and who practises it)
(c) benefits
(d) treatment
(e) cost
(f) level of training required by practitioner
(g) groups who would benefit.



Integrated medical care

In 2009, the Lifehouse at RPA was established by the late Professor Chris O'Brien as a cancer research and treatment facility, integrating clinical care, research and education, and holistic care for cancer patients. Professor O'Brien's own experiences during cancer treatment led him to believe that alternative and complementary treatments, such as natural medicines and meditation, had a role and could benefit patients in trying to put the body back 'in balance'. Find out more about the centre and its holistic approach using the **Lifehouse at RPA** weblink in your eBookPLUS and write a short report on your findings.

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study on

Concept code: PDH-029

Do more
Making informed decisions

Practice HSC exam questions

How to make informed consumer choices

When choosing any type of health or medical service it is important to investigate the service offered and the credibility of the practitioner. A client needs to ask the following questions.

- What is the treatment you offer? How can it benefit me?
- What experience and training do you have?
- What are your qualifications?
- How much will the treatment cost?
- Can this treatment be combined with conventional medication?

An important first step in making informed choices is to gather such specific information about the nature of the alternative medicine, its credibility as an effective type of treatment, and the qualifications and experience of practitioners. Asking friends and community members about their experiences and recommendations can also be valuable.

Some alternative medicines are considered to be very effective, and the World Health Organization recognises them to be valuable and significant treatments. Chiropractic medicine, naturopathy and acupuncture, for example, are offered as university courses within Australia. Other forms of alternative medicines have endeavoured to ensure the highest quality of treatment by providing courses within their organisations; for example, the Bowen Therapy Academy of Australia offers an introductory course followed by a six-month practitioner course to obtain accreditation.



APPLICATION

Developing personal consumer skills

Using the questions listed above as a guide, or your own questions, investigate the credibility of one type of alternative medicine. Your investigation methods may include:

(a) gathering information from local practitioners

(b) experiencing the chosen treatment

(c) researching the qualifications required to practise

(d) contacting training organisations to collect information

(e) interviewing people who regularly use this treatment.

Present your findings as a report and share this with the class.



INQUIRY

Making informed consumer choices

1. When selecting an alternative medicine, what information would you require to make an informed choice?
2. Discuss methods of accessing correct and relevant information about alternative medicines in your local area.
3. How do you know which practitioners and health-care organisations to believe?
4. In small groups or in pairs, create a PMI chart as follows to summarise the advantages and any drawbacks of alternative medicines.

Plus	Minus	Interesting

SUMMARY

- The role of health care in Australia is to provide quality health facilities and services that meet the needs of all Australians.
- The health-care system involves a complex interrelationship between Commonwealth, state and local governments, health insurance funds, public and private providers, institutions and other organisations.

- The range of health-care facilities and services in Australia include public and private hospitals, psychiatric hospitals, nursing homes, medical practitioners and specialists, community programs, health promotion services and other health professionals who offer alternative health care.
- Health-care facilities and services are essential in diagnosing, treating and rehabilitating the ill and injured. They also play an important role in preventing illness and promoting health.
- Efficient and effective health-care services, along with adequate public housing, employment, education, hygiene and environmental safety, are all crucial factors that have an impact on levels of health.
- Access to health-care facilities and services is affected by a number of factors, including affordability, location, knowledge of service and language barriers. These factors result in inequity in access to health care.
- The private sector within the community plays an important part in providing health-care services, such as the health-promotion strategies undertaken by the National Heart Foundation.
- Individuals have a responsibility to take actions to promote their own health, thus lessening the financial burden on taxpayers.
- Emerging health treatments and technologies are having considerable impact on many areas of health including screening, programs, drug administration, surgery, treatment, prosthesis and general medical procedures. While technological advancements such as keyhole surgery and MRI scans improve patient outcomes, they do come at a price.
- Medicare is the national health insurance program that was introduced to support the health of all Australians. It covers a proportion of basic medical and public hospital expenses. Medicare is funded by Australian taxpayers.
- Private health insurance allows people to be covered for extra medical and private hospital costs.
- The Commonwealth Government has introduced an income-tested rebate as an incentive for people to join private health insurance. It has also introduced a levy on high earners who do not have private health insurance. Most recently, it set up the 'lifetime health cover' scheme to encourage membership.
- A large proportion of health expenditure in Australia is devoted to curative services, with a small fraction allocated to health promotion. Ill health is costly to the government and the individual. Our taxes fund the bulk of the medical systems within Australia.
- Health promotion is a much more cost-effective means of reducing disease and illness in the long term.
- Complementary and alternative medicine is growing in popularity in developed countries. Greater globalisation and societal trends towards individualism have contributed towards this phenomenon. Some people are becoming disillusioned with the biomedical treatments on offer.
- There are a range of alternative health-care approaches, such as acupuncture, chiropractic, herbalism, naturopathy and iridology.
- It is important to make informed decisions when choosing an alternative health-care approach. The individual needs to investigate the services on offer, the costs, the qualifications and experience of the practitioner, and the health claims being made before committing to it.

QUESTIONS

Revision

1. Outline the range and type of health-care facilities and services that exist in Australia. (H1) (3 marks)
2. Briefly explain the role of health care within Australia. (H5) (4 marks)
3. Explain the differences between institutional and non-institutional health-care facilities and services. What services does each provide to promote health? (H5) (4 marks)
4. Describe the roles and responsibilities of the following groups in the provision of health services. (4 marks)
   (a) Commonwealth Government
   (b) State and territory governments
   (c) Local governments
   (d) Private sector (H5)
5. Discuss the issue of equitable access to health-care facilities and services across the Australian population. (H14) (5 marks)
6. Using examples, discuss the level of responsibility a community should assume for individual health problems and suggest what should be done. (H5) (5 marks)
7. Outline the benefits of early intervention in terms of health-care expenditure. (H14) (3 marks)
8. Discuss the impact of emerging new treatments in terms of cost and access. (H15) (5 marks)
9. Explain how Medicare attempts to provide equity in access to health care. (H14) (5 marks)
10. Discuss the benefits of private health insurance. (H14) (4 marks)
11. Describe measures taken by the Commonwealth Government to support private health insurance. (H15) (4 marks)
12. Explain what you can do, as an individual, to reduce the cost of health care to taxpayers. (H5) (4 marks)
13. Explain why complementary and alternative health-care approaches have grown in popularity in developed countries over recent years. (H14) (5 marks)
14. Identify and discuss the information you need to make informed decisions about alternative health-care approaches. (H16) (5 marks)

Extension

1. How can the Commonwealth Government justify spending more of its total health expenditure on illness prevention and health promotion than on curative services? (H15) (5 marks)
2. Argue the benefit of adopting health promotion actions that promote social justice. (H14) (5 marks)
3. Identify and analyse the key factors affecting the health of Australians. Suggest strategies that could lead to improved health for all Australians. (H15) (6 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 4

Actions required to address Australia's health priorities



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H4**, **H5**, **H14**, **H15**, **H16** from the PDHPE HSC syllabus.

Health promotion is a combination of science, medicine, practical skills and beliefs aimed at maintaining and improving the health of all people.

In this chapter we formulate an argument about why **health promotion** is most effective if it includes key stakeholders working together in partnership and is based on the five areas of the Ottawa Charter.

We investigate the principles of social justice and the responsibilities of individuals, communities, governments and non-government agencies under each action area of the Ottawa Charter.

Finally, we critically analyse the importance of the five action areas of the Ottawa Charter through an in-depth study of the National Tobacco Strategy 2004–09 and the National Action Plan on Mental Health 2006–11.



LEVELS OF RESPONSIBILITY FOR HEALTH PROMOTION

You learned in your studies of the Preliminary Course that responsibility for promoting health does not lie only with the health sector. Responsibility for promoting health applies at many levels, including:

- individuals and families
- groups in the community and industry, such as schools, workplaces and the media
- all levels of government — local, state and Commonwealth
- non-government organisations, both Australian and international.

Governments have recognised that health promotion is most successful if individuals, groups, governments and other organisations take a shared responsibility and joint action to improve health outcomes for Australians.

study on
Concept code: PDH-030
Practice HSC exam questions

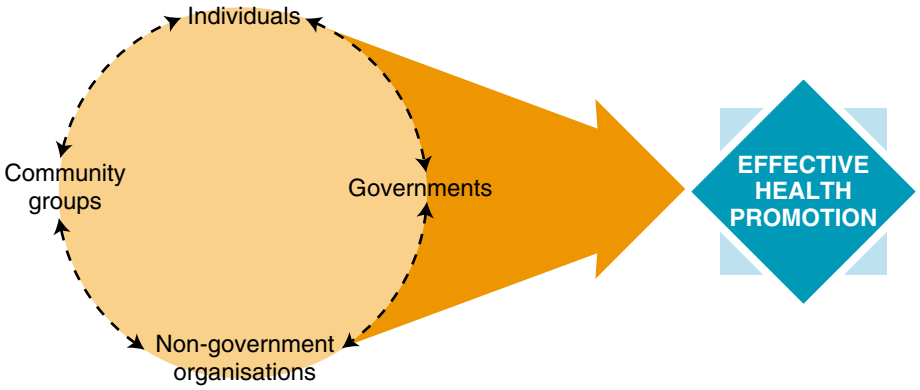


Figure 4.1: Health promotion achieves more positive results if all levels participate and cooperate in the program or strategy.

In 2004, NSW Health released the *NSW Health and Equity Statement: In all Fairness*. It identified six focus areas that can help to gauge the existing strategies, policies and programs to reduce health inequities, as well as provide a framework for future planning. (See the snapshot on the next page.) The Centre for Health Equity Training Research and Evaluation has been reviewing the implementation of the Health and Equity statement. Although their evaluation is still to be released, in 2012 they noted that many of the actions outlined in the statement were being implemented, progress was being made in most areas, and recent research has confirmed that the statement's focus areas of action were still relevant.

INQUIRY

In all fairness

Read the snapshot 'In all fairness', which outlines the goals of the NSW health and equity statement.

1. Describe reasons why NSW Health needs to work with multiple partners in order to effectively reduce health inequities.
2. Identify the levels of government and other stakeholders in the New South Wales health system who need to be involved in all stages of health processes and services.

SNAPSHOT

In all fairness: NSW health and equity statement

Six key focus areas

1. Strong beginnings — Investing in the early years of life

Goal: *To secure good health outcomes for children at birth and throughout their lifespan by concentrating on health care during the antenatal period and the first eight years of life.*

[Strategies] to reduce inequities in the availability of and access to the range of health services appropriate to the needs of children with the poorest outcomes while continuing to improve the health of all children

2. Increased participation — Engaging communities for better health outcomes

Goal: *To invest in and strengthen community participation in the NSW health system in recognition of the value of individual and community involvement in managing health problems and developing health services.*

All stakeholders in the NSW health system, including consumers, carers, volunteers, NGOs, industry and professional organisations, health professionals, and NSW Health must be given opportunities to contribute to the planning, development, implementation and evaluation of health processes and services.

Participation contributes to better health outcomes by empowering individuals and communities to take action to improve their health, and ensuring health services meet individual and community needs. See table 4.1 below.

3. Developing a stronger primary health care system

Goal: *To improve the accessibility and effectiveness of the primary health care system, particularly for those people with the greatest health needs.*

Involves care delivered by GPs, nurses, allied health professionals, pharmacists, dentists, community health services, emergency departments, community and non-government organisations, and health organisations controlled by the Aboriginal community.

4. Regional planning and inter-sectoral action — Working better together

Goal: *To increase the capacity of the NSW health system to work with other sectors to address health inequities through improved regional planning and inter-sectoral action.*

Many of the social determinants of health lie outside the control of the health system [and projects designed to reduce health inequities should also seek to tackle unemployment, poor education, poor housing and inadequate income.] NSW Health must therefore continue working with multiple partners to address these determinants in order to reduce health

Table 4.1: Contribution of participation to better health outcomes

Individual	Community	System
• Increases the involvement of patients and carers in decisions about their health • Improves quality of care • Improves patient satisfaction • Improves accountability (and focus on rights and responsibilities)	• Leads to more appropriate, more responsive services • Improves accountability (and focus on rights and responsibilities) • Increases capacity and social capital • Leads to better health outcomes (population health focus)	• Legitimates [sic] programs and services in building a political constituency • Improves accountability (and focus on rights and responsibilities) • Leads to more responsive, more flexible services • Improves skill development and capacity

(continued)

inequities. Effective collaboration across a range of government and non-government agencies is essential for addressing the wider social factors that influence health, and for developing health services that are comprehensive and responsive to people's needs. Planning and implementing strategies must involve action at all levels, from local communities, to local, regional and state agencies, and the Commonwealth Government.

5. Organisational development — Building our capacity to act

Goals: *To increase the NSW health system's capacity to address health inequities through improved systems, infrastructure and workforce development.*

Planned improvements in systems and infrastructure are required to assist in building the capacity of the NSW health system to achieve this goal. The capacity to assess whether actions and investments are improving health and reducing health inequities must also be developed at all levels of the NSW health system.

6. Resources — For long-term improvement in reducing health inequities

Goal: *To reorient patterns of investment within the NSW health system to explicitly address health inequities.*

Among the key issues was the need to improve equity across the health system through long-term investments in infrastructure and programs, and through more targeted approaches.

Source: New South Wales Health and Equity Statement, *In all Fairness — increasing equity in health across NSW*, NSW Department of Health, May 2004, pp. 3, 15, 18, 19, 22, 24, 25, 28, 31

This information is presented for instruction purposes only and does not represent current policy of NSW Health.

SNAPSHOT

Get Set 4 Life

The *Get Set 4 Life — habits for healthy kids Guide* is to be provided to parents/carers as part of the Healthy Kids Check for all Australian children at four years of age. The Healthy Kids Check promotes early detection of lifestyle risk factors, delayed development and illness, and introduces guidance for healthy lifestyles and early intervention strategies.

The *Get Set 4 Life — habits for healthy kids Guide* was developed by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) for the Australian Government. The Guide provides practical information on key areas of health and development such as: healthy eating, regular exercise, speech and language, oral health, skin and sun protection, hygiene and sleep patterns.

A wide range of stakeholders were invited to participate in the development of the content of the Guide including, but not limited to, the Australian Council for Health, Physical Education and Recreation, Dietitians Association of Australia, Raising Children's Network and the Royal Australian College of General Practitioners. The Guide has also been tested with General Practitioners, Practice Nurses and parents/carers of 4-year-old children to ensure that the topics, information, language and tone of the Guide are appropriate…

The Guide is now available in 6 community languages — Arabic; Traditional Chinese; Greek; Italian; Spanish and Vietnamese…

Together the Healthy Kids Check and the Get Set 4 Life

Guide will help ensure that children are healthy and ready to learn when they start school and that their parents/carers have a resource that will assist them in helping their children develop healthy habits for life.



General Practitioners, Practice Nurses and Community Health Workers are ideally placed to support parents and carers through the provision of practical information and advice at the time of the Healthy Kids Check to assist them in caring for their four-year-old children's health and well-being…

Source: Australian Government, Department of Health and Ageing, fact sheet, www.health.gov.au/epc.

INQUIRY Get Set 4 Life — a health promotion initiative

1. Read the snapshot 'Get Set 4 Life' and identify the groups and organisations that:
   (a) were involved in the development of the health initiative
   (b) will be responsible for implementing the initiative.
2. Outline the benefits that the health promotion strategy hopes to achieve.



BENEFITS OF PARTNERSHIPS IN HEALTH PROMOTION

study on

Concept code: PDH-031

Practice HSC exam questions

As you are aware from your studies in the Preliminary Course, the Ottawa Charter can be used as a checklist for health-promoting agencies, both government and non-government, at all levels, to evaluate the chance of campaign success. The five areas of the Ottawa Charter are:

1. developing personal skills
2. creating supportive environments
3. strengthening community action
4. reorienting health services
5. building healthy public policy.

If every area of the Ottawa Charter is well represented through a variety of strategies, then:

- the risk of people or populations adopting poor health behaviours in the first place is vastly reduced
- those people already engaged in poor health behaviours are encouraged to reduce or eliminate these actions, which will result in improvements in their health and a decreased burden on the health-care system.

The prospect of success is also increased if individuals, communities, governments and non-government agencies work together in partnership towards achieving a common health goal. If an integrated health promotion program is implemented, this creates optimal conditions for achieving the program's aims.

There are many benefits of health promotion that involve individuals, communities and governments working together in partnerships. The chance of effective health promotion relies heavily on how it is planned, delivered and evaluated. Individuals and communities need to be included in the planning of all health promotion programs to ensure that their interests and needs are being addressed. It must be **enabling** and done by, with and for people — not just imposed on them. This therefore encourages participation. Participation contributes to better health outcomes by empowering individuals and communities to take action to improve their health, and ensuring health services meet individual and community needs. Consider the example of a high school deciding to make compulsory wearing a school hat during break times. Do you think students would be more likely to wear a hat designed and chosen by students or one that teachers selected and imposed on the student body? Clearly the one designed by students would be more popular as it would be in a style that students would be more inclined to like.

Enabling means allowing or giving the means for something to be carried through.

There is increasing recognition of the value of individuals participating in decisions about their health and health services. A person's sense of well-being is directly related to the quality of their relationships and the amount of

Empowering is giving people the support needed to achieve a goal.

control they feel they have over their situation. There are a range of strategies for **empowering** people and communities to identify problems and work together in developing solutions to things that affect their health. These may include consultative community meetings, surveys and the analysis of local health data.

When implementing an integrated health promotion program, it is important to create optimal conditions for success. Capacity building involves the development of sustainable skills, organisational structures, resources and commitment to health improvement, to prolong and multiply health gains many times over. This means that skills can be applied to improve other health issues in the future.

The strategy will be deemed effective if the health of the individual or population is improved. Any improvement can be sustained only if the person's knowledge and skills are improved so they can maintain their new healthier behaviour. This in turn leads to the collection of healthier individuals becoming a community of healthier people.

Ad hoc means impromptu or for a single purpose rather than a coordinated one.

Government and non-government organisations (NGOs) must work with the community to identify priorities and build the capacity of the individuals within the community. They must find out what is already happening and find out what people know and what they think is important. They also need to share information with other agencies to assist with research and information collection. This prevents fragmented, **ad hoc** health promotion initiatives. It also ensures that health promotion is evidence-based or subject to evaluation. The full potential of an approach is only realised when providers are connected and integrated.

SNAPSHOT

Recapturing the active Australian

By Julie Robotham

'There is nobody who smokes who doesn't know it's bad for them. Nobody who is obese who doesn't know it's bad for their health,' says Professor Ron Penny [senior clinical adviser to NSW Health]. 'The question is, why don't they stop smoking? Why don't they lose weight?'

The National Health and Hospitals Reform Commission pulls no punches in nominating chronic disease — mainly caused or worsened by unhealthy lifestyles — among the most critical problems facing any future Australian health system . . .

Cast-iron evidence links poor diet to heart disease, diabetes and cancer, but that alone does not change people's behaviour . . .

After researchers packed up and left people to their own devices, many initiatives proved unsustainable. Failed diets, abandoned gym memberships and smoking relapses are so common as to look like the natural order.

But the stakes are high enough to keep trying. Perhaps two-thirds of long-term diseases could be improved by what might appear simple changes to food, physical activity or alcohol and tobacco use. The same measures could cut cancer deaths by a third — a conservative estimate.

And the costs of not making such changes spread well beyond those individuals whose potential is blighted by the poverty, pain and psychological problems that frequently accompany chronic illness. Workforce participation among people who rate their own health very good or excellent is double that of those who say their health is only fair or poor, according to Victorian statistics. The World Health Organization says a country's economic growth can be linked directly to citizens' health.

Disease prevention is a government dream — one of few defences against the looming tsunami of health-care demand from ageing baby boomers.

The reform commission has proposed a new statutory agency, independent of the health department, to oversee prevention and health promotion activities.

(continued)

It would, in the commission's words, 'translate the sometimes easy rhetoric [of prevention] into hard reality' with research and campaigns and agitating for all portfolios to consider the health impact of new policies.

The last point acknowledges health professionals' concern that the basic infrastructure of modern life — long working hours, disproportionately expensive fresh food, suburbs that repel pedestrians — can thwart individual good intentions.

But the problems go deeper still. Half the population, by the Bureau of Statistics' reckoning, has insufficient literacy, numeracy, form-filling or problem-solving ability to navigate everyday life and work — or, by extension, manage their own health.

. . . One difficulty in convincing people to modify their lifestyle, says Professor Ian Olver [chief executive of Cancer Council Australia], is that the benefits accrue in the distant future. The prospect of sun-induced melanoma in middle age may be beyond the imaginative reach of the pre-teen who loathes her dorky school hat. Bowel cancer risk statistics are unlikely to redirect someone with a bacon craving towards the bircher muesli . . .

He says health messages must acknowledge the power of instant gratification. 'The benefits of not getting skin cancer are well down the track,' he says. 'But sunburn is painful tomorrow.' . . .

Many people see exercise as a means of losing weight and do not appreciate its independent effects, Shilton says . . .

'What else can you take once a day that gives you all those benefits and no side-effects?' he says, arguing promotion of physical activity should concentrate on pleasure and social opportunity.

And well-meaning, homespun campaigns 'pale into insignificance compared to the advertising of alcohol and junk food', Shilton says, estimating a national exercise marketing campaign intense enough to enter the collective consciousness would cost $200 million a year.

More compelling still would be the opportunity to change by example. Once a critical mass of people starts cycling to work, it becomes unremarkable for others to join them.

'We like to think of ourselves as healthy, active Australians,' he says. 'Unfortunately that culture has somewhat deserted us. We need to recapture that.'

Source: Sydney Morning Herald, 21 February 2009, p. 7.



INQUIRY

Empowering change

Read the snapshot 'Recapturing the active Australian' and answer the following questions.

1. Identify reasons why some people fail to take control of their own health.
2. Why is disease prevention seen as a 'government dream' and a 'defence' for the future?
3. Describe some approaches to health promotion that might empower individuals to become more physically active and generally improve their health behaviours.
4. What might be the impact of health promotion campaigns that 'recapture the active Australian'?



INQUIRY

Health service partnerships

Read the snapshot 'Initiatives for New South Wales' health' on the next page, which describes two examples of initiatives for New South Wales' health.

1. Explain the reasons why the NSW State Knockout Challenges initiative has a high chance of improving the health of Aboriginal people. Include in your answer:
   (a) the benefits of individuals, communities, governments and non-government agencies working in partnerships
   (b) the action areas in the Ottawa Charter.
2. Identify the government agencies that are working in partnership to assist parents through the Schools as Community Centres Program.

Initiatives for New South Wales' health

NSW State Knockout Challenges — Part of the Culture–Health–Communities approach

NSW Health is partnering with the NSW Rugby League to reduce the prevalence of chronic disease in Aboriginal communities.

The major risk factors for chronic disease are an unhealthy diet, physical inactivity and tobacco use. Eliminating these risk factors would prevent at least 80% of heart disease, stroke, type 2 diabetes and chronic renal failure; and 40% of cancer. To motivate people to manage their risk factors (or chronic disease), a weight loss challenge and a walking challenge will be offered in Aboriginal communities intending to participate in the Aboriginal Rugby League Knockout. Different sectors of the community (General Practice, Aboriginal Medical Services, Local Health Districts, Local Aboriginal Land Council's, local government, other local organisations and Knockout team representatives) will participate in local Town Committees to support their teams to participate in the challenges.

The weight loss challenge will involve up to 50 Aboriginal communities entering teams of 25 Aboriginal people (over 18 yr) motivated to lose weight…with the winning community receiving $70 000 to promote healthy lifestyles. All the teams will have a celebrity Team Coach — a local legend or current or past Rugby League player — to motivate the team and the community. All the participants will be offered a personal health coach from the Get Healthy information and coaching service.

Source: NSW Health website, http://www0.health.nsw.gov.au/initiatives/chronic_care/aboriginal/index.asp.

NSW Schools as Community Centres Program

Schools as Community Centres (SaCC) projects work with local human service agencies to provide a range of activities and initiatives to engage and support families raising young children. Common SaCC initiatives include supported playgroups, early literacy, parenting programs, transition to school, adult learning and health and nutrition initiatives.

In 2011 a total of 45 Schools as Community Centres projects were based in primary schools across NSW. SaCC projects are funded through the NSW Government's Families NSW strategy. Families NSW is jointly delivered by the following government agencies — Department of Family and Community Services, Department of Education and Communities and NSW Health.

Source: Schools as Community Centres Annual Results Based Report 2011, pp. 2, 3.



HOW HEALTH PROMOTION BASED ON THE OTTAWA CHARTER PROMOTES SOCIAL JUSTICE

The principles of social justice — equity, diversity and supportive environments — are an essential part of effective health promotion. It is imperative that each of the principles is strongly addressed in health promotion initiatives if gaps in health status are going to be bridged across communities.

Inevitably health promotion based on the Ottawa Charter will promote social justice. Earlier in this chapter the argument was made for individuals, communities and governments working in partnership to effect positive change in health behaviours via health promotion. Next we will investigate how both the principles of social justice and levels of responsibility for health promotion can be explored in reference to the Ottawa Charter.

study on
Concept code: PDH-032
Do more
The Ottawa Charter in action
Practice HSC exam questions

Developing personal skills

Developing personal skills is aimed at improving the knowledge and skills of individuals so they:

- are able to make more informed health decisions for themselves
- have the capacity to be a positive influence on those around them.

In order to achieve *equity*, access to education must be assured for all individuals if this social justice principle is going to be upheld. Access can be restricted by factors such as money, distance or lack of exposure. Education to improve a people's level of health literacy is central in ensuring they have the information and skills required to make decisions about their health to ensure positive outcomes. Examples of this may include access to free on-line health courses and PDHPE lessons via distance education.

Diversity is about ensuring that information is relevant to all people irrespective of their age, gender, culture, geographic location, sexuality or socio-economic status. This is where the 'one-size fits all' approach to health promotion reaps little success. Programs must be able to be personalised in order to target all individuals. Consider a pamphlet that describes how to conduct breast self-examinations to detect the early signs of breast cancer. This pamphlet would develop the skills of a greater group of women if it was available in many different languages and included self-explanatory graphics that could be understood by all women regardless of their level of education.

It is crucial for an individual to develop their personal skills if they are going to overcome any negative influence their environment may have on them. Developing personal skills can support the social justice principle *supportive environments* through empowering individuals by giving them knowledge and skills, which they can pass on to others within their environment. If a parent is educated about healthy food habits they will provide nutritious foods for their children, which will reduce the chance of them developing a diet-related illness such as diabetes.

In terms of levels of responsibility, developing personal skills is directly and most closely related to the individual, as it is about developing their capacity to take charge of their own health.

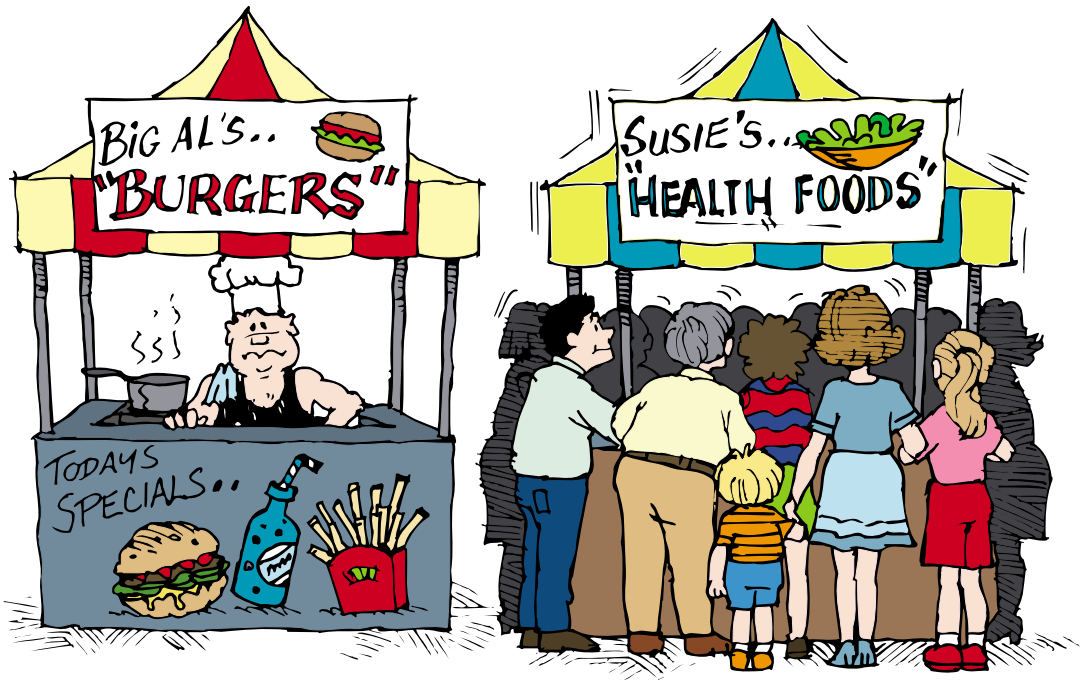


Figure 4.2: Parents can help to develop their child's personal skills in decision making about their health by influencing them to make healthy food choices.

Creating supportive environments

A supportive environment significantly increases the chance of a person being able to make positive changes to their health. The place they live and the people around them can either create barriers to good health or in optimal conditions help to break down barriers. The social justice principle of supportive environments is closely linked with this area of the Ottawa Charter.

Any health promotion initiative that addresses and acknowledges the influence of a person's environment will have an increased chance of success. If a local council improves the lighting and security of the local bicycle track it will increase the chance of it being used by people either in the early hours of the morning or later in the evening. This increased level of availability may encourage members of the community to use the track and therefore improve their physical fitness. This is how a *community* can assume some responsibility for promoting health.

SNAPSHOT

Healthy spaces and places

The Department of Health and Ageing has funded a unique partnership between the Australian Local Government Association, the National Heart Foundation of Australia and the Planning Institute of Australia for the *Healthy Spaces and Places* project. The *Healthy Spaces and Places* project aims to promote the on-going development and improvement of built environments where Australian people live, work and play. The collaboration has produced a web-based national planning guide with practical tools, case studies and guidelines, to assist planning and design practitioners to incorporate active living principles into the built environment

Healthy Spaces and Places has consulted broadly with planning and health professionals, governments, the development industry and community sector, and academics and researchers via a series of workshops held in metropolitan and regional locations around Australia.

Healthy Spaces and Places [demonstrates] the importance of taking a national perspective to:

- managing our environments, particularly how the physical characteristics of where Australians live, work and play can influence their physical and mental health and wellbeing
- investing in Australia's future health and wellbeing
- reducing health costs by preventive measures
- fostering collaborative partnerships
- supporting social connectiveness.

Sources http://www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/healthy-spaces-index, http://www.healthyplaces.org.au/site/about.php.



Figure 4.3: Accessible and appropriate recreational facilities

INQUIRY

Healthy spaces and places

Read the snapshot 'Healthy spaces and places', then answer the following questions.

1. Describe the aims of the project.
2. Identify the organisations, industries and groups that have been involved in the project.
3. Explain how this project and its development demonstrate the action area of the Ottawa Charter related to 'creating supportive environments'.

Strengthening community action

Valuing *diversity* is central when aiming to strengthen community action. Each community is unique and different so must be consulted about the development of health promotion strategies intended to improve their health. It would be even more effective if members of the community were directly involved in the development of the initiative to guarantee their needs are being met. While outsiders can appreciate the diverse nature of other communities it does not mean that they always 'know what's best' for the group. Programs that prove effective in indigenous populations always have indigenous people involved in their development to ensure that cultural aspects are especially considered.

Establishing equity between communities is also very important. Resources — whether financial, structural or human — must be equally available to all communities in order to optimise potential for health promotion success. Government and non-government organisations are highly responsible for achieving the equitable distribution of resources, including grants, donations, program funding or provision of expertise. Communities should also endeavour to find their own catalyst for self-improvement as ownership of the goal will empower and motivate them to achieve it.

Reorienting health services

Reorienting is adjusting a position, direction or approach to suit particular circumstances.

The process of **reorienting** health services encourages the health sector to move beyond its traditional role of providing curative services. For example, in order to ensure that equity is achieved, the health services offered must be culturally sensitive and respect the diverse needs of all people irrespective of their backgrounds. Doctors should be aware of how their patient's cultural background may be influencing their health choices rather than just addressing symptoms they may be displaying.

Reorienting health services is also about change in professional education and training. All individuals, irrespective of educational backgrounds, should have equal opportunities to train in the promotion of health as well as the provision of health services to increase the health outcomes of their own community and that of others. This would uphold the social justice principle of equity.

The benefit of research into health conditions is that it can improve health outcomes for all groups of people, particularly if it encourages change in negative lifestyle behaviours. This aspect of reorienting health services addresses diversity and equity as all people in the future can reap the positives outcomes of important research, whether it is scientific or social.

Building healthy public policy

Through implementing legislation, policies and fiscal measures, governments can work towards creating equity among individuals and across different populations. Laws can ensure that all people are treated fairly, irrespective of their social markers. For example:

- all workplaces have government-enforced smoking bans that protect both blue-collar and white-collar workers
- the Pharmaceutical Benefits Scheme (PBS) is an example of how the social justice principle equity is addressed by the Commonwealth Government. It recognises that not all people can afford the cost of prescription drugs so, in order to create equal access, the government subsidises the cost of the medication to assist people from low socio-economic backgrounds.
- the 'no hat, no play' policy in primary schools promotes a supportive environment for children, as wearing a hat during breaks is compulsory. This protects children from UV exposure and reduces the chance of them developing skin cancer.



Figure 4.4: The 'no hat, no play' policy in schools is an example of a health-promoting action.

Building healthy public policy relies heavily on the initiative and support of government and non-government organisations to implement change to create positive health outcomes for communities and individuals.



THE OTTAWA CHARTER IN ACTION

For an area of the Ottawa Charter to be properly addressed in a health initiative there must be many strategies that represent the area within the campaign. People must almost feel that there is nowhere to hide from messages regarding their health behaviours. We can think of the Ottawa Charter as a well co-ordinated army that surrounds and attacks poor health behaviours or encourages positive health behaviours. Consider the following example of the influences related to areas of the Ottawa Charter that surround a smoker in a normal day.

> *Denni wakes up in the morning, gets ready for work and walks to catch the bus, having a cigarette on the way because it is illegal to smoke on public transport* (building public policy). *She notices a local council poster on the bus shelter about Quit Month. It outlines the services that the council offers to assist people to give up smoking* (strengthening community action). *Denni catches the bus to work and quickly has a cigarette outside the building as smoking is not allowed inside* (creating supportive environments). *She turns on her computer, checks her emails and finds a reminder message from the Quitline about registration and offering support and strategies to quit smoking* (developing

personal skills). *After work, Denni has a doctor's appointment to check on a cough she has developed. The doctor reminds her of the adverse effects of smoking and gives her a prescription for medication to help with giving up smoking* (reorienting health services).

This example illustrates a multifaceted health promotion initiative. Whether smokers are aware of it or not, they are constantly being supported and encouraged to give up smoking. Messages are continually reviewed and revised by health-promoting agencies in case people become resistant to their impact.

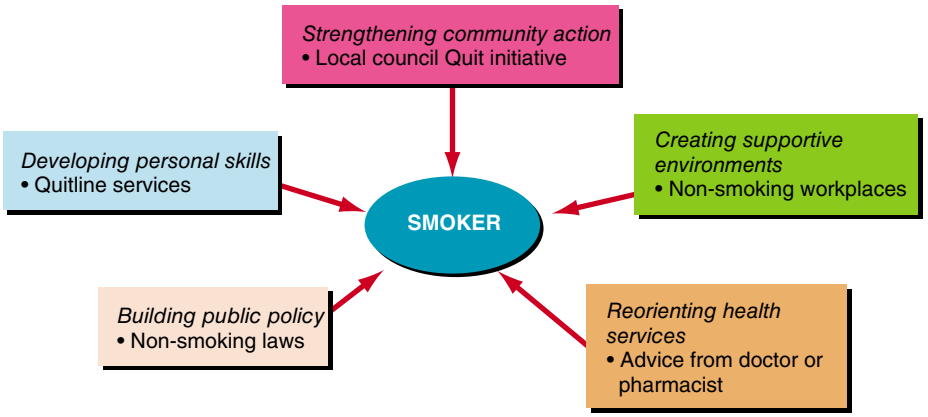


Figure 4.5: Action areas of the Ottawa Charter applied to the example of smoking

The two health promotion initiatives that are analysed in the following section address two of Australia's health priorities. Both approaches are government-driven initiatives that are effective because of the partnerships with non-government agencies that exist within them.

National Tobacco Strategy 2004–09

The Ministerial Council on Drug Strategy established the importance of a National Tobacco Strategy in November 2004 as follows:

> *In a recent study, economists valued the savings associated with avoided deaths and related declines in illness and disability due to reduced tobacco use in Australia over the last 30 years at $8.6 billion. They estimated that $2 has been saved on health care for each $1 spent on tobacco control programs to date. Total economic benefits are estimated to exceed expenditure by at least 50 to 1. It is difficult to imagine any other public expenditure providing social returns of this magnitude.*

The National Tobacco strategy is a very successful example of the Ottawa Charter at work. It is a multifaceted campaign that aims to:

- further use regulation to reduce the use of, exposure to, and harm associated with tobacco
- increase promotion of Quit and Smokefree messages
- improve the quality of, and access to, services and treatment for smokers
- provide more useful support to parents, carers and educators helping children to develop a healthy lifestyle
- endorse policies that prevent social alienation associated with the uptake of high risk behaviours such as smoking, and advocate policies that reduce smoking as a means of addressing disadvantage
- tailor messages and services to ensure access by disadvantaged groups
- obtain the information needed to fine-tune policies and programs.

(*Source:* National Tobacco Strategy 2004–09, page iii.)

All of these aims can be achieved through well considered and planned health promotion. Table 4.2 outlines the strategies, the relevant action area of the Ottawa Charter and reasons for the effectiveness of the strategies.

Table 4.2: Analysing the National Tobacco Strategy

Strategy	Ottawa Charter	Reasons for effectiveness of strategy
Regulation of promotion • Eliminating all remaining promotion of tobacco products by those in the tobacco trade • Discouraging and addressing the harm caused by other positive portrayals of smoking in the media	Creating supportive environments	People are not exposed to messages that may glorify smoking while not revealing any of the risks associated with smoking.
Regulation of place of sale • Enforcing existing laws banning sales to minors • Limiting visibility of tobacco products	Building public policy	• Harsh laws and fines ensure that retailers will not be tempted to sell tobacco products to minors. • People will not be reminded that they need tobacco products if they are not on display.
Regulation of tobacco tax • Increasing excise and customs duty on tobacco products • Restricting the extent of discounting at the retail level	Building public policy	Increasing taxes and restricting discounts on tobacco products will make them less affordable to smokers.
Regulation of place of use • Ensuring that all indoor areas of workplaces and public places are covered by legislated smoking prohibitions • Extending smoke-free environments legislation to specifically cover all elements of the recreation and hospitality sectors	Creating supportive environments	• Smokers may be encouraged to give up or at least reduce smoking because of the inconvenience caused by not being able to smoke at work or when they socialise. • Non-smokers are protected in their workplace and social settings from passive smoking.
Regulation of packaging • Improving the effectiveness of health warnings • Ensuring that tobacco companies do not mislead consumers about risks posed by tobacco use	Creating supportive environments	The visual impact of harsh warnings on cigarette packets will ensure that smokers are fully aware of the range of health risks associated with smoking.
Regulation of products Requiring manufacturers to make cigarettes less likely to start house fires and bushfires	Building public policy	The general public will be protected from the potential harms caused by littering of cigarette butts.
Strategies to increase promotion of Quit and Smokefree messages • To keep quitting on people's agenda and to reach people as they cycle in and out of 'readiness to quit' at many times each year • To reach people at times in their life that they are vulnerable to messages about smoking, and times when they are more likely than usual to be responsive to encouragement to change	Creating supportive environments	Smokers are constantly bombarded and reminded about the need to quit, which may increase the chance of them doing so when they are in the window of making the positive decision.
Cessation services and treatment • Advice from doctors and other health providers • Intensive counselling and treatment at specialist clinics catering specifically for nicotine-dependent patients who are discharged from a hospital visit related to a chronic disease	Reorienting health services	• Smokers are supported by health professionals to give up smoking in order to improve existing health conditions that are a result of tobacco use rather than merely treating the illness.

(continued)

Strategy	Ottawa Charter	Reasons for effectiveness of strategy
• Self-help materials in print or on-line • Tailored advice delivered electronically or by post	Developing personal skills	• Smokers have access to information they can use to help themselves to quit irrespective of their location.
• Tailored, personalised repeated counselling from a trained provider, either by phone or face to face • Participation in facilitated groups	Creating supportive environments	• Continual support from a qualified counsellor can help the smoker overcome any temptations they may have to resume smoking.
Community support and education • Making sure children get age-appropriate information about smoking including information about short-term effects and other 'un-glamorous' aspects • Helping children develop skills to resist experimenting and to avoid becoming addicted	Developing personal skills	• Education from many sources at a young age will deter young people from smoking irrespective of their family environment. • Young people will be equipped with refusal skills to assert their position against smoking to their peers.
• Promoting clear and consistent messages and rules about smoking • Helping children feel connected to schools and community	Creating supportive environments	• Children are more likely to adhere to non-smoking messages as they respect the source of the information.
Addressing social, economic and cultural determinants of health • **Aboriginal and Torres Strait Islander peoples** – Find and support quitters who can speak about the benefits to their lives (feeling better, extra resources available, improved capacity to cope etc.) – Ensure Aboriginal and Torres Strait Islander organisations are represented on expert and decision-making committees – The Centre for Excellence in Indigenous Tobacco Control has been funded to develop culturally appropriate indigenous tobacco control resources	Strengthening community action	• Aboriginal and Torres Strait Islander smokers may be more inclined to listen to quit messages from those who have been smokers and are members of their community. • Key stakeholders are represented, which will ensure that various cultural considerations will be acknowledged when making decisions. • These resources will be targeted specifically at the Aboriginal and Torres Strait Islander community, which will ensure that there are no cultural barriers.
• **People with severe and disabling mental illness** Trial treatments of nicotine withdrawal among people with mental illness in in-patient and emergency settings	Creating supportive environments	• People with severe and disabling mental illness would benefit from support and medical assistance in making an attempt to quit smoking.
• **Other people in institutions, including those in custodial settings** – Encourage managers of correctional facilities to increase the number of smoke-free cells and units in prisons – Personnel trained in each major facility to provide Quit counselling and run Quit courses	Creating supportive environments	• Non-smoking prisoners would have the option of requesting a smoke-free cell, thus reducing their exposure to passive smoking. • Prisoners who smoke would have access to qualified Quit counsellors while in custody.
• **Parents in disadvantaged areas** – Concentrate delivery of materials for parents through maternal and child health, children's hospitals, play groups, child care centres, parent associations and parenting networks in low-income areas – Distribute Quit materials promoting Quitline and any schemes subsidising NRT (nicotine replacement therapy) and offer Quit courses in the community centres on or close to major public housing estates in Australian capital cities and regional centres	Developing personal skills	• Parents in disadvantaged areas would have access to information that would encourage them not to smoke, both for their health and their children's. • Smokers would not be disadvantaged by lack of transport required to access Quit services.

(continued)

Table 4.2 *(continued)*

Strategy	Ottawa Charter	Reasons for effectiveness of strategy
• **People living in rural or remote areas** – Extend call-back counselling to Western Australia, Queensland, the Northern Territory and Tasmania, and promote in rural affairs programs and in regional media – Quitting stories, perhaps tailored to regional Australians, placed in rural affairs programs and regional media	Creating supportive environments	• People in rural and remote areas will not be disadvantaged by being unable to receive counselling due to their isolation. • The local media will provide an avenue for Quit messages and information that is targeted towards rural people.
• **People from certain cultural backgrounds** – Train multilingual pharmacists and other health professionals in areas with large numbers of particular communities – Distribute media releases in community languages to relevant multicultural media across the country	Reorienting health services	• Language barriers are broken down and Quit messages are being delivered to all members of the community irrespective of their cultural background.
Research, evaluation, and monitoring and surveillance • Based on the Agenda, decide on two or three major research needs and put out Requests for Applications to the research community • Legislate to require tobacco companies manufacturing or importing cigarettes to Australia to provide to government quarterly data on sales (and any marketing expenditure) on each brand and brand variant for each product type (cigarettes, roll-your-own tobacco, cigars and any other existing and new product types) on a state-by-state and regional basis. These data would be compiled by government to assess consumption levels in each state and state health department region in Australia. • Investigate feasibility of including recent smoking status on death certificates in all states and territories (including smoking status of parents in the case of infants)	Building public policy	• Research may uncover a breakthrough in regards to the treatment of nicotine addiction. • This hard data would allow the government to strategically target Quit programs to those who would benefit most. • These data would highlight both the health and financial burden of cigarette smoking on the Australian community.
Workforce development • Given the importance of the public receiving accurate information about the health risks of smoking and the effectiveness of various treatments, policies and programs there is also a need for more people skilled in media relations. • The Australian National Training Authority has recently endorsed two units of competency in smoking cessation as part of the National Population Health Training Package.	Developing personal skills	• The media is an incredibly powerful tool that can change behaviours when used effectively. • This will increase the number of people qualified to help smokers quit.

The National Tobacco Strategy 2012–18 is being developed, and a draft for consultation was released in mid 2012. The Australian government also implemented the plain packaging of tobacco products in December 2012 (see page 47).



INQUIRY

The National Tobacco Strategy

Using table 4.2, study figures 4.6, 4.7 and 4.8 and identify to which area of the Ottawa Charter the improving trends can be attributed. Justify your choice by outlining your reasons. Remember there may be more than one relevant area of the Ottawa Charter, which makes it important for you to provide support for your selections.

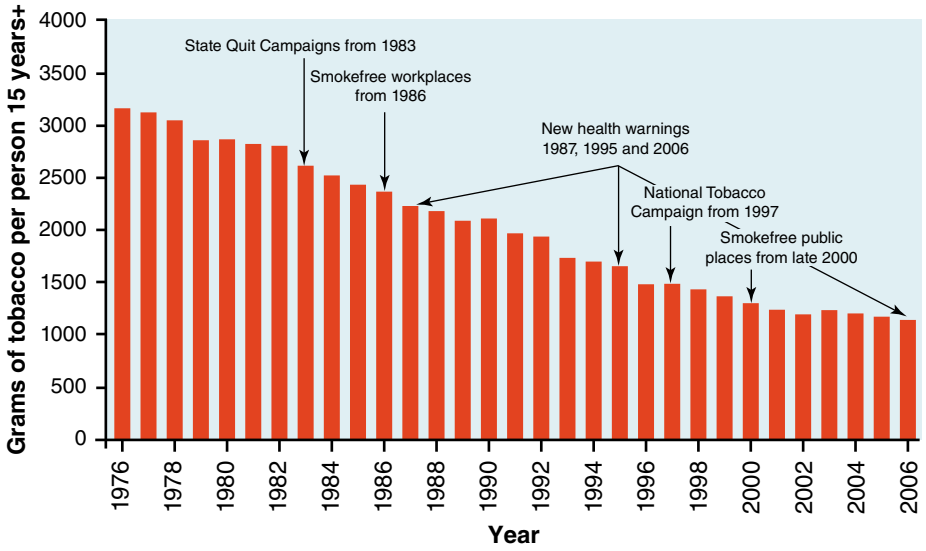


Figure 4.6: Amount (grams per person 15 years and older) of tobacco products (cigarettes, cigars, roll-your-own) on which excise duty was paid, Australia, 1976–2006 (*Source:* Scollo, M., *Tobacco in Australia — facts and issues*, http://www.tobaccoinaustralia.org.au.)

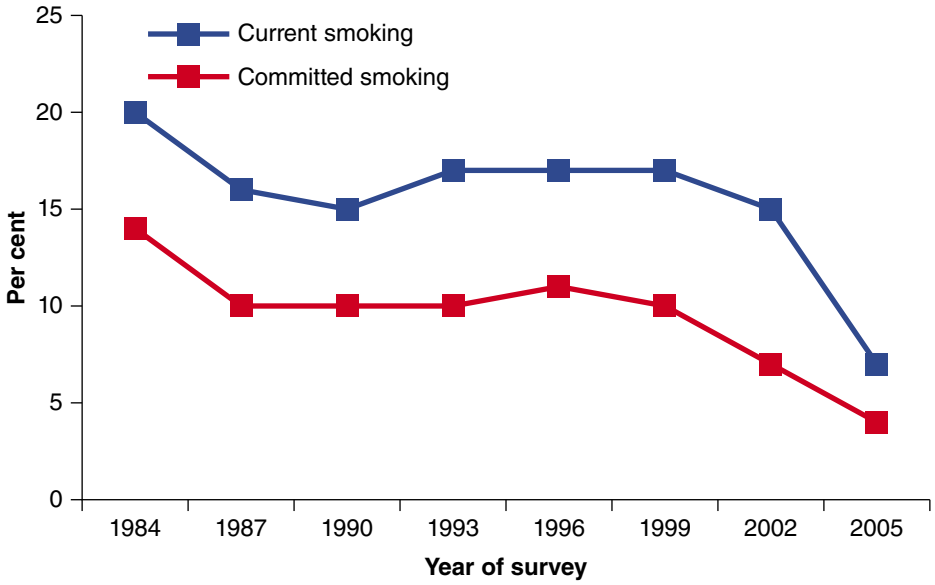


Figure 4.7: Trends in proportion of current (smoked in past week) and committed smoking (smoked on three or more days of past week) among 12- to 15-year-old students, 1984–2005

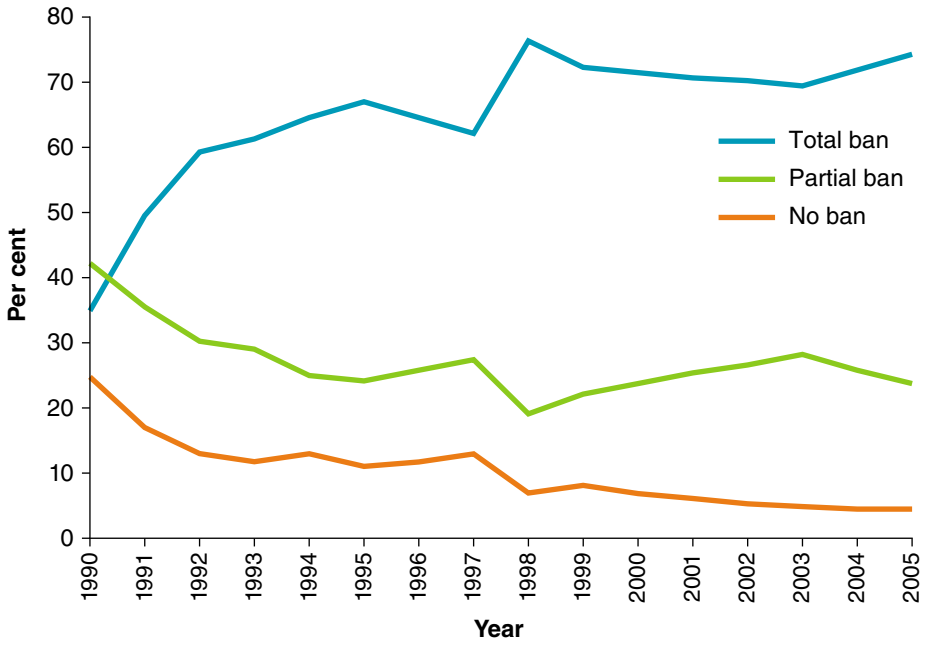


Figure 4.8: Trends in smoking restrictions among indoor workers, 1990–2005

National Mental Health Reform 2011

Another example of a health promotion plan that effectively reflects areas of the Ottawa Charter is the reform package for mental health services announced in the federal government's 2011–2012 budget. It includes initiatives to be implemented over 5 years, aimed at improving the lives of Australians with mental illness by:

- providing more intensive support services, and better co-ordinating those services, for people with severe and persistent mental illness who have complex care needs
- targeting support to areas and communities that need it most, such as indigenous communities and socioeconomically disadvantaged areas that are underserviced by the current system
- helping to detect potential mental health problems in the early years, and supporting young people who struggle with mental illness.

Table 4.3: Analysing the National Mental Health Reform package 2011–12

Strategies	Ottawa Charter	Reasons for effectiveness of strategy
Providing full national coverage of *headspace* services, which support early intervention for young people with mental and substance use disorders	Developing personal skills	Young people are provided with information and skills to better manage their mental illness while being supported by health professionals
Training employment services providers and Department of Human Services staff to identify and assist people with mental illness, and to develop effective employment strategies for job seekers with mental illness.	Building public policy	Improving outcomes for people with mental illness by participating economically and socially through employment and education, and in society more generally.
Support for the Day-to-Day Living in the Community program to assist people with severe and debilitating mental illness	Creating supportive environments	People with severe mental illness have access to structured and group-based activities designed to improve skills for independent living.
Employment of *personal helpers* and mentors to provide intensive, one-on-one support for people with severe and persistent illness.	Creating supportive environments	People with severe mental illness will be given one-on-one support to set and achieve personal goals such as finding employment, improving relationships with family and friends, and managing everyday tasks.
Expert Group to advise on the inclusion of a mental health and wellbeing check as part of the current Healthy Kids Check for three and four year old children	Developing personal skills	If signs of mental illness are identified at an early age, specialist care can reduce the chance of it becoming more severe.
Establish an online national mental health portal to consolidate scattered websites and telephone services currently available.	Creating supportive environments	The single portal will guide people to programs most suited to their needs, such as self-directed programs or clinician-assisted support.
Additional funds for Access to Allied Psychological Services which enables GPs to prepare a mental health treatment plan and refer their patients to local health professionals.	Reorienting health services	People who typically have difficulty accessing mental health services, such as indigenous Australians and people in rural and regional Australia and low income areas, and are referred to psychologists, social workers, mental health nurses, occupational therapists and Aboriginal and Torres Strait Islander health workers with specific mental health qualifications who deliver focused strategies at low or no cost.
Increase the number of Family Mental Health Support Services	Creating supportive environments	Children and young people with, or at risk of mental illness, will have counselling and support in their own home to help them attend school and build better relationships with family and friends.
Development of national data specifically for young people in their middle years through a Social Engagement and Emotional Development survey for 8–14 year olds.	Building public policy	New survey data collected to inform future mental health policy by providing an understanding of patterns and variation in Australian children's wellbeing across groups, with a particular emphasis on children who experience disadvantage.



APPLICATION

Analysing a health promotion initiative

Research and construct a well structured answer to the following question: 'Critically analyse the application of the five areas of the Ottawa Charter to a health promotion initiative you have studied that addresses cancer.'

Remember that in order to critically analyse you must add a level of depth, knowledge, understanding and quality. Analyse means to identify components and the relationship between them, then draw out and relate implications. Ask your teacher to check that you have actually critically analysed.

SUMMARY

- Health promotion has an increased chance of success when individuals, communities, government and non-government organisations work together in partnership.
- A multifaceted health promotion campaign, including strategies that represent all five action areas of the Ottawa Charter, has the greatest chance of improving the health of individuals and, in turn, entire communities.
- Individuals, communities, government and non-government organisations must take various levels of responsibility in actioning the Ottawa Charter.
- The social justice principles are reflected in and supported by the Ottawa Charter. They do not exist in isolation, but work together in order to achieve health for all.
- All areas of the Ottawa Charter are comprehensively addressed in any successful health promotion campaign.

QUESTIONS

1. Describe how individuals, communities and governments can work in partnership when developing health promotion initiatives. (H5) (5 marks)
2. Assess the value of health promotion based on the Ottawa Charter. (H4) (8 marks)
3. Justify how health promotion based on the Ottawa Charter promotes the principles of social justice. (H14) (8 marks)
4. Critically analyse the importance of the five action areas of the Ottawa Charter on a health promotion initiative you have studied that aims to address Australia's health priorities. (H4, H15) (8 marks)

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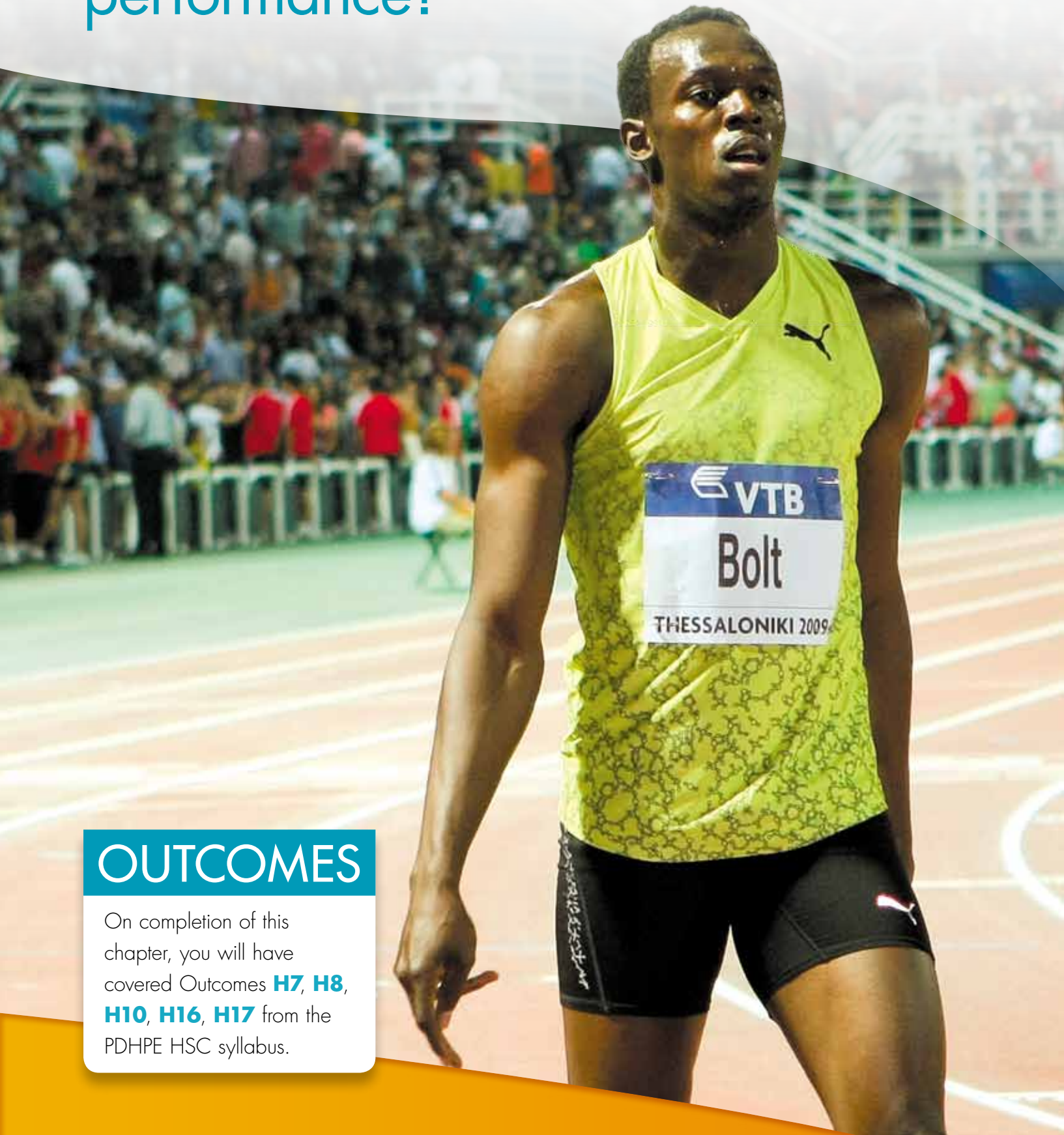
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CHAPTER 5

How does training affect performance?



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H7**, **H8**, **H10**, **H16**, **H17** from the PDHPE HSC syllabus.

ENERGY SYSTEMS

The human body requires a continuous supply of energy both to meet the needs of its systems and organs and to power muscular contraction for movement. However, unlike the car which carries its energy supply in a fuel tank, body energy is stored in the chemical bonds that join atoms and is released only as needed. This is a very efficient method of storing fuel because of its light weight and because it occupies only a small amount of space in the body. The fuel required by a runner to complete a marathon would weigh at least as much as the runner. Yet food weighing only a fraction of this is ingested prior to a race. The transformation of food (**chemical energy**) to energy that the muscles can use (**mechanical energy**) is the role of energy systems.

Chemical energy is energy stored in bonds between atoms.

Mechanical energy is motion or movement energy.

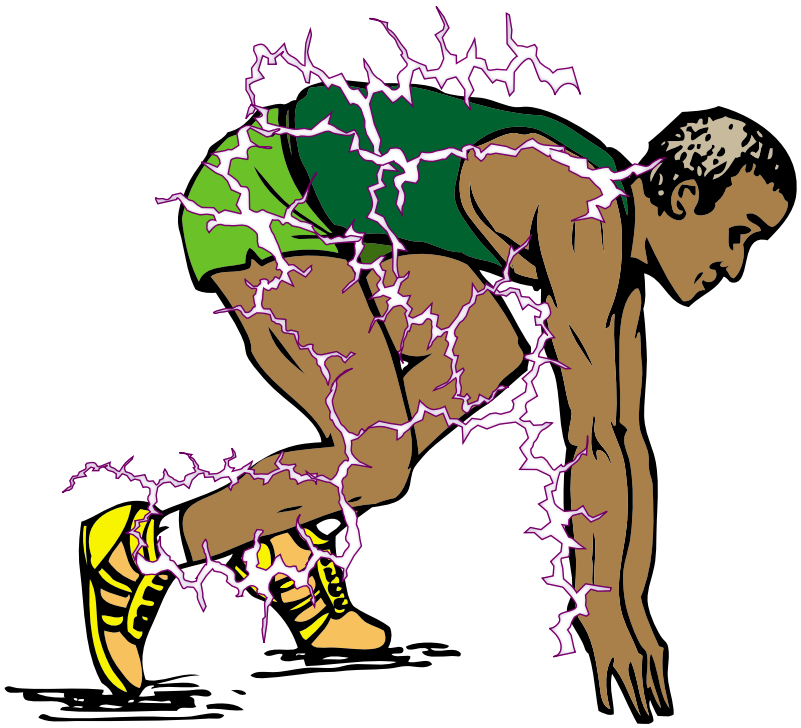


Figure 5.1: Energy systems power all parts of the body, including muscular contraction.

A **kilojoule** (or calorie) measures the energy value of food. A calorie is the equivalent of 4.2 kilojoules.

Energy provided by food is measured in **kilojoules** (kJ). Foods have different amounts of energy. Carbohydrate and protein supply 16 and 17 kilojoules of energy per gram respectively, whereas fat yields 38 kilojoules per gram. Hence, foods with relatively high levels of fat yield a larger number of kilojoules and, subsequently a lot more energy.

Adenosine triphosphate (ATP) is a high energy compound that stores and transfers energy to body cells, allowing them to perform their specialised functions, such as muscle contraction.

When food is digested, it breaks down to sugars, amino acids and fatty acids, substances that become available as a usable form of energy. From these, ATP or **adenosine triphosphate** is produced and represents the most important substance in energy production. Large amounts of fuel in the form of carbohydrates (glucose or sugars), fats and protein (amino acids) lie in storage in the body, waiting to be used. ATP can be likened to a spark plug in an engine. It enables the release of energy from these substances where it can be used for muscular contraction and essential body processes such as digestion, blood circulation and tissue building. Some of these functions are illustrated in figure 5.2.

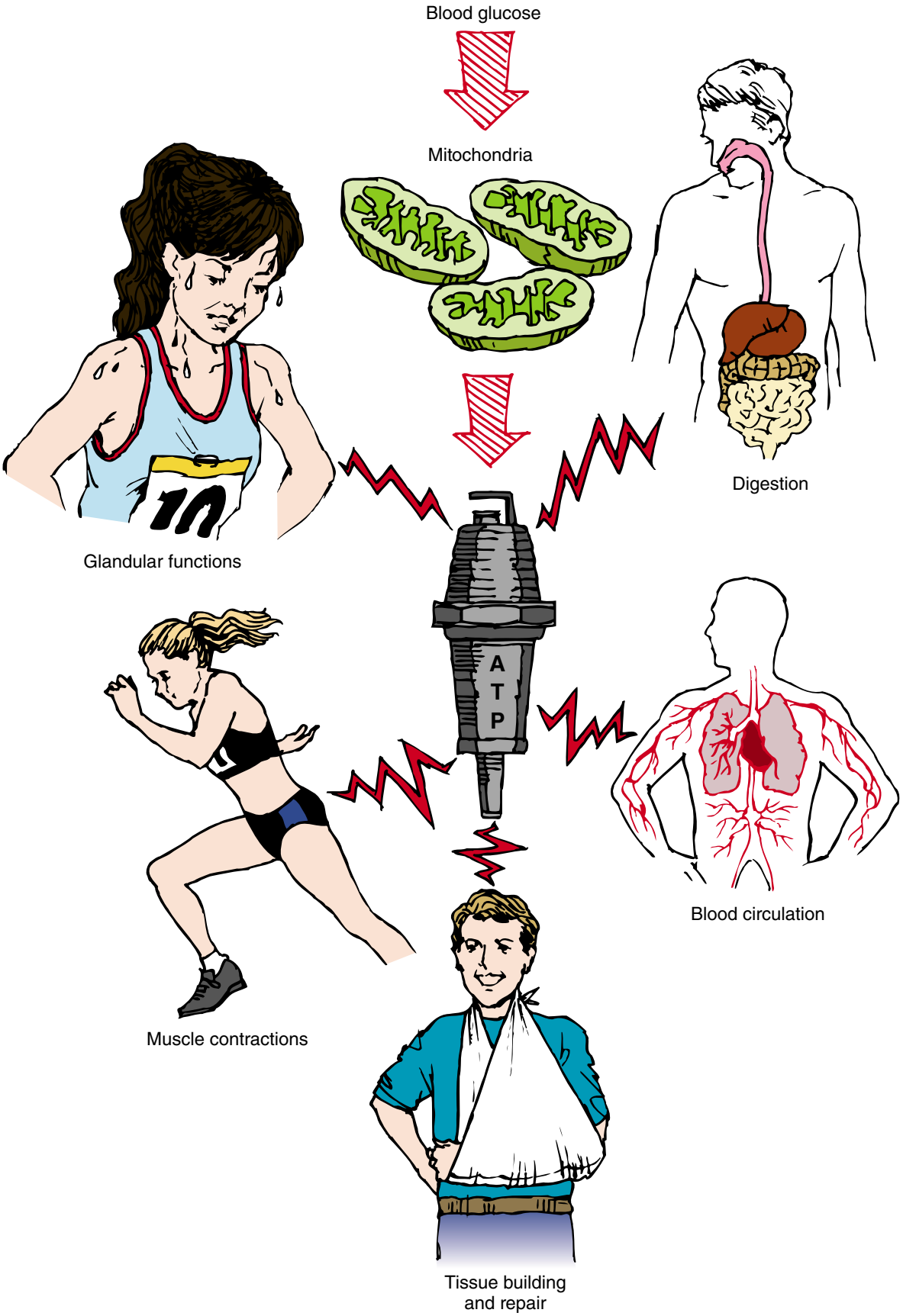


Figure 5.2: In a similar way to a spark plug's role of initiating an energy response in a car's engine, ATP enables the energy in food to be released for important body processes to function.

The ATP compound consists of a large molecule called adenosine (A) and three smaller molecules called phosphates (P). Each of the phosphates is held together by high energy bonds. The chemical structure of ATP is shown in figure 5.3.

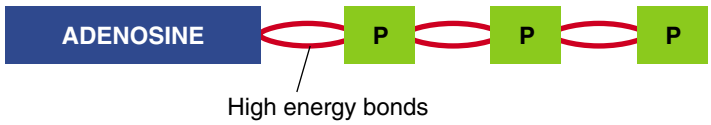


Figure 5.3: The structure of ATP

When the last (terminal) phosphate is detached, energy stored in bonds between the phosphates becomes available and this is transferred to the cells. This process is like flicking on a light switch. The light will not work until the current flows and provides energy to light the globe. In the muscle cells, the energy from ATP allows the fibres to contract and make movement possible. This is represented as follows.

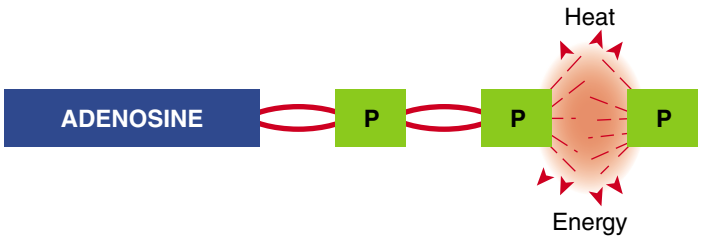


Figure 5.4: Heat and energy are released as the bond between the two end phosphates breaks.

However, ATP now has only two phosphates attached. In this state it is referred to as ADP (adenosine diphosphate) and is powerless to provide energy. It is represented as follows.

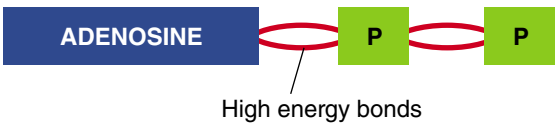


Figure 5.5: Adenosine diphosphate is unable to supply energy.



Figure 5.6: We 'turn over' about three-quarters of our body weight in ATP each day, and much more if we engage in sustained physical activity.

Resynthesis is the process of restoring ATP to its former state.

Unlike food that has had the nutrition extracted for use by the cells, used ATP does not become a waste product that is discharged from the body. Rather, it has the ability to be quickly rebuilt or **resynthesised**, allowing us to continue to function while still using the limited amount we have. Your body would struggle to carry all the ATP needed to supply energy for a day. In fact, it has been estimated that the body turns over ATP to the equivalent of 75 per cent of its weight during a 24-hour period (see figure 5.6) and much more if the person exercises intensely. Having energy stored in bonds and being available on demand is an extremely efficient way of packaging because it avoids the cost of carrying it around in bulk. It is similar to saving work onto a CD. As digital text, it is lighter and easier to transport than the printed, bulkier hard copy.

ATP needs to be continually rebuilt to enable an energy flow. Under normal conditions such as sitting, lying or reading, only sufficient is produced to

enable basic functions to be sustained. However, if intense physical demands such as cycling, swimming or running are placed on the body, the systems respond by producing much higher levels of ATP to ensure that our immediate energy needs are met.

The three systems that make ATP available are:

- the *alactacid* system (commonly called the ATP/PC system)
- the ***lactic acid*** system (glycolytic system)
- the *aerobic* system (oxygen system).

Lactic acid is a by-product of the incomplete breakdown of carbohydrate in the absence of oxygen.

The alactacid and lactic acid systems are both called *anaerobic* pathways because they do not require oxygen for the resynthesis of ATP. However, the *aerobic* system is oxygen dependent; that is, ATP produced using this system relies on the availability of sufficient oxygen in the cells.

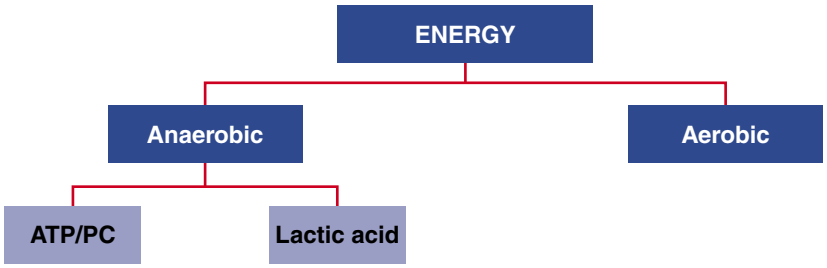


Figure 5.7: The body's energy systems

The systems are commonly called energy pathways because they each supply ATP but use different processes to do so. Each system has a way of resynthesising (rebuilding) the partly destroyed ATP molecule. How well each system resynthesises ATP determines its efficiency in energy production.

Alactacid system (ATP/PC)

As mentioned, residual supplies of ATP in the body are very limited. In fact, we have sufficient for only one explosive muscular contraction, for example, a standing long jump or sprint start lasting one to two seconds. An explosive movement causes the ATP molecule to 'split', providing energy for muscular contraction. Further muscular work relies on **creatine phosphate (CP)** breaking down to creatine and phosphate, and releasing energy in the process. The energy is used to drive free phosphate back to ADP so it can once again become a triple phosphate. Once reformed, ATP can break down again — and so the process goes on. The problem, however, is that CP supplies are exhausted within 10–12 seconds and take two minutes to be restored. The sequence is shown in figure 5.8 on page 138.

Creatine phosphate (CP) is an energy-rich compound that serves as an alternative energy source for muscular contraction.

Source of fuel

We have about 90 grams (about the same weight as a large egg) of ATP in our body. This is sufficient to power the muscles required in one explosive movement such as a jump, start or throw. That equates to one to two seconds of hard work. Following that, we rely on the 120 grams of reserve fuel, CP, stored in our cells. Creatine phosphate, then, is the fuel of the ATP/PC system.

Efficiency of ATP production

The alactacid system functions to make ATP rapidly available. Moreover, this occurs whether or not oxygen is available. This rapid supply is enabled

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primarily by a concentration of CP within muscle cells that is approximately five times greater than that of ATP. However, the supply of ATP is very limited if the demand is high as a result of sustained, maximal or near maximal work. But the system is able to recover quickly. Hence, the importance of this system to short, explosive movements in activities such as weight-lifting, discus throwing and starts in athletics is paramount.

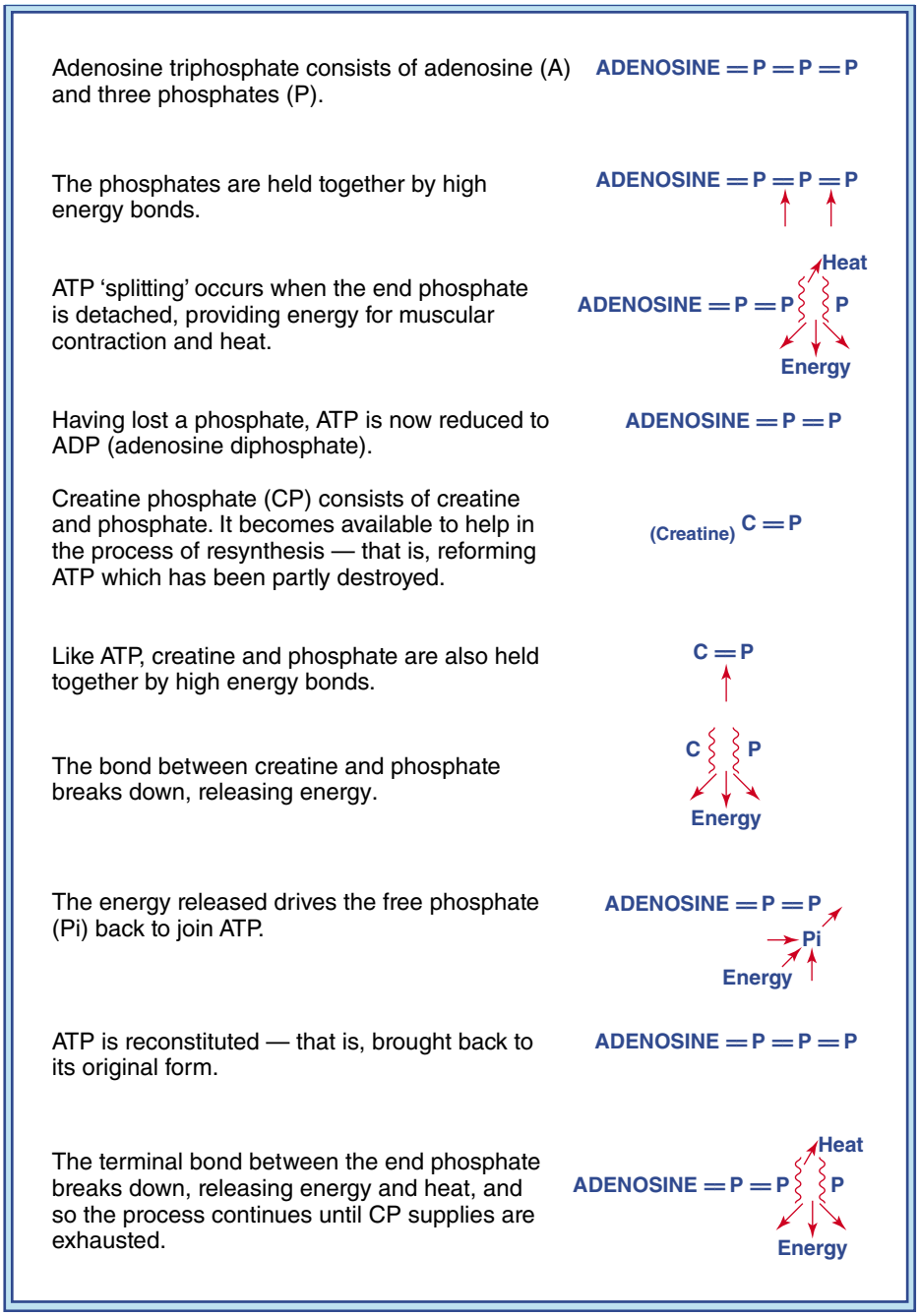
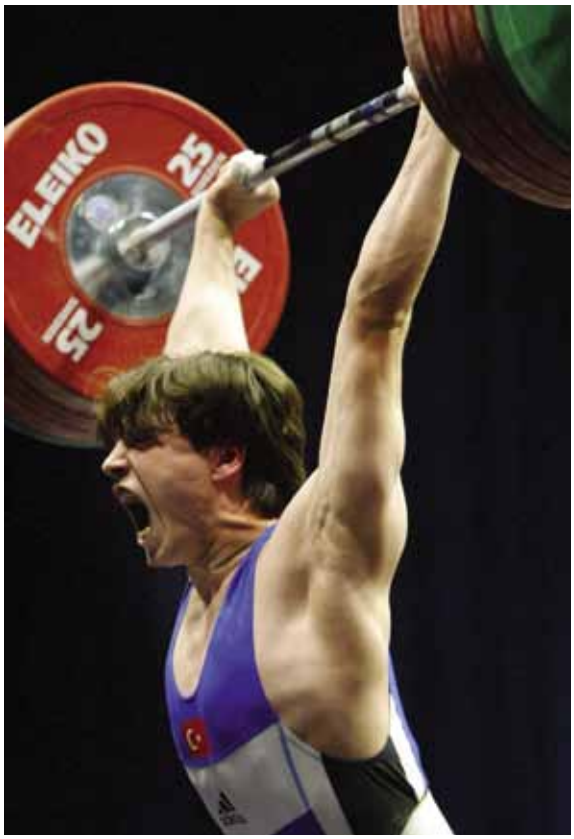


Figure 5.8: The breakdown and resynthesis of adenosine triphosphate

Duration of the system

In the alactacid system, ATP supplies are exhausted after two seconds of hard work and CP supplies are exhausted in a further 10 to 15 seconds. However, at rest, CP supplies are almost fully restored within two minutes.



Cause of fatigue

At maximal or near maximal effort, fatigue is caused by the inability of the system to continually resynthesise ADP from CP because CP supplies are quickly exhausted. This is why we are unable to run at maximal effort for distances longer than 100 metres. It is particularly evident in an all-out sprint over 150 metres, where the winner will not be the athlete that accelerates most to the finish, but the one who slows down the least in the final metres of the race.

By-products of energy production

While there are no fatiguing by-products of this system, heat is produced during the process of muscular contraction.

Rate of recovery

The ATP/PC system recovers quickly from exercise. Within two minutes, most of the ATP and CP supplies have been fully restored, with 50 per cent of creatine phosphate replenishment occurring in the first 30 seconds of rest recovery. This is why high jumpers, weight lifters and discus throwers can 'back up' almost immediately after their first and second attempts.

Figure 5.9: The alactacid system plays an important role in sports that require explosive movements.

SNAPSHOT

Creatine loading

Creatine is a rapidly available, energy-producing substance used by the body during high intensity activity. It is used to bind phosphate to form creatine phosphate, which is essential to regenerate ADP to ATP and provide energy for muscular contraction. As creatine is a natural substance and found in meat and fish, it is classified as a food supplement, not a pharmaceutical. As such, it has gained vogue among athletes keen to improve performances in strength, power and sprint events. It is a legal food supplement and was first used in the 1992 Olympics.

Most studies have found creatine to be effective in boosting performance when taken in conjunction with high carbohydrate diets. Creatine supplementation of 20 grams per day over five to seven days each week has been reported to improve sprint performances from one to five per cent and up to 15 per cent on repeated sprint type activities. Other studies report no performance-enhancing effect.

Most research on creatine is inconclusive, particularly where supplementation continues over a period of time. It appears to contribute to weight increases, elevated heart rate and dehydration, which causes cramping in hot, humid conditions. It has also been reported to contribute to stress fractures attributable to escalation in the strength of muscular contractions.

INQUIRY

Creatine loading

Discuss the ethics of using a substance such as creatine to boost energy stores. Even if legal, could it represent a gateway to other performance-enhancing drugs that are illegal? Explain your viewpoint.

APPLICATION

Experiencing the alactacid system

Have three students run a 150 metre distance at full effort. Place markers indicating the start to the 75 metre distance (section 1) and the 75 metre mark to the finish (section 2). Time the runners for each of the sections.

How did the times compare over each of the sections? Using your knowledge about resynthesis of ATP, discuss reasons for the results with the class.

INQUIRY

Identifying alactacid dependent activities

1. Identify a range of sports or activities where the ATP/PC system is the predominant energy system.
2. Suggest how use of an interchange/substitution rule in some team sports could improve player performance on the field.

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Lactic acid system

Following 10–12 seconds of maximal exercise, CP supplies are exhausted. ATP still needs to be produced to provide energy, assuming that the activity requires effort for longer than this, such as in a 400 metre race. Sufficient oxygen is not available even though the breathing rate has increased because of effort. This is because it takes some time for the blood to move from the lungs around the body and then to the working muscles where oxygen is in high demand.

The body needs to find a different fuel because CP supplies are at a low level. It does this by using the immediate sugar supplies circulating in the blood (blood sugar), as well as our sugar storage supplies in the muscle and liver. We refer to our blood sugar as glucose. It circulates freely in the bloodstream and its level is constantly regulated by the pancreas. When we accumulate too much, the body stores the excess in the liver and muscle. Stored glucose is called **glycogen**.

The process of using glycogen or glucose as fuel is called **glycolysis**. Glycogen is much more abundant than CP and can be used whether oxygen is available or not. In the case of the lactic acid system, oxygen is still not available because it takes a couple of minutes for the blood to transport oxygen from the lungs to the working muscles. For this reason, the lactic acid system is **anaerobic** and, because glycogen is the only fuel, the degradation process is called **anaerobic glycolysis**. As sufficient oxygen is not available during intense exercise, lactic acid levels rise and continue to rise as intensity increases.

Lactic acid is produced because insufficient oxygen results in the partial breakdown of glucose, providing quick but limited ATP production, as well as the by-product, lactic acid.

Glycogen is the storage form of glucose and is used for fuel when blood glucose levels decline.

Glycolysis is the process of using glycogen or glucose as fuel.

Anaerobic means that the reaction occurs in the absence of oxygen.

Anaerobic glycolysis is a process where glucose is broken down in the absence of oxygen to produce energy.

Source of fuel

The only fuel that can be used by the lactic acid system is carbohydrate. This exists in two forms:

- as glucose in the blood
- in the storage form called glycogen.

Glycogen is broken down, producing ATP and energy for muscular contraction. This is illustrated in figure 5.10.

Efficiency of ATP production

A **mole** is the gram-molecular weight of a substance. 1 mole (mol) = 1000 millimoles (mmol).

The lactic acid system provides ATP quickly, but this requires large quantities of glucose. In other words, ATP is rapidly available but at considerable cost. For example, three **moles** of ATP is the most that can be manufactured from the breakdown of 180 grams of glycogen during anaerobic glycolysis.

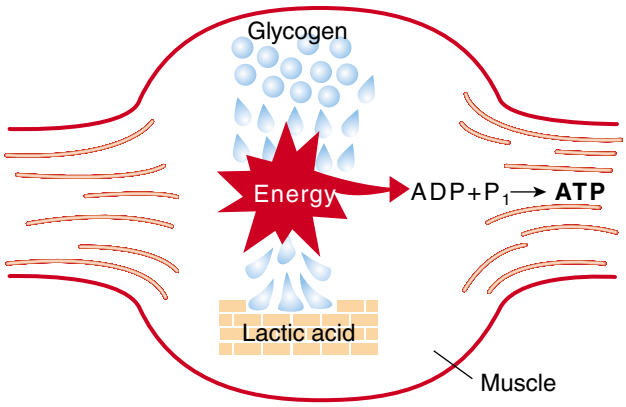


Figure 5.10: The lactic acid system uses glycogen to produce energy. (*Source:* EL Fox, *Sports Physiology*, (2nd ed.), The McGraw-Hill Companies, Inc., 1984, p. 16, figure 8.20.)

Duration of the system

The duration (work span) of the system depends on the intensity of the activity. Whereas a near maximal effort causes exhaustion in 30 seconds, an effort of 70–80 per cent will not cause exhaustion for three to four minutes and much longer for moderate intensity activity. Generally speaking, the lactic acid system produces energy for high intensity activities lasting from 10 seconds to one minute or more depending on the effort involved. It is the dominant system for all maximal activity performed between 30 seconds and two minutes — for example, 200 metre sprint, 400 metre running, 800 metre running, 200 metre freestyle and gymnastic routines.

Cause of fatigue

Fatigue occurs when lactic acid levels build up within the muscle cells. Although it was previously thought that lactic acid impeded performance, recent research suggests that it can be beneficial. Researchers have shown that fatigue is not caused directly by lactic acid but rather by its rate of removal, and this varies from one person to another.

Metabolism is the sum of all chemical processes within cells that transforms substances into energy.

Lactic acid is produced whenever the body uses carbohydrate as fuel, and this occurs most of the time. Even at rest, some lactic acid is produced because some carbohydrate is being **metabolised**, even though the body's predominant fuel source is fat. The speed of lactic acid production depends on exercise intensity. The faster you work, the more rapidly lactic acid accumulates. Excessively high levels of lactic acid prevent the muscle fibres from contracting and result in a rapid deterioration in performance.

However, while high lactic acid levels cause fatigue, tolerable levels can, in fact, enhance performance, because lactate is a fuel source. Finding the balance between the levels comes with training, together with the individual's awareness of the presence of lactic acid accumulation. Lactic acid tolerance improves with training, as do removal rates. Even though production rates may be high during intense exercise, high removal rates may ensure that performance is not affected.

What, then, is the relationship between lactic acid and fatigue? When lactic acid is formed, it immediately separates into the lactate ion (lactate) and a hydrogen ion (H^+). Each substance has a different effect on the body's ability to perform. The hydrogen ion is the acid part of lactic acid and impairs performance. In contrast, the lactate ion is a fast fuel, and is actually preferred by the muscle, even over glucose, because of its easy removal from the blood. Lactate is readily processed in the mitochondria or 'food factories' in the muscle cells and, while most is converted to carbon dioxide and water (65 per cent), some is converted to fuel. From here it is transported to other tissues such as the heart and brain and is used for energy. In fact, about 20 per cent of the liver's glycogen supplies are produced from lactic acid.



Figure 5.11: An athlete's effort in a 100 metre hurdles race produces high levels of lactate and hydrogen ions.

The **lactate threshold** is the point at which lactic acid accumulates rapidly in the blood.

The cause of fatigue in this system is predominantly the accumulation of lactic acid in quantities faster than it can be removed. However, other factors, such as the demanding nature of muscular effort, also need to be considered. High levels of lactic acid in isolation may not be the cause of fatigue, as some well-trained athletes can tolerate high levels, providing the removal rate is equally high. For example, while the **lactate threshold** for untrained people is around 4 mmol/L, trained athletes have been known to continue aerobic work with blood lactate levels above 20 mmol/L. Proper training positively affects the rate of removal of lactic acid from the body.

Elite athletes train with the intent of producing lactic acid by working above the lactic acid threshold for as long as they can sustain output. The response to this intense training is that the body produces enzymes that hasten the use of lactic acid as a fuel. The ability to use lactate as a fuel therefore varies from one athlete to another because of the trained characteristics of muscle fibres and, particularly in the case of endurance athletes, red muscle fibres.

SNAPSHOT

Evidence mounts that lactic acid helps, not hinders, athletic performance

By Justin Kemp and Damian Farrow

Sally Robbins stopped rowing because of it. Paula Radcliffe ended her Olympic marathon due to it. And the Australian 4 x 400 metres relay team claims that a silver medal helped cure its ill-effects. One chemical appears to be solely responsible for all the fatigue and discomfort felt when exercising to the limit — lactic acid. But is this really true?

There are many types of fatigue and the causes vary depending on the duration and intensity of the activity. Acute alterations to nerve and muscle function, to the metabolic environment in cells, to the availability of fuel for energy supply and to hormonal levels may all act to slow us down.

The brain, too, plays its part in perceiving these signals and acting to protect the body from damaging over-exertion. But because lactic acid production increases with ever-heavier exercise, it has become the common scapegoat to explain declines in performance at the muscle level.

When lactic acid is generated in human cells, it immediately separates into two components: (1) the lactate ion, and (2) a hydrogen ion (which reflects an increased acidosis). These two are often touted to inhibit the force and speed of muscle contraction, disrupt the ionic balance of the cells and slow the work-rate of the muscle's energy-supplying pathways.

Many studies have explored the impact that both lactate and acidosis have on muscle performance and this work is now trumpeting the virtues of lactic acid.

When lactic acid is produced during exercise and transported from working muscles into the bloodstream as lactate, the heart, neighbouring and distant muscle fibres and even the brain can use it as an energy source. Furthermore, the liver and kidney can convert lactate back to glucose, demonstrating that lactate is not the negative by-product of metabolism that it is so often labelled. It is actually a mobile fuel appreciated by other tissues.

In truth, lactate is an indispensable intermediary molecule involved in many physiological processes, including a role in maintaining muscle force. Professor Graham Lamb's team at La Trobe University has shown that high concentrations of lactate have little inhibitory effect on activation and contraction within single muscle fibres.

Meanwhile, scientists at Aarhus University in Denmark demonstrated that lactic acidosis may even protect against potential losses in the ability to activate muscles (called muscle excitability) and enforce output that can take place because of inevitable potassium escape from exercising muscle fibres.

A subsequent collaboration between these Danish and Australian research teams also has provided evidence that acidosis might block the movement of chloride across muscle fibre membranes — a mechanism that would enhance the excitability of the fibres.

Moving from single muscle fibre experiments to regular exercise, the Medical School of Hanover in Germany recently reported that an induced acidosis did not negatively affect the contraction speed of muscles involved in hand-grip exercise.

Moreover, a Swedish group has shown that some of the experiments that implicated acidosis in muscle fatigue do not hold when these same trials are performed at body temperature. Some scientists even suggest that lactate production decreases muscle acidosis.

The accumulation of lactate in the muscle and blood during exercise might still be a good marker to indicate the onset of fatigue, but this in no way declares that lactic acid causes muscle fatigue.

There is now overwhelming evidence from myriad experimental protocols expounding lactate as being not harmful, and even beneficial, to exercise performance, compared with limited evidence to the contrary.

Source: The Age, 4 September, 2004.



APPLICATION

Sensing lactic acid accumulation

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Organise a voluntary group or your class to follow a thorough warm-up with an all-out 400 metre run. Stop when you feel you are unable to run any harder or cannot increase your pace; that is, you are approaching your lactate threshold. Alternatively, use the **Running** weblink in your eBookPLUS to read a description of lactate threshold running.

Write a brief description of how your body felt when you stopped. Refer to muscles, breathing rate, energy and willpower. Discuss your description with the class.

Rate of recovery

During the post-exercise period, lactic acid diffuses from the muscle and into the bloodstream where its use as a by-product is important. In the liver, lactic acid is reconverted to glycogen and can once again be used as a source of fuel (see figure 5.12). The process takes about 30 minutes to an hour. This further contributes to the body's efficiency by resynthesising waste for use at a later stage.

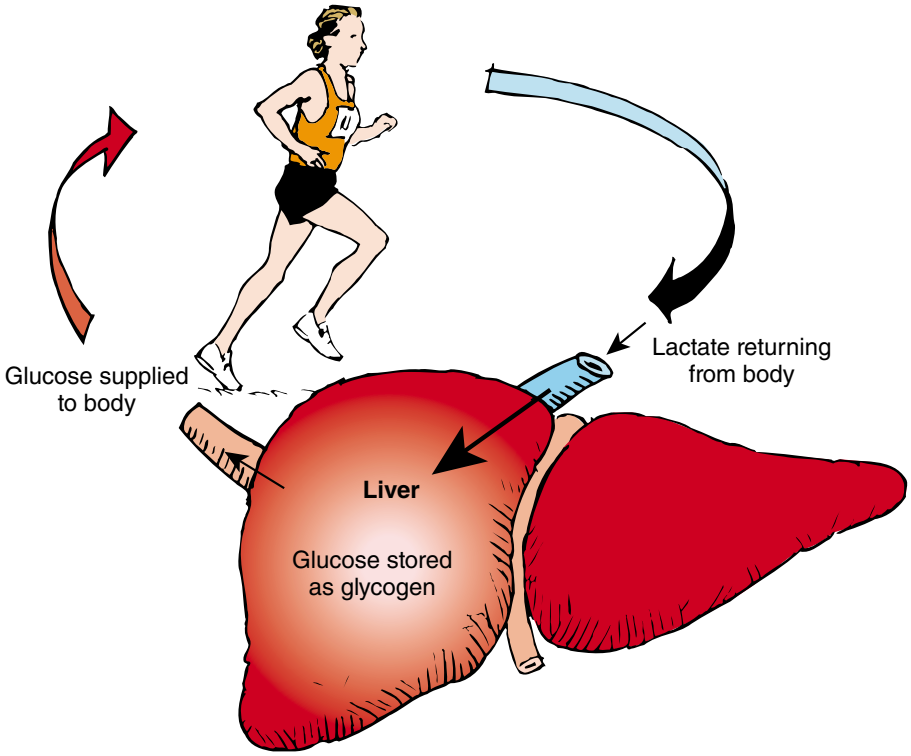


Figure 5.12: Not only does the liver store glycogen, but also it is able to reconvert lactate back to glycogen to be once again used as fuel.

INQUIRY

Identifying the lactic acid system

1. List three sports or activities in which the lactic acid system is the predominant energy system. Suggest strategies an athlete could use to help overcome the build-up of lactic acid in an 800 metre event.
2. Examine the program for the school athletics carnival. Evaluate the impact of lactic acid build-up in relation to recovery periods of athletes wishing to compete in all events.

Aerobic system

Aerobic metabolism is the breakdown of fuel in the presence of oxygen to produce energy (ATP).

Physical activity lasting more than a few minutes requires the presence of oxygen to ensure the continuation of muscular contraction. Oxygen is not immediately abundant to the muscles when we begin exercise; rather, it gradually becomes available as the oxygen-rich blood fills the muscle cells. This allows the third energy pathway, called the aerobic pathway or oxidative system to become the predominant supplier of ATP. This process of fuel degradation is sometimes called **aerobic metabolism** because glucose and fat (and sometimes protein) are broken down in the presence of oxygen to produce ATP. Lactic acid does not accumulate during aerobic metabolism because oxygen is present. This is in contrast to anaerobic glycolysis.

Source of fuel

Whereas the lactic acid system can use only glucose as fuel, the aerobic system can use carbohydrate, fat and even protein (figure 5.13). During the early stages of endurance work, carbohydrate is the preferred fuel. However,

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if exercise continues beyond an hour or so, fat becomes increasingly important as a fuel and reigns as the dominant energy source if glycogen supplies become exhausted.

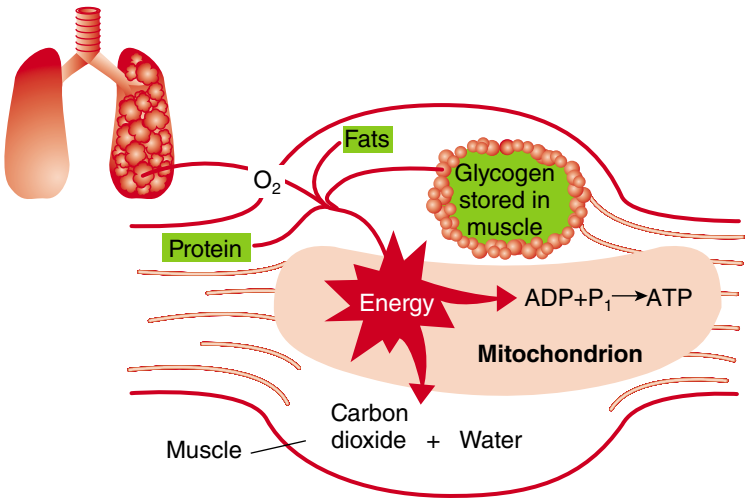


Figure 5.13: The aerobic system can use many sources of fuel to produce ATP. (*Source:* EL Fox, op. cit., p. 18.)

Efficiency of ATP production

The aerobic system is extremely efficient in the metabolism of fuel and provision of energy. Whereas the lactic acid system is able to generate only three moles of ATP from 180 grams of glycogen, the aerobic system is able to generate 39 moles of ATP from 180 grams of glycogen. In effect, it enables the production of much more energy from glycogen, enabling us to continue sustained work for longer periods of time.

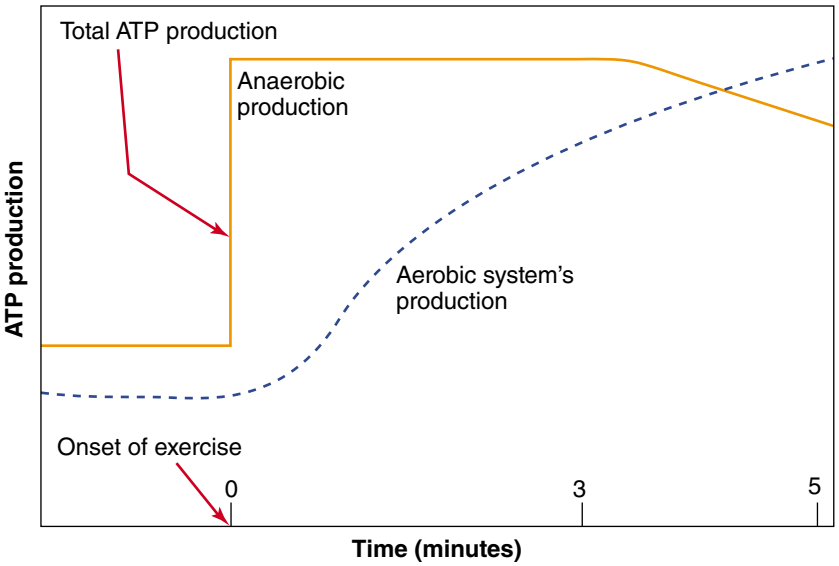


Figure 5.14: Efficiency of production of ATP

Duration of the system

The total amount of glycogen in the body is approximately 350 grams. This is sufficient for 12 hours of rest or one hour of hard work. In intermittent exercise, such as football or netball, glycogen supplies last for approximately four to six hours. However, in the case of marathon runners, supplies could be exhausted in about two hours.

The body has virtually unlimited supplies of fat and this is used as a fuel source as glycogen supplies are depleted. In well-trained athletes, the body mixes carbohydrate and fat in endurance events. This process, called *glycogen sparing*, results in some fat fuel being used earlier so that glycogen can be available at a later stage, such as for a sprint finish. These fuels used jointly, yet sparingly, ensure that the body can operate using this system for long periods of time. The aerobic system is the predominant system for use during extended endurance events such as marathons and low demand activities such as walking, sitting and reading.

Cause of fatigue

Because the aerobic system is so versatile in fuel usage (remember it can use carbohydrate, fat and even protein to produce energy), it is not a lack of fuel but other factors that contribute to fatigue while this system predominates. During endurance work, slow-twitch muscle fibres will do most of the work. These fibres have many **capillaries** and a rich oxygen supply. Before a run, these fibres may be saturated with glucose. However, activity beyond an hour or so results in depletion of fuel and, although some is replaced from the liver, glycogen is exhausted. Glycogen is premium fuel for muscles. When it runs out, the body tires.

Capillaries are tiny blood vessels that connect the smallest arteries to the smallest veins.

A second cause of fatigue is the exhaustion of carbohydrate and subsequent reliance on the secondary fuel, fat. Although fat is much higher in energy than carbohydrate, its use as a sole fuel can cause problems. The point at which the body changes its main fuel supply from glycogen to fat is called 'hitting the wall'. Fatigue occurs because fat requires more oxygen for metabolism than does carbohydrate. This increases the runner's body temperature and rate of **respiration**.

Respiration is the process of breathing.

By-products of energy production

During aerobic activity, oxygen is required to burn the fuels in the body (carbohydrate and fat). As with most fuels that are burnt, by-products are produced, in this case, carbon dioxide and water. The carbon dioxide is breathed out through the process of respiration and the water is available to the cells. These by-products are not harmful to performance.

Rate of recovery

The recovery rate of the aerobic system depends on the duration of use. If used for a short period of time, the system recovers quickly because glycogen stores have not been depleted. However, if used for hours, glycogen storage areas could well be exhausted. In this case, it may take days to fully replenish glycogen reserves.



INQUIRY

Fuelling the aerobic system

Identify a sport or activity in which the aerobic system is the predominant energy system. Discuss the strategies that could be used to ensure that the athlete has sufficient fuel for the duration of the activity.

Energy systems summary

The energy systems should not be thought of as individual metabolic units that operate independently of one another. Although the systems have been referred to individually, they actually function together (see figure 5.15). This gives rise to the term *predominant energy system*, or the system that is being most utilised at that point in time. This concept is further illustrated in figure 5.15, where, after 120 seconds of running time, the ATP/PC system is contributing little to energy supply and the lactic acid system is in decline, although still assisting to some extent. The contribution of the aerobic system at this point is predominant and rising gradually.

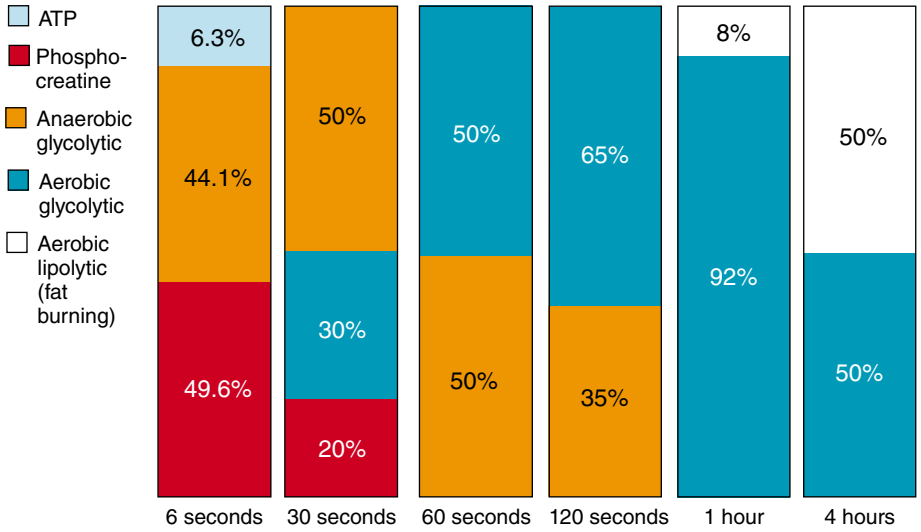


Figure 5.15: The combined energy systems used in high intensity exercise (*Source:* J Hawley and L Burke, *Peak Performance*, Sydney: Allen & Unwin, 1998, p. 47.)



APPLICATION

Experiencing the energy systems

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Perform a recognised field test of aerobic fitness such as the Coopers 12-minute run. Use the Coopers test weblink in your eBookPLUS to view the procedure. Try to be aware of changes in energy systems as you run.

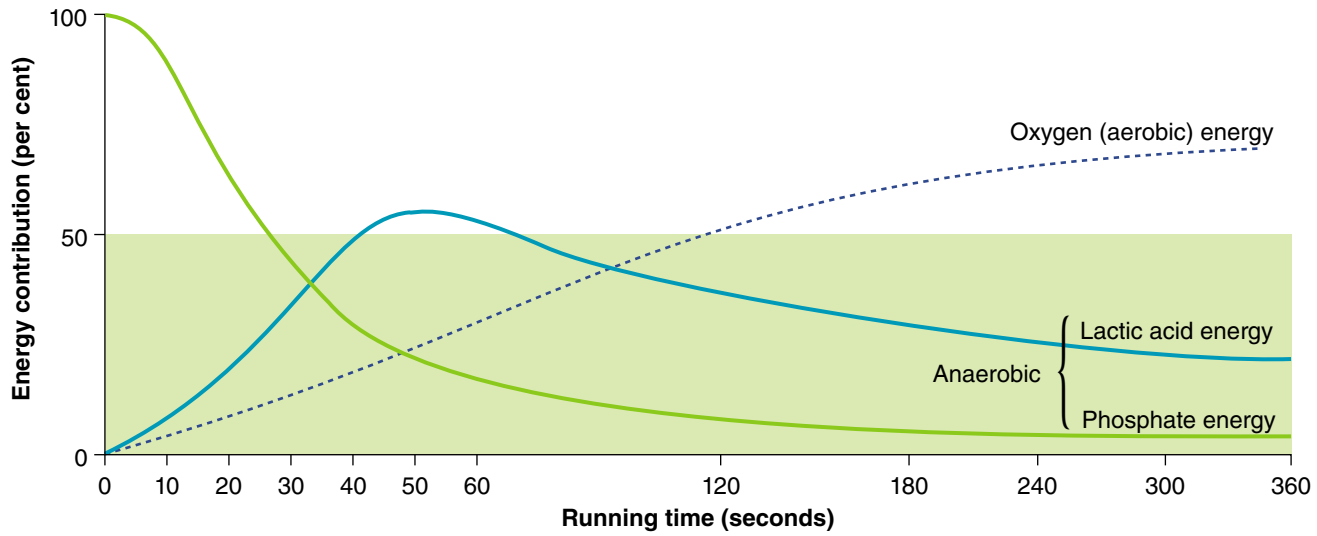


INQUIRY

Experiencing the energy systems

1. Briefly describe your feelings (muscles, breathing rate, fatigue) once your body changed to the aerobic system to supply energy.
2. Examine figure 5.16. Do you think the diagram illustrates the energy contribution from each system during your fitness run? How would the diagram alter if you walked the entire distance? Discuss your response with the class.

Figure 5.16: Relationship between running time and energy systems



INQUIRY

Analysing the energy systems

Make an enlarged copy of the following table in your workbook. Analyse each energy system in terms of the points listed. Sources of information could include:

- this chapter
- table 5.1 (see below)
- the **Energy system** weblinks in your eBookPLUS.

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Criteria for analysis	ATP/PC	Lactic acid	Aerobic
Fuel source			
Efficiency of ATP production			
System duration			
Causes of fatigue			
By-products			
Process and rate of recovery			

Table 5.1: Characteristics of the three energy systems

Characteristic	ATP/PC	Lactic acid	Aerobic
1. Energy source for ATP production	Creatine phosphate	Carbohydrate Glycogen	Carbohydrate Fat Protein
2. Number of ATP molecules made from one molecule of energy source	Creatine phosphate: less than 1	Glucose: approximately 2	Glucose: 38 Fat: more than 100
3. Maximal rate of ATP production (molecules/minute)	3.6	1.6	1.0
4. Duration of peak energy production	5–10 seconds	30–45 seconds	3–7 minutes
5. Percentage contribution at rest	Less than 5 per cent	Approximately 15 per cent	Approximately 80 per cent
6. Percentage contribution in a maximal sprint	55 per cent	40 per cent	5 per cent
7. Recovery time until repeat effort	Creatine phosphate replenishment: 3–5 minutes with 50 per cent recovery in first 30 seconds	Depends on time above lactate threshold. Removal of lactic acid to rest levels: • with active recovery: – 50 per cent removal: 15 minutes – 95 per cent removal: 30 minutes • with passive recovery: – 50 per cent removal: 30 minutes – 95 per cent removal: 60 minutes	Restoration of body glycogen stores: • after competition of more than 1 hour: 24–48 hours • after hard interval training: 6–24 hours

Characteristic	ATP/PC	Lactic acid	Aerobic
8. Limiting factor when operating maximally	Depletion of creatine phosphate	Lactic acid accumulation in quantities faster than it can be removed.	Lactate and hydrogen-ion accumulation • Depletion of glycogen stores • Overheating (hyperthermia)
9. Intensity and duration of activity where the system is dominant ATP provider	Maximal intensity (>95 per cent) and duration of 1–10 seconds	High, sub-maximal intensity (85–95 per cent) and duration of 10–30 seconds	Sub-maximal intensity (85 per cent) and duration of >30 seconds
10. Specific sporting examples	• Any athletic field event • Elite 100 metre athletic sprint • Golf drive • Gymnastic vault • Volleyball spike • Tennis serve	• 200–400 metre run • 50 metre swim • Consecutive basketball fast breaks • High intensity 15–20 second squash rally • Elite netball centre in close game	• Marathon • Cross-country skiing • Triathlon • AFL mid field • All elite team players • 2000 metre rowing race • Water polo game



TYPES OF TRAINING AND TRAINING METHODS

To prepare athletes adequately, training is essential. However, the type of training and methods used depends on the type of movements, skill requirements and specific demands of the activity in question. Weight-lifters, for instance, have different training requirements from golfers; soccer players from tennis players; sprinters from endurance runners; and dancers from gymnasts. The four types of training are:

- aerobic training
- anaerobic training
- flexibility training
- strength training.

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Aerobic training

Aerobic training uses the aerobic system as the main source of energy supply. It includes a number of training types including:

- continuous training
- Fartlek training
- aerobic interval training
- circuit training.

Continuous training

In continuous training there is sustained effort — that is, effort without rest intervals. For training to be categorised as continuous, it needs to persist for not less than 20 minutes. During continuous training, the heart rate must rise above the aerobic threshold and remain within the target zone for the duration of the session. Examples of continuous training are jogging, cycling and aerobics. In the case of an endurance running program, a period of time in excess of 30 minutes per session is needed for an improvement in fitness to occur.



Figure 5.17: Continuous training requires sustained effort.

The two types of continuous training are:

- *Long, slow distance training.* This is standard for those who need to improve general condition. Subjects work at between 60 and 80 per cent of their maximal heart rate and focus on distance rather than speed.
- *High intensity work of moderate duration.* This *is* very demanding as the athlete works at 80 to 90 per cent of maximal heart rate. Only well-conditioned athletes use this training and, even then, intervals of relief are required. High intensity training requires work at or near competition pace and is essential for developing leg speed.

Fartlek training

In **Fartlek** ('speed play') **training**, participants vary their speed and the terrain on which they are working, ultimately engaging both anaerobic and aerobic energy systems.

The word 'Fartlek' means 'speed play'. In **Fartlek training**, participants vary their speed and the terrain on which they are working, ultimately engaging both anaerobic and aerobic energy systems. Fartlek training resembles a combination of interval and continuous training because of its random use of variations in speed and intensity. Using this type of training, the amount of effort is not predetermined as a percentage of heart rate, but rather by 'feel' according to how the body is responding. Short, sharp surges dictate an anaerobic energy supply and the development of this system. Fartlek training is good for most athletes, but is particularly beneficial for games players who are frequently asked to sprint, stop, jog, change direction and accelerate as part of the activity.

Some ways of incorporating speed play into continuous training are:

- regular bursts of speed every two or three minutes
- running up and down sand-hills
- group running with changing leadership
- cross-country running, covering a variety of terrain types.

Fartlek training is beneficial for pre-season training and in preparation for activities where there is frequent changes between predominant energy systems; for example, rugby, basketball and soccer.

Speed play program

1. Warm-up jog
2. Light callisthenics such as push-ups, sit-ups and star jumps
3. Form one or two lines depending on numbers.
4. Jog 400 metres with the person at the back of the line moving to the front every 50 metres.
5. Walk 100 metres.
6. Run 500 metres over varying terrain, changing speed between walk, jog, sprint.
7. Repeat steps 4, 5, 6.
8. Cool-down with some light stretching exercises.

Figure 5.18: A sample speed play program

Aerobic interval training

Aerobic interval training involves alternating sessions of work and recovery. Using this method, an athlete performs a given amount of work, such as a 400 metre run, in a particular time or at a specific level of intensity. This is followed by a recovery period before the task is repeated a number of times in the same manner (see figure 5.20). The rest period is important in differentiating aerobic interval from anaerobic interval training. During aerobic interval training the rest period is very short, say 20 seconds, between exercise bouts. The short rest period does not allow enough time for full recovery and thus maintains stress on the aerobic system.

Aerobic interval training involves alternating sessions of work and recovery. The rest period is important in differentiating aerobic interval training from anaerobic interval training.

This training method effectively develops aerobic endurance because:

- sustained effort of moderate intensity ensures that the aerobic system is stressed but not completely fatigued
- the level of intensity can be adjusted to achieve the desired level of aerobic capacity.

The overload principle (see page 162) can easily be applied to interval training by manipulating the following four variables:

- work intensity (how difficult the exercise is to perform)
- work time (how long the exercise lasts)
- the number of repetitions
- the work–rest ratio.



Figure 5.19: Aerobic interval training involves alternating between periods of work and recovery.

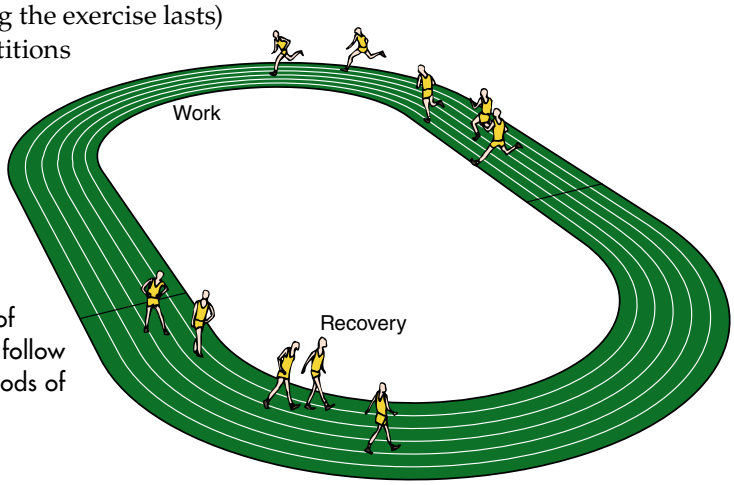


Figure 5.20: Interval training consists of cycles where the athletes follow periods of work with periods of recovery.

Circuit training

Circuit training develops aerobic capacity and has the potential to make substantial improvements in strength, endurance, flexibility, skill and coordination. While it can be used anytime, circuit training is generally preferred in the preseason to develop a solid fitness platform for the numerous physical demands of the season ahead.

Circuit training requires participants to move from one 'station' to another, performing specified exercises at each until they complete the circuit.

A typical general conditioning circuit is illustrated in figure 5.21. Here, participants move from one activity to the next after completing the required repetitions (or performing for the specified time) for that exercise. Participants usually aim to complete the circuit in the shortest period with decreasing times indicating improving fitness levels. Circuit training can be used as an anaerobic or aerobic training program depending on the type of activity, the time spent at each activity and the number of circuits required. Once again, the effectiveness of circuit training relies heavily on how well the overload principle is applied. Progressive overload in circuit training is achieved by:

- increasing the number of stations
- increasing the time at each station
- increasing the repetitions at each station
- decreasing the time allowed for the circuit
- increasing the repetitions of the circuit

- determining the repetitions at each station on the basis of the individual's target zone for their heart rate response. Fitter athletes will do more repetitions at each station than less fit athletes.

  The greatest benefits are achieved when:
- the overload principle is applied
- the skills at each station concentrate on the attributes needed for a particular game/activity
- all fitness components essential to the particular sport or activity are developed
- record cards are kept to monitor improvement to keep athletes aware of their progress.

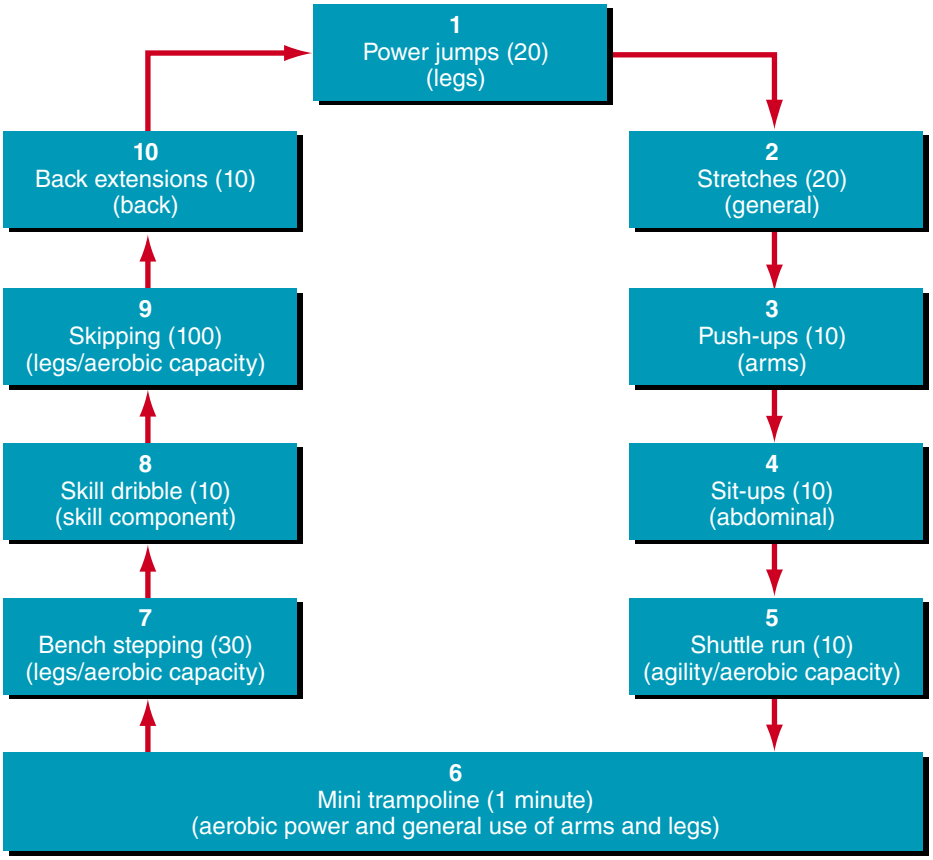


Figure 5.21: A typical conditioning circuit



APPLICATION

Designing and trialling a circuit

As a class or in small groups, design a circuit to improve aerobic capacity. Include at least 10 activities and ensure a logical progression from one activity to the next. Make a card for each activity in your circuit that names (and perhaps illustrates) what is to be done at each station. On each card indicate the number of repetitions of the movement that are required before progression to the next activity. Finally, perform your circuit as quickly as possible and record the time taken.



INQUIRY

Evaluating the circuit

Comment on how well the circuit taxed your current level of physical condition.

Explain the value of your circuit in enhancing the aerobic fitness of a group of athletes who are about to begin training for your chosen sport.

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Anaerobic training

Anaerobic training uses high intensity work coupled with limited recovery to develop systems of energy supply that function in the absence of oxygen. Anaerobic training is shorter in duration than aerobic training, lasting less than two minutes. While activity is brief, effort is maximal and followed by short rest periods that do not allow full recovery of systems that supply energy. Anaerobic training seeks to enhance systems that supply energy under periods of intense activity while developing greater tolerance for the lactic acid created as a result of the work.

There are three types of anaerobic training:

- *short anaerobic* training lasts less than 25 seconds and develops the ATP/PC systems of energy supply
- *medium anaerobic* training lasts from 25 seconds to one minute and develops the lactic acid system for energy supply
- *long anaerobic* training lasts one to two minutes and develops the lactic acid/aerobic systems.

Anaerobic interval

Anaerobic interval training can best be described as sprint training over short distances using maximal effort. Most anaerobic interval training is directed towards the development of speed as might be required in 100 metre sprinting and for short bursts in games such as touch football. Table 5.2 shows differences in anaerobic interval training programs depending on activity type. To develop speed while focusing on technique, the rest period needs to be slightly extended to allow lactate to disperse, as lactate build-up inhibits the development of quality with the sprinting action.

Table 5.2: Various types of anaerobic interval training

Interval	Use	Work duration	Rest duration	Work–rest ratio	Repetitions	% of maximum speed	% of maximum heart rate
Long	Anaerobic threshold training	2–5 min	2–5 min	1 : 1	4–6	70–80	85–90
Medium	Anaerobic training	60–90 sec	120–180 sec	1 : 2	8–12	80–90	95
Short	High energy training (anaerobic)	30–60 sec	90–180 sec	1 : 3	15–20	95	100
Sprint	Speed (anaerobic)	10–30 sec	30–90 sec	1 : 3	25+	100	100

Source: R Martens, *Successful Coaching: America's Best-selling Coach's Guide,* 3rd edn, p. 313, table 14.10
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Flexibility training

Flexibility is the range through which joints and body parts are able to move.

Muscles require not only strength but also length. Muscle length can be enhanced through a sound flexibility training program. A **flexibility** program is essential for:

- prevention of injury
- improved coordination between muscle groups
- muscular relaxation
- decreasing soreness and tightness following exercise
- an increased range of movement around joints, maximising performance potential.

Sports such as football, basketball, netball and hockey can cause muscle tightness and shortening because the muscles do not undergo the full range of movement. Stretching during the warm-up and cool-down phases can promote the flexibility that assists these activities. Flexibility is affected by a number of factors including:

- *age.* Muscles shorten and tighten as we grow older.
- *sex.* Generally, females are more flexible than males
- *temperature.* Increased atmospheric and body temperature both improve flexibility
- *exercise.* People who are frequently involved in exercise tend to be more flexible than more sedentary people.
- *specificity.* Flexibility is joint specific. The fact that a person is flexible in the shoulders does not automatically mean similar flexibility exists in the hips.

The four common types of stretching methods used in flexibility programs are:

- static
- ballistic
- proprioceptive neuromuscular facilitation (PNF)
- dynamic.

Static stretching

Static stretching is a safe form of stretching in which the stretch is held for a period of 10–30 seconds.

During **static stretching**, the muscle is slowly stretched to a position (end point or limit) which is held for about 30 seconds. The movement is smooth and performed slowly, taking the muscle to a point where there is stretch without discomfort. Static stretching is safe and is used extensively in the rehabilitation of injury and the warm-up and cool-down phases of training. An example of a static stretch is sitting down with legs extended, gently reaching forward and holding the position for 30 seconds.

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Figure 5.22: An example of static stretching

Ballistic stretching

The **stretch reflex** is an involuntary muscle contraction that prevents fibre damage if muscles are lengthened beyond their normal range.

Ballistic stretching involves repeated movements such as swinging and bouncing to gain extra stretch. This form of stretching activates a mechanism in the muscle called the **stretch reflex** (see figure 5.23), causing the muscle to contract. The force and momentum of the movement can be potentially harmful as the contracted muscle is then stretched well beyond its preferred length.

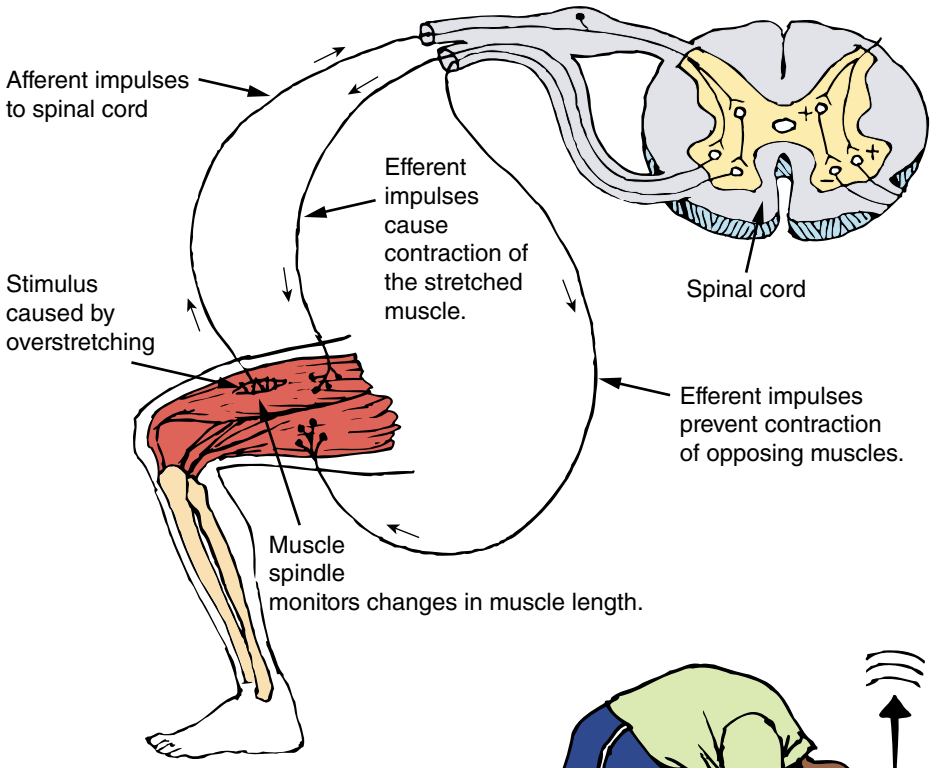


Figure 5.23: The stretch reflex

Ballistic stretching should be used *only* by advanced athletes and even then should follow a thorough warm-up and another form of stretching. The movements must be executed rhythmically to avoid jerky actions and too much momentum at the end point of the stretch. An example of ballistic stretching would be touching toes using a bouncing motion.

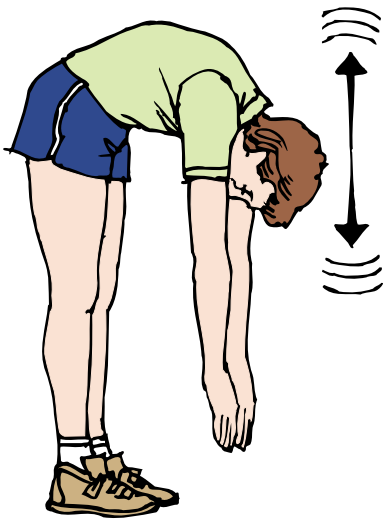


Figure 5.24: Touching toes using a bouncing motion is an example of ballistic stretching *not* recommended to stretch the hamstrings.

Proprioceptive neuromuscular facilitation (PNF) stretching

PNF stretching is a progressive cycle incorporating a static stretch, an isometric contraction and a period of relaxation in the lengthened position. It is aimed at stretching and strengthening muscle in a safe movement.

PNF stretching involves lengthening a muscle against a resistance usually provided by a partner. It incorporates static stretching, strength development using isometric contractions and periods of relaxation in a progressive sequence. The steps are:

- the muscle group to be stretched is determined
- the muscle group is stretched using a static contraction

- while in the stretched position, the person isometrically contracts the muscle (that is, he/she pushes against an immovable object, such as the ground or a partner, and holds the position for 10 seconds)
- the participant relaxes in the lengthened position for five seconds
- a further static stretch is applied followed by an isometric contraction.

PNF stretching is useful in rehabilitation programs because the isometric component strengthens the muscle fibres during the stretching process. PNF is also recommended as an integral part of the warm-up and cool-down phases of training programs because of its ability to provide added stretch under safe conditions.

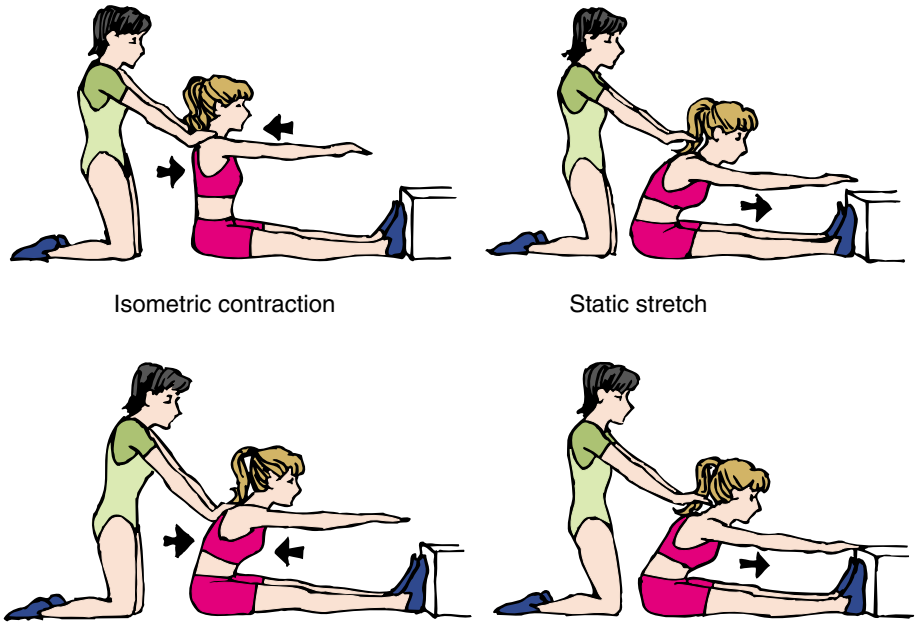


Figure 5.25: PNF stretching

Dynamic stretching uses speed and momentum with movements experienced in a game to increase flexibility.

Dynamic stretching

Dynamic stretching is popular for warm-ups and pre-training routines as it attempts to imitate many of the movements experienced in the game. Dynamic stretching uses movement speed together with momentum to gradually warm up muscle fibres and extend them through the degree of stretch required in the game. Bouncing movements, common in ballistic stretching, are avoided. Actions attempt to reduce muscle tightness rather than lengthen muscle fibres.

In contrast to static stretching, dynamic stretch movement is continuous but the end position is not held. Dynamic stretching is not as safe as static or PNF stretching due to tension exerted by specific movements on muscles and across joints. However, many prefer to use it just prior to a game because its movements simulate those required in the game. An example of dynamic stretching is arm circling. To find out more about dynamic stretch movement in action, use the **Dynamic stretches** weblink in your eBookPLUS.

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APPLICATION

Categorising different forms of stretching

From figure 5.26, choose five exercises that could be developed into static stretches and five that could be developed into PNF stretches. In pairs perform your exercises. Briefly describe your exercises and say why each fits the specified category.

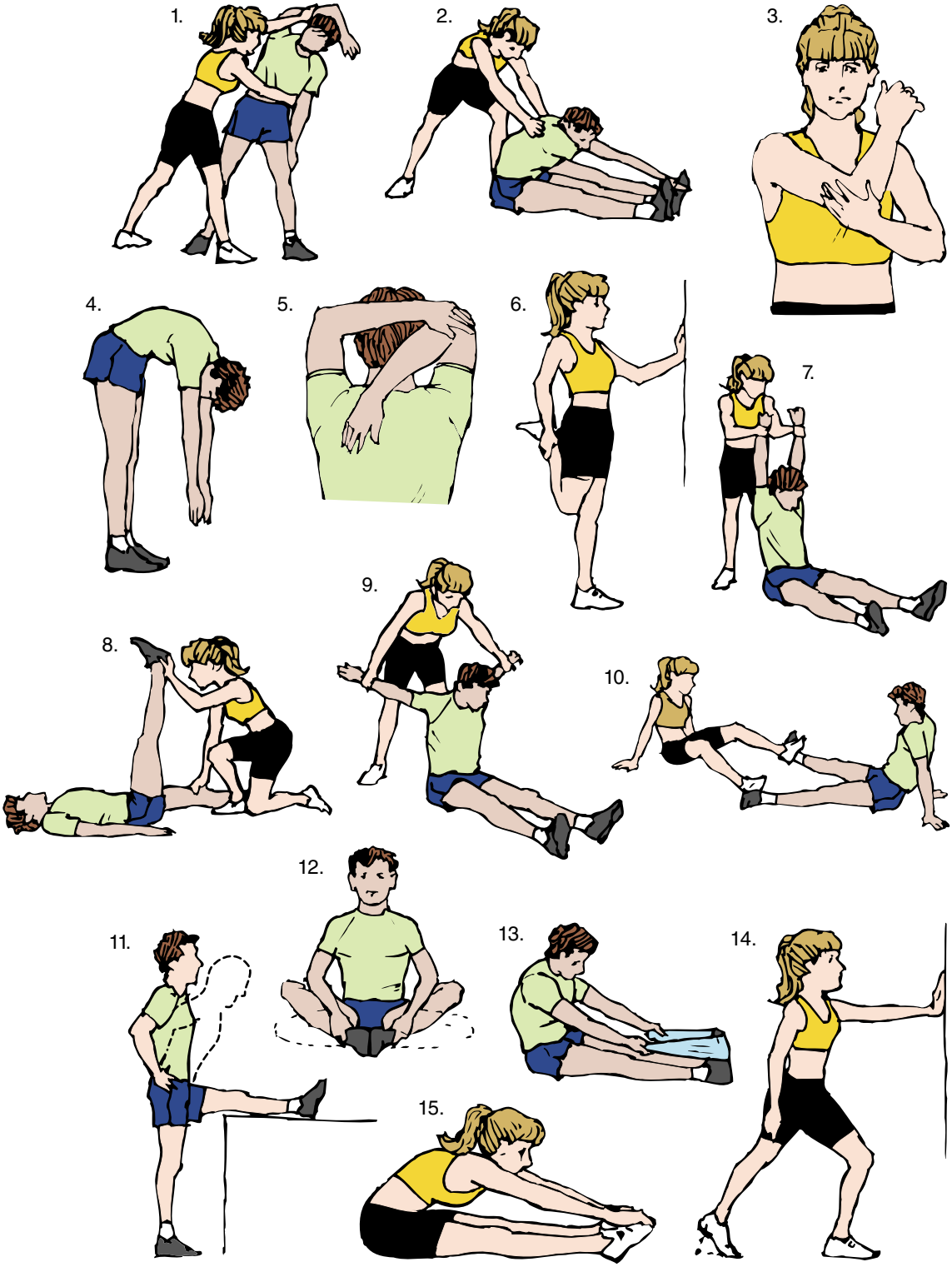


Figure 5.26: Flexibility exercises

Strength is the ability of a muscle or muscle group to exert a force against a resistance.

Muscle **hypertrophy** is a term that refers to muscle growth together with an increase in the size of muscle cells.

Strength training

Strength training is a form of training where muscular contraction is resisted by calculated loads, thereby building the strength of the muscle. Stimulus in the form of resistance causes muscle **hypertrophy** as more fibres are engaged

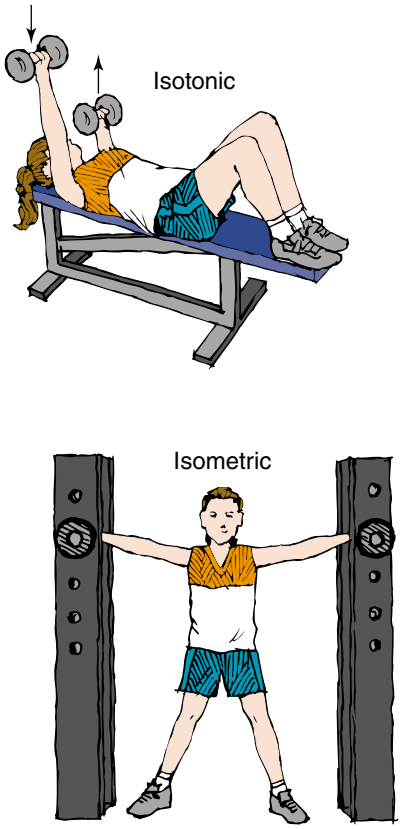


Figure 5.27: Two types of resistance training program

to aid the movement. There are many ways of creating resistance — that is, an opposing force (as in lifting, pushing) — including:

- free weights
- fixed-weight machines
- elastic and hydraulic forces.

Strength training programs can be used for many purposes including:

- building strength
- developing power
- developing muscular endurance
- injury rehabilitation
- body building
- general health benefits.

Strength training is fundamental to improvement in most sports, particularly those in which lifting a weight or opposing a force (such as in football) is involved.

Strength programs can be divided into two categories:

- *isotonic programs* — participants raise/lower or pull/push free weights to contract/lengthen muscle fibres. Nearly all strength training is isotonic.
- *isometric programs* — participants develop strength by applying a resistance and using exercises in which muscle length does not change.

These programs are useful for body building, improving muscle tone, increasing strength/power and rehabilitation following injury. The differences are illustrated in figure 5.27.

Like many sports, strength training has its own terminology. The most common terms used include:

- *repetitions* — the number of times an exercise is repeated without rest
- *repetitions maximum (RM)* — the maximum weight you can lift a number of times. For example, 1 RM is the maximum weight you can lift only once; 8 RM is the maximum weight you can lift eight times. Therefore, the actual weight or mass lifted during an RM varies from one individual to another.
- *set* — a number of repetitions done in succession; for example, one set equals 10 repetitions
- *resistance* — the weight or load
- *rest* — the period of time between exercises, sets or sessions.

There are a number of principles that you need to be aware of when considering the type of strength and method you use in its development.

- *Target specific muscle groups*. Only those muscles that encounter the resistance will benefit from the work.
- *Progressive overload*. The load (resistance) needs to be progressively increased as adaptations take place.
- *Volume*. Lifting more by increasing the number of days on which you train or the amount per session is of benefit to a point. Care needs to be taken to avoid injury and overtraining, and to allow periods of time for muscles to rest.
- *Variety*. Using different methods (free weights/machine weights), changing muscle groups, introducing new exercises and utilising a circuit format adds interest and enhances motivation.
- *Rest*. Allow rest between sets. The amount varies according to your program aims, such as power or endurance.
- *Repetition speed*. To increase power, perform repetitions quickly. Focusing on strength or bulk necessitates slower speeds.

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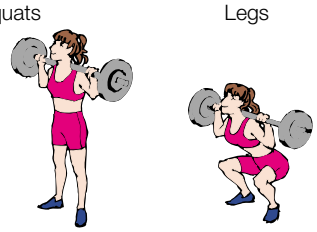
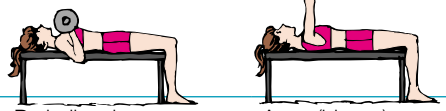
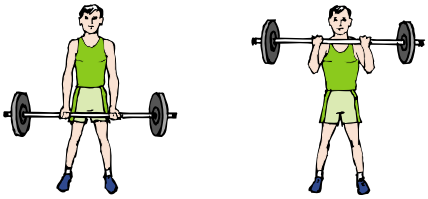
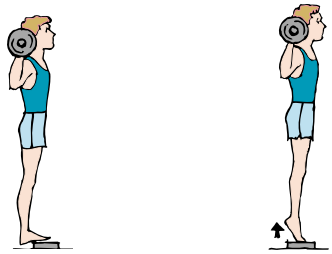
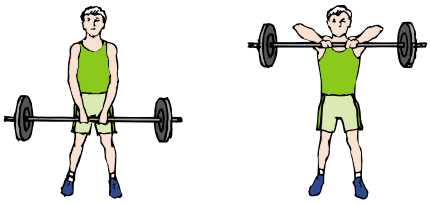
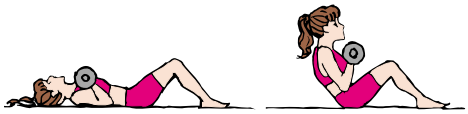
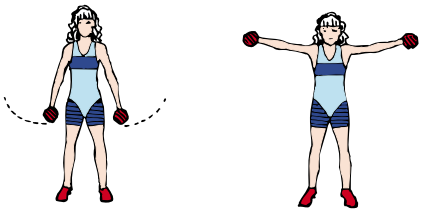
- *Repetition numbers.* Generally, absolute strength is developed by low repetitions (3–8), anaerobic strength endurance by medium range repetitions (10–20) and aerobic strength endurance by high range repetitions (20–40 or more).
- *Recovery.* Train every second day to allow muscles to recover. If training each day, target different muscle groups to those of the previous day.

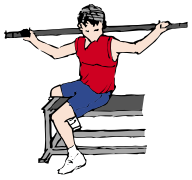
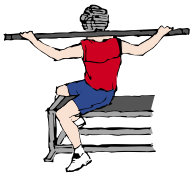
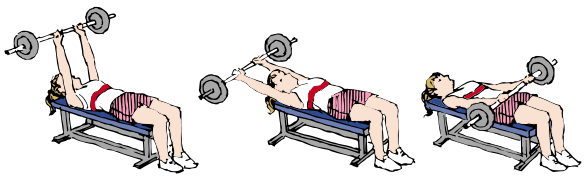
Well balanced isotonic programs include a range of exercises that address all major muscle groups. Some of the more commonly used exercises are illustrated in table 5.4 (pages 160–1).

Table 5.3: Examples of strength training programs

Method	How it works
Free weights 	For example, use of barbells, dumbbells and hand weights. Weights are used to develop all muscles in a group at the same time; for example, the quadriceps muscles in the upper leg. With free weights, most resistance is encountered when initiating the movement. Using free weights can be time-consuming as users may need to frequently load and unload plates. It also requires strict form and good technique to avoid injury, together with the ability to balance the weight while performing the exercise.
Weight machines 	There are many different types of weight machine. Resistance is usually provided by stacked weights where users can adjust loads by changing pin placements. They are often preferred to free weights by beginners as there is less chance of injury because tracks restrict the way each movement can be performed. This enhances stability and can give more confidence to first time users. Weight machines are particularly beneficial for isolating specific muscles for development.
Resistance bands 	Resistance bands are a cheap and portable form of resistance training and are commonly used in home gyms. Most resistance bands are colour coded, with light bands being recommended for small muscle groups and heavy bands for large muscle groups. With the bands anchored by a wall fixture or against part of the body, the strong rubber bands are stretched, creating a resistance. Most of the resistance is experienced at the end of the movement because this is where the elastic material is under the greatest tension. As a result, it is this part of the muscle where most strength gains are made.
Hydraulic resistance 	During hydraulic resistance training each effort made is confronted by an opposing force. Resistance is felt through the entire movement; that is, if you lift something, you must also pull it back. For example, a biceps curl requires that you curl the weight by contracting the biceps, then returning it to the original position using the triceps. Unlike free weights, gravity does not assist the return, making effort necessary through the full range of movement. Greatest resistance is felt when performing movements at higher speeds.

Table 5.4: Examples of exercises commonly used in isotonic programs

Name	Area developed	Description
1. Squats 	Legs	Use of overgrip (knuckles up to balance bar across shoulders). Keep head up and back flat and squat until the thighs are parallel to the floor.
2. Bench press 	Chest, arms and shoulders	Lying facing up on bench, hold bar with overgrip (palms forward) and with hands slightly wider than shoulders. Push bar up and then lower until it touches the chest.
3. Barbell curls 	Arms (biceps)	With arms shoulder width apart, hold bar at thigh height, palms facing out. Lift bar to shoulders and return in a smooth continuous movement, keeping the back straight.
4. Calf raise 	Calf muscles	With bar across shoulders, place balls of feet on a board, keeping heels off the ground. Keeping the body erect, rise on toes as high as possible and lower until heels touch the floor.
5. Upright rowing 	Upper arms and shoulders	Using an overgrip (knuckles on top and away) hold bar in front of body with hands five centimetres apart. Lift the bar to chin height keeping elbows higher than bar and then return.
6. Sit-ups 	Abdominal	Hold weight on the chest. Lie with hips flexed. Sit up with curling action, taking shoulders as far off the ground as possible, then return to floor.
7. Lateral arm raise 	Shoulders	Grasp dumbbells with palms facing towards body and arms at side. Keeping the body straight, raise arm to shoulder height. Elbows remain locked throughout. Gradually return dumbbells to starting position (lower arm).

Name	Area developed	Description
8. Leg curl 	Hamstrings 	With body lying face-down on a bench, lock heels under rollers. Grasp front of bench and bring heels over until rollers touch back of thighs.
9. Back raise 	Lower back 	Lie across a bench with heels hooked under roller. Place hands behind head and bend forward until trunk is at right angles to legs. Raise body to straight position.
10. Seated barbell twist 	Back and lower trunk 	Sit on bench with a bar across shoulders and hands well spread. Twist body so that the bar turns at least 180°.
11. Pull-overs 	Chest and shoulders	Lie on bench holding a bar with arms extended and hands slightly wider than shoulder width. Lower weight over head and then bring it on an arc to rest on thighs. Repeat.



APPLICATION

Dumbbell exercises

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Use the **Dumbbell** weblink in your eBookPLUS and watch the animated dumbbell exercises.

Comment on the need for correct technique when performing strength training exercises.



INQUIRY

Machines or free weights

You are training a sprinter. What type of strength training method would be most appropriate and why?

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Use the **Machines vs free weights** weblink in your eBookPLUS to assist you in your appraisal.



INQUIRY

Training types and methods for different sports

Draw an enlarged copy of the table on the next page in your workbook together with the list of sports/activities. For each sport, identify the training type/method that would most enhance performance in that sport. Use the final column to justify your choice by indicating why you prefer that type/method of training and how it would affect your performance.

Sport	Training type and method	Justification
Basketball		
Triathlon		
Soccer		
High jump		
Surfing		
100 m hurdles		
Rugby		



PRINCIPLES OF TRAINING

All athletes train knowing that repetition of movements required in the game/activity will improve performance. However, the quality of training is very much dependent on our understanding of its anticipated benefits. Effective training requires the implementation of a number of important principles. Whether we are training to improve our aerobic capacity, strength or perhaps our flexibility, certain principles must be applied. Ignorance or disregard for these principles means that the rewards are not matched by the effort.

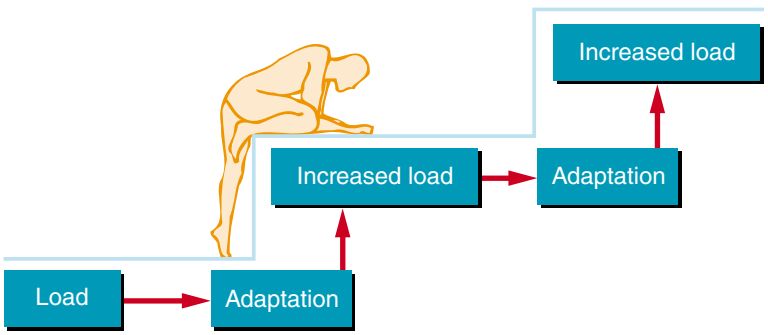


Figure 5.28: The overload principle requires a gradual increase in load for benefits to be realised.

Progressive overload

The overload principle implies that gains in fitness (adaptations) occur only when the training load is greater than normal and is progressively increased as improvements in fitness occur. This is illustrated in figure 5.28 which shows improvement in performance when overload is applied.

Training produces certain physiological changes that allow the body to work at a higher level of intensity. This higher level is achievable as a result of adaptations that have occurred in response to training stress at the lower level. As the body becomes familiar with a particular level of training stress, it adapts to it and further training at this level fails to sufficiently stress the system. These adaptations will not take place if the load or resistance is either too small or too big. A resistance that is too low to stress the body system signalled for development fails to produce the necessary adaptations. A resistance that is too high, particularly in the early stages, results in the onset of fatigue as well as possible injury and the discontinuation of the activity. This is illustrated in figure 5.29.

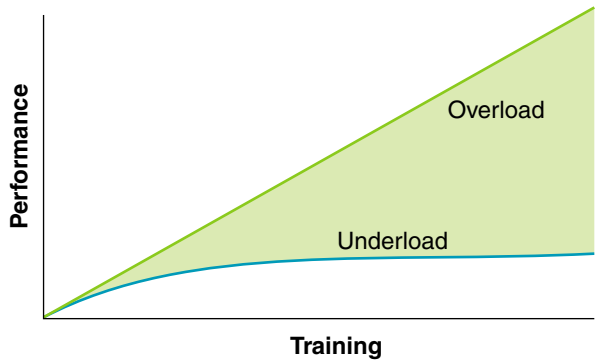


Figure 5.29: Insufficient stress underloads the body, and training benefits are not maximised.

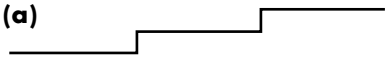
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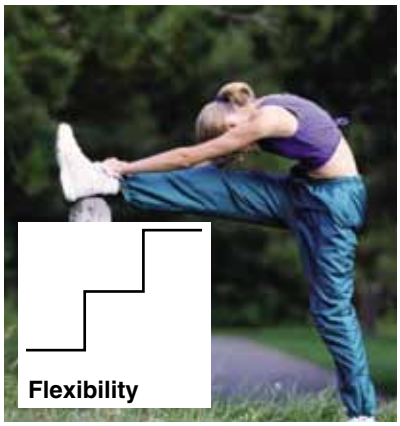
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(a)



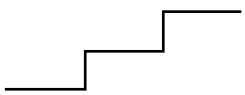
Endurance



(b)



(c)



Strength

Figure 5.30: An appropriate training load must be applied for adaptations to be maximised.

Some examples of application of overload are listed below.

- *Aerobic training* — application of the overload principle is reflected in the heart's ability to pump more blood to the working muscles (increased cardiac output) and the ability of the working muscles to take up more of the oxygen as it is delivered to the cells (increased oxygen uptake).
- *Strength training* — application of the overload principle results in an increase in the cross-sectional area of a muscle, commonly called muscle hypertrophy. This is usually directly related to an increase in strength.

The overload principle is probably the most important principle in aerobic, strength and flexibility training programs. If there is no overload, the rate of improvement decreases and performance plateaus.

It should be noted that not all adaptations take place at the same rate. This is illustrated in figure 5.30. In endurance programs, the load (height of the step) needs to be small and the adaptations (length of the step) take place slowly (figure 5.30a). In other words, gains are made over a longer period of time. Fastest gains are made in flexibility programs where progressive increases in loads produce small adaptations (figure 5.30b). The loads need to be less for peak strength development, but the adaptations are more significant (figure 5.30c).

Specificity

The specificity principle implies that the effects of a training program are specifically related to the manner in which the program is conducted. The principle draws a close relationship between activities selected for training and those used in the game or event. It focuses on *what* is being performed at training and its similarity to what is done in the game. The specificity principle implies that greatest gains are made when activity in the training program resembles the movements in the game or activity. This is because the body adapts to stresses in a very specific way.

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Specificity
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The principle of specificity is particularly important when considering the development of energy systems, muscle groups and components of fitness. *Metabolic specificity* refers to identifying the energy system or systems most appropriate to the activity and developing these systems through related training procedures. The best way to identify which energy system is predominant is to assess the level of intensity of the activity and establish the time over which it extends. Short-term, explosive activity requires development of the anaerobic systems while continuous, moderate, sustained activity requires development of the aerobic system.

The principle of specificity when applied to muscle groups suggests that those groups used for the activity need to be the same as the groups used during training. This is because the body 'recruits' the type of muscle fibre that is best able to do the task. For instance, if the subject is required to run 100 metres, the white fibres (fast-twitch fibres) are required to do most of the work. However, if work continues, the red fibres (slow-twitch fibres) increasingly take over this role. To ensure that the most desirable fibres for the activity are developed, the effort and duration of training activities need to closely resemble those of the game or activity.

Finally, the components of fitness required in the game should closely resemble those developed during training. Coaches need to construct training programs incorporating drills and exercises that, as far as possible, require the same movements as those required in the related competition. For example, a centre in netball needs to make short, sharp movements in creating leads. Activities focusing on agility, reaction time, power and coordination require special attention during training to develop the necessary movement patterns and skills.

Some examples of application of the specificity principle are given below.

- *Aerobic training* — an athlete training for a marathon must target the aerobic system in training. Most activity ensures that the third energy pathway is used for 95 per cent of the time or more. The same athlete should choose activities in training that recruit slow-twitch muscle fibres so that aerobic enzymes in muscle fibres become more efficient in utilising oxygen.
- *Strength training* — if increased leg power is required to improve a person's ability to sprint, the training program must correctly address the speed and number of repetitions, load and time between sets correctly. For example, if the load is too high and the repetitions too low, the program causes bigger improvements to muscle bulk than muscle power.

SNAPSHOT

Specificity of training

An activity such as jogging recruits muscle fibres uniquely suited to the task. Slow fibres are recruited for slow jogging. The metabolic pathways and energy sources are also suited to the task. Daily jogging recruits the same fibres and pathways over and over, leading to the adaptive response known as the training effect.

The outcomes of training are directly related to the activity employed as a training stimulus. We've shown that training has effects on muscle fibres as well as on the supply and support systems, such as the respiratory and cardiovascular systems. In general, the effects of training on muscle fibres are very specific, meaning that they are unlikely to transfer to activities unlike the training. So most of the benefits of run training will not transfer to swimming or cycling. On the other hand, the effects on the respiratory or cardiovascular systems are more general, so they may transfer to other activities (Sharkey and Greatzer 1993).

Training leads to changes in aerobic enzyme systems in muscle fibres, so it is easy to see why those changes are specific. In the early stages of training, the muscles' inability to use oxygen limits performance. Later on, as the fibres adapt and can utilise more oxygen, the burden shifts to the cardiovascular system, including the heart, blood, and blood vessels. Then the cardiovascular system becomes the factor that limits performance (Boileau, McKeown, and Riner 1984).

Training gains don't automatically transfer from one activity to another. Training effects can be classified as peripheral (in the muscle) and central (heart, blood, lungs, hormones). Central effects may transfer to other activities, but peripheral changes are unlikely to transfer. However, central changes in blood volume and redistribution may aid performance in another endurance activity. But keep in mind that one-leg training studies show that some part of the heart rate (and stroke volume) change is due to conditions within the muscle fibres, conditions that are relayed to the cardiac control centre (Saltin 1977). These changes are specific and will not transfer from one activity to another.

It makes sense to concentrate training on the movements, muscle fibres, metabolic pathways, and supply and support systems that you intend to use in the activity or sport. This does not imply that athletes should ignore other exercises and muscle groups. Additional training is necessary to avoid injury, to avoid boredom, to achieve muscle balance, and to provide backup for prime movers when they become fatigued. In spite of the widespread affection for the term cardiovascular fitness, the evidence suggests that the concept is overrated. Muscle is the target of training.

Finally, if exercise and training are specific, it stands to reason that testing must be specific if it is to reflect the adaptations to training. This means you should not use a bicycle to test a runner, and vice versa. Training is so specific that hill runners are best tested on an uphill treadmill test. How do we test the effects of training on dancers? We don't. When studies compare runners and dancers on a treadmill test, the runners exhibit higher VO_2 max scores. If that is true, why do runners poop out in aerobic dance, cycling, or swimming? Because the effects of training are specific. At present there is no widely accepted way to accurately assess the effects of aerobic, ballet, modern, or other dance forms.

Source: Human Kinetics Publishers, Inc.



INQUIRY

Specificity of training

Read the article 'Specificity of training', then answer the following questions.

1. What is meant by training being specific to an energy source?
2. Explain how the principle of specificity would be applied differently in enhancing an aerobic program versus a strength program.



INQUIRY

Investigation of training programs

Investigate two different training programs — for example, one that relates to sprinting and one that relates to a game, cycling or rowing. Suggest the type of activities that would be included in the program and describe how the principles of overload and specificity could be applied.

study on

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Practice HSC exam questions

Reversibility

The effects of training programs are reversible. In the same way that the body responds to training by improving the level of fitness, lack of training causes the opposite to occur. This is referred to as the *detraining* effect. The reversibility process applies equally to aerobic, strength and flexibility training programs. Gains made in aerobic fitness are gradually lost if training ceases. For

example, the ability of the working muscles to use the oxygen being delivered in the blood is reduced when training stops. Losses here are slower than those experienced in strength/power programs, where minimal regular stimulation is necessary to maintain the benefits achieved by training. In flexibility programs, some elasticity is lost quickly if stretching programs are not carried out on a regular basis.

In general, if big gains have been made during training, greater losses will follow when training stops because there is more to lose. You must be actively participating in the training program to maintain the training benefits. In the case of cardiorespiratory endurance, you can avoid reversing the effects of training only by continuing regular training at 70 per cent MHR (maximal heart rate) and on at least three occasions per week. Runners who are unable to continue normal training due to injury may substitute activities such as swimming or cycling.

study on
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Practice HSC exam questions

Variety

Using the same drills and routines to develop fitness components in every training session is not productive, as repetition without creativity leads to boredom. It is important to continually strive to develop the required attributes using different techniques to ensure that athletes are challenged not only by the activity, but also by initiative and implementation. For example, it is not necessary for a footballer to pass, tackle and practise tactics each and every training session. General endurance, strength and power can be developed using a variety of techniques such as swimming, **plyometrics** and resistance programs to supplement the training experience. Mental wellbeing is vital to maximise effort in physical training.

Plyometrics refers to a special range of exercises in which a muscle is lengthened using an eccentric contraction. This is rapidly followed by a shortening or concentric contraction.

Some examples of application of the variety principle are given below.

- *Aerobic training* takes many forms. We can train the aerobic system using a variety of activities such as swimming, running, cycling and circuit training.
- *Strength training* uses a variety of methods. Isometric and isotonic methods increase strength, but do so using different equipment such as free weights, elastic bands and hydraulic devices.

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Do more Cardiovascular disease
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Training thresholds

Thresholds generally refer to a specific point that, when passed, take the person to a new level. Most of us are familiar with the tax-free threshold. Below this level of income, tax is not payable. Above this level, tax is progressively increased. Thresholds also apply to physical training. When we train, we expect an improvement in our physical condition. However, for improvement to occur, no matter how small, we must work at a level of intensity that causes our bodies to respond in a particular way. These changes are called adaptations or fitness gains. The magnitude of improvement is approximately proportional to the threshold level at which we work.

The **aerobic threshold** refers to a level of exercise intensity that is sufficient to cause a training effect. This is approximately 70 per cent of a person's maximal heart rate (MHR).

The lowest level at which we can work and still make some fitness gains is called the training threshold or (where it concerns developing aerobic fitness) **aerobic threshold**.

Thresholds are determined by work intensity, which can be calculated using heart rate. A person's maximal heart rate (MHR) is estimated at 220 beats/minute minus age. Therefore, a 20-year-old person would have an MHR of

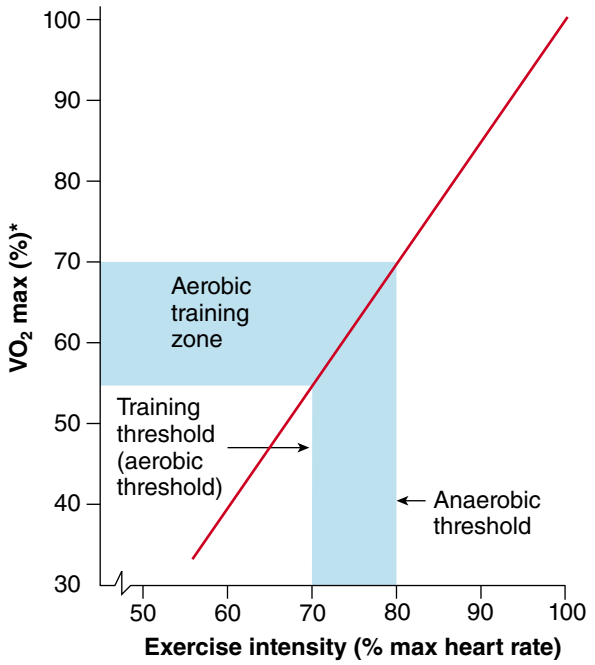
200 beats per minute. If the aerobic threshold is 70 per cent of MHR, the athlete would be working at a level of intensity that would cause the heart to beat at approximately 140 beats per minute. For most people between 16 and 20 years of age, this is equivalent to a moderately paced jog.

When a person is working at a level of intensity above the aerobic training threshold and below the anaerobic threshold, they are working in the **aerobic training zone**. Exercise here is referred to as steady-state exercise and results in improvements in physical condition. The uppermost level is called the **anaerobic threshold** or, more accurately, the **lactate inflection point (LIP)**, a point at which further effort is characterised by fatigue. The LIP reflects the balance between lactate entry and removal from the blood. If exercise intensity increases after the LIP is reached, blood lactate concentration increases substantially. The exercise intensities for the aerobic threshold (training threshold) and anaerobic thresholds are shown in figure 5.31.

The **aerobic training zone** refers to a level of intensity that causes the heart rate to be high enough to cause significant training gains.

The **anaerobic threshold** refers to a level of intensity in physical activity where the accumulation of lactic acid in the blood increases very quickly.

The **lactate inflection point (LIP)** is a point beyond which a given power output cannot be maintained. It is characterised by lactic acid accumulation and decreased time to fatigue.



*VO_2 max (%) = percentage maximal volume of O_2 that can be consumed in one minute

Figure 5.31: Working between the training (aerobic) and anaerobic thresholds is necessary for fitness gains to be realised. (*Source:* B Sharkey, *Fitness and Health*, 6th edn, p. 101, figure 6.1 © 2007 by Brian J Sharkey. Adapted with permission from Human Kinetics, Champaign, IL.)

Sometimes while exercising in the aerobic training zone, we wish to increase our intensity. An example is to increase the pace during the final half of a 12-minute run. This causes the muscles to require more oxygen, which is supplied by an increase in respiration and heart rates. If we increase the pace to a point where the cardiorespiratory system is unable to supply all the oxygen required at that point in time, energy will start to be produced anaerobically. In other words, the body will metabolise glycogen in the absence of sufficient oxygen to fulfil immediate ATP requirements.

The result is that the by-product of anaerobic glycolysis, lactic acid, starts to be produced in large quantities and permeates to the muscle cells. This point in training is called the anaerobic threshold. Well-trained endurance athletes can improve their performance by working close to and, in spurts, above the anaerobic threshold. This improves their tolerance of lactic acid, which is a feature of well-trained athletes.

Lactic acid concentrate (mmol*)	Training for:	Heart rate	% of maximum intensity	Training effect	Training benefits
20.0	Maximum anaerobic power	200			• High improvements in anaerobic endurance • Overemphasis may result in overtraining
		200			
12.0	Lactic acid tolerance	200	85–90%		
8.0	MVO_2 (maximum volume of O_2 that can be consumed in one minute)	190–200	80–90%		
		180			• Considerable improvement in aerobic endurance • Observe intensity for optimal benefit
		170	(60)–70–85%		
	Anaerobic threshold	160			
4.0		150			
		140			• Improvement in aerobic endurance
		130	60%		
2.0	Aerobic threshold	120	50%		
		110			• Little improvement in aerobic endurance
		100			
1.1	Resting state	>80			

* millimoles per litre

Figure 5.32: The body's response to changing thresholds (*Source:* T Bompa, *Theory and Methodology of Training*, 3rd edn, p. 310, Kendall Hunt, 1994, Dubuque, Iowa.)



The anaerobic threshold

1. Examine figure 5.32. How have lactate levels and heart rate changed in response to moving from resting state to the anaerobic threshold?
2. Explain why continuous training above the anaerobic threshold would be detrimental to aerobic endurance.

Some applications of training thresholds are given below.

- *Aerobic training* — the efficiency of the cardiorespiratory system is improved if the athlete works closer to the anaerobic threshold than the aerobic threshold. Working at this level increases the capacity and functioning of the cardiovascular system and the athlete's ability to tolerate inevitable rises in performance crippling lactic acid.
- *Strength training* — bigger gains in strength are made as resistance is progressively increased. If training for absolute strength, the threshold is represented by a high resistance or load ensuring that only a few repetitions can be completed. If training for strength endurance, the threshold is represented in terms of quantity, with a high number of repetitions being required to effectively challenge the threshold.

Warm-up and cool-down

Each training session requires three essential components — warm-up, training (or conditioning) and cool-down. A session that lacks one or more of these components may contribute to injuries or fail to achieve the desired results.

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Warm-up
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The purpose of the warm-up is to:

- *reduce the risk of injury* or soreness by increasing joint mobility and muscle stretch
- *increase body temperature* and enzyme activity to promote faster and more powerful muscle contractions
- *mentally prepare the athlete* for training
- *stimulate the cardiorespiratory system*.

The warm-up should follow a set procedure involving:

- *general aerobic activity* (gross motor) such as jogging to raise body temperature
- *specific flexibility exercises* to increase the range of motion of joints and to prevent muscle tears
- *callisthenics*, such as push-ups, star jumps and sit-ups to increase blood flow to the working muscles
- *skill rehearsal* — that is, performing movements or skills that will be repeated in the game (for example, sidesteps, swerves, dribbling or passing the ball).

An effective warm-up should be sustained for at least 10 minutes. For athletes such as elite sprinters whose events require explosive movements, the warm-up could last for 30 minutes. Stretching should be avoided until the body is warm. 'Never stretch before you sweat' is a good guide for players to observe. Rest periods may well be essential during the warm-up to avoid fatigue but should not be longer than necessary.

The cool-down is the period that follows the training session and is the reverse of the warm-up. The purpose of the cool-down is to minimise the muscle stiffness and soreness that could result from a strenuous training session. While not as intense or involved as the warm-up, it is still an important component and should include:

- *aerobic work*, (for example, jogging), which gradually decreases in intensity and allows the body temperature to return to normal
- the *stretching of muscle groups* used extensively during the training session (for example, leg muscles).

The cool-down helps to disperse and metabolise lactic acid concentration and to replenish the body's energy stores. It is an essential component of aerobic, strength and flexibility programs.

INQUIRY

Training and performance

Copy and complete the web diagram in figure 5.33 to analyse the following critical question: 'How can the principles of training improve performance?'

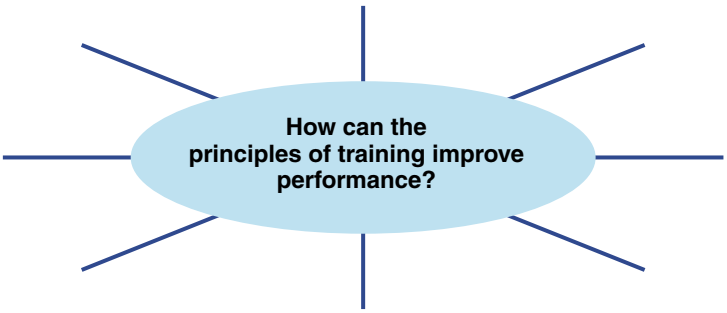


Figure 5.33: Principles of training and their effect on performance

INQUIRY

Applying the principles of training to aerobic and resistance training

Draw an enlarged copy of the following table in your workbook, leaving plenty of space in the blank squares. The principles of training are listed in the centre of the table. Use the columns either side to describe how each principle can be applied to aerobic and resistance training. Use examples to clarify your points.

Aerobic training	Principles of training	Resistance training
	Progressive overload	
	Specificity	
	Reversibility	
	Variety	
	Training thresholds	
	Warm-up/cool-down	



PHYSIOLOGICAL ADAPTATIONS IN RESPONSE TO TRAINING

study on

Concept code: PDH-046

Practice HSC exam questions

In response to training, the body makes adaptations or adjustments to the level of stress imposed on it. These adaptations allow it to function more comfortably at existing levels of stress and respond more efficiently to new levels of stress. The time taken before improvements are noticed varies from one individual to another and depends upon the biological systems affected. Although progressive improvements will be seen throughout a training program, it usually takes about 12 weeks to realise the entire benefits. Training will cause adaptations to a number of capacities, including resting heart rate, stroke volume, cardiac output, oxygen uptake, lung capacity, haemoglobin levels, muscle size and muscle recruitment.

Resting heart rate

Resting heart rate is the number of heartbeats per minute while the body is at rest.

Heart rate measurement at rest and during exercise is a reliable indicator of how hard the heart is working. All things being equal, the trained athlete has a lower **resting heart rate** than the untrained athlete. This is due to the efficiency of the cardiovascular system and, particularly, a higher stroke volume.

Training decreases resting heart rate. For example, a sedentary person with a resting heart rate of 72 bpm can expect it to reduce by about one bpm each week for the first few months of training. After 10 weeks of endurance training, the resting heart rate of the same subject should decrease from 72 to about 60 bpm. Highly conditioned endurance athletes have resting heart rates below 40 bpm and some are less than 30 bpm. Figure 5.34 illustrates the benefits of a training program on heart rate. The most appreciable difference is evident in the recovery period. Figure 5.35 illustrates the difference between trained and untrained individuals at rest and during maximal exercise.

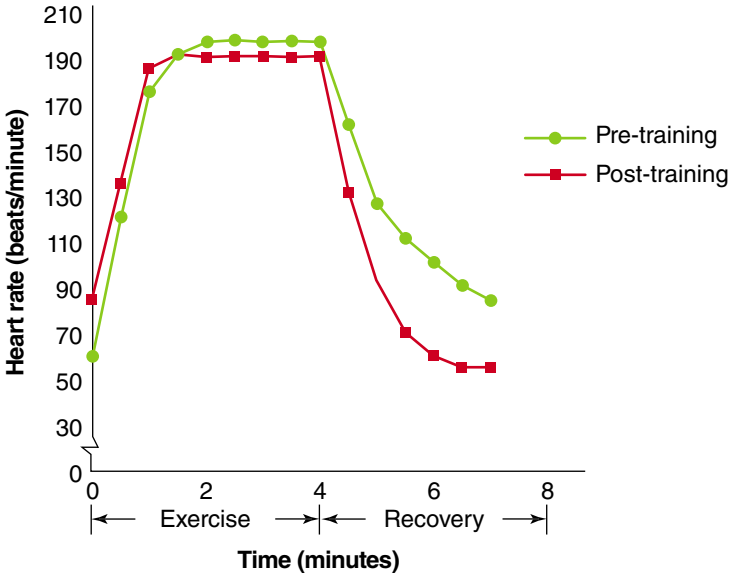


Figure 5.34: The effect of training on heart rate (*Source:* JH Wilmore and DL Costill, op. cit. figure 9.7, p. 281.)

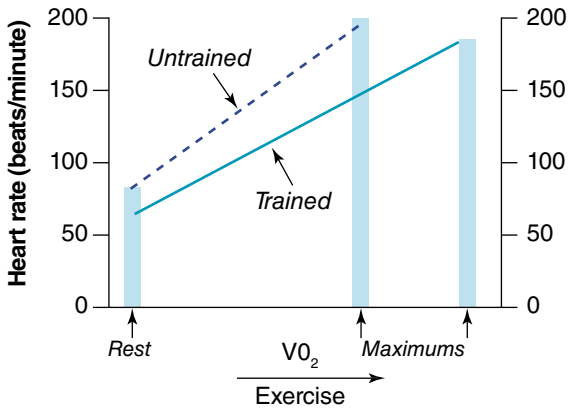


Figure 5.35: The effect of exercise on maximal heart rates of trained and untrained people (*Source:* E Fox and D Matthews, *The Physiological Basis of Physical Education and Athletics*, 4th edn, 1989, The McGraw-Hill Companies, Inc., Iowa, p. 250.)

Stroke volume

Stroke volume is the amount of blood ejected by the left ventricle of the heart during a contraction. It is measured in mL/beat.

Stroke volume (SV) is the amount of blood ejected by the left ventricle during a contraction. It is measured in mL/beat. A substantial increase in SV is a long-term effect of endurance training (see figure 5.36). In other words, stroke volume is notably higher at maximal exercise following an endurance training program. This occurs because training causes the left ventricle to fill more completely during diastole (the relaxation phase of cardiac contraction) than it does in an untrained heart. There is also more blood in circulation following training as a consequence of an increase in blood plasma volume. This means that more blood is able to enter the ventricle. In fact, blood volume can increase by half a litre after only eight days of endurance training. This results in a further stretch by the ventricular wall which increases the elastic recoil of the chamber. The enlarged ventricle enables contractions that are more powerful, resulting in less blood remaining in the ventricles following systole.

study on
Concept code: PDH-047
Practice HSC exam questions

The increased oxygen available to the working muscles results in improved performance.

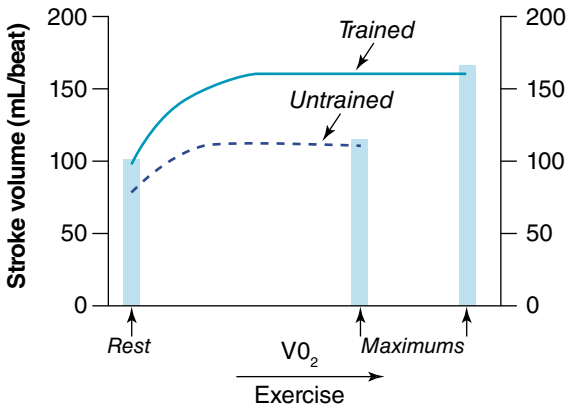


Figure 5.36: The effect of training on stroke volume (*Source:* E Fox, RW Bowers and M Foss, op. cit., p. 250.)

Cardiac output

Cardiac output is the amount of blood pumped by the heart per minute.

Cardiac output (CO) is the volume of blood ejected by the heart per minute. It is determined by multiplying heart rate and stroke volume. A large cardiac output is the major difference between untrained people and endurance athletes. Untrained individuals may have a CO of 15 to 20 litres per minute. For trained athletes, CO is 20 to 25 litres per minute. In highly trained endurance athletes, CO may even rise as high as 40 litres per minute. What is more exceptional is that the maximal heart rate of the trained athlete may be slightly lower than that of the untrained person even when each person is working to their highest capacity. It follows that the trained athlete achieves a considerably higher CO not from heart rate, but as a direct result of a huge increase in stroke volume. This is illustrated in figure 5.37. However, as shown in figure 5.38, maximal values for CO, stroke volume and heart rate are affected by age, decreasing gradually as we grow older.

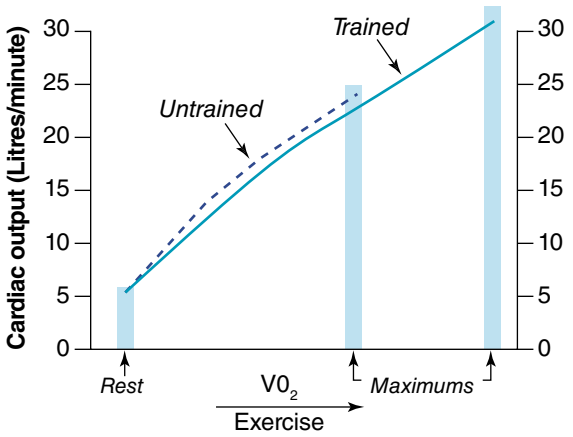


Figure 5.37: Changes in cardiac output with endurance training (*Source:* E Fox, RW Bowers and M Foss, ibid., p. 250.)

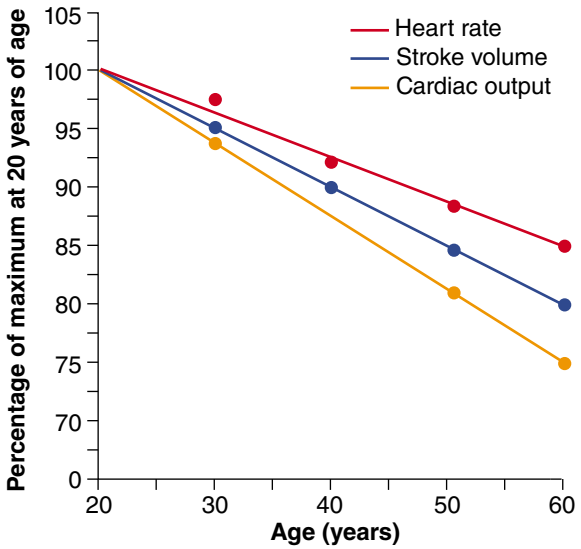


Figure 5.38: The effects of ageing on maximal values for cardiac output, stroke volume and heart rate (*Source:* JH Wilmore and DL Costill, *Physiology of Sport and Exercise*, 2nd edn, p. 554, fig. 17.7 © 1999 by Jack H Wilmore and David L Costill. Adapted with permission from Human Kinetics, Champaign, IL.)

Oxygen uptake

Oxygen uptake is the ability of the working muscles to use the oxygen being delivered.

The most significant improvements in response to aerobic training are in **oxygen uptake** (VO_2). The body consumes only small amounts of oxygen at rest. However, as we begin to exercise, the mitochondria in the cells use more oxygen in the provision of energy. Maximal oxygen uptake, or VO_2 max, is regarded as the best indicator of cardiorespiratory endurance because it indicates the maximal amount of oxygen that muscles can absorb and use at that level of work.

Maximal oxygen uptake is relatively easy to estimate using tests such as bicycle ergometry in the laboratory, or field tests such as the 12-minute run or the multistage fitness test. A high VO_2 max indicates a superior oxygen delivery system and contributes to outstanding endurance performance. Most tests that measure VO_2 max are able to take account of individual differences. Measurements are expressed in millilitres of oxygen per kilogram of body weight per minute (mL/kg/min). Average VO_2 max values are about 45 mL/kg/min for 17-year-old boys and 40 mL/kg/min for girls. The lower value for girls reflects the fact that females have less muscle tissue as a percentage of total body weight (less lean body mass) than males and less oxygen-carrying capacity due to lower haemoglobin levels. Oxygen uptake decreases at the rate of about one per cent per year after the age of 25, but is influenced greatly by aerobic training.



Figure 5.39: An athlete undertaking a treadmill test for maximal oxygen uptake

Training appreciably increases VO_2 max even in an eight- to 12-week period. A 15–20 per cent increase is typical for the average inactive person who applies the FITT formula for a six-month period. This reflects an improvement of 35 to 42 mL/kg/min. The highest recorded value for a female, world-class, endurance athlete is 75 mL/kg/min and the highest for a male athlete is 94 mL/kg/min.

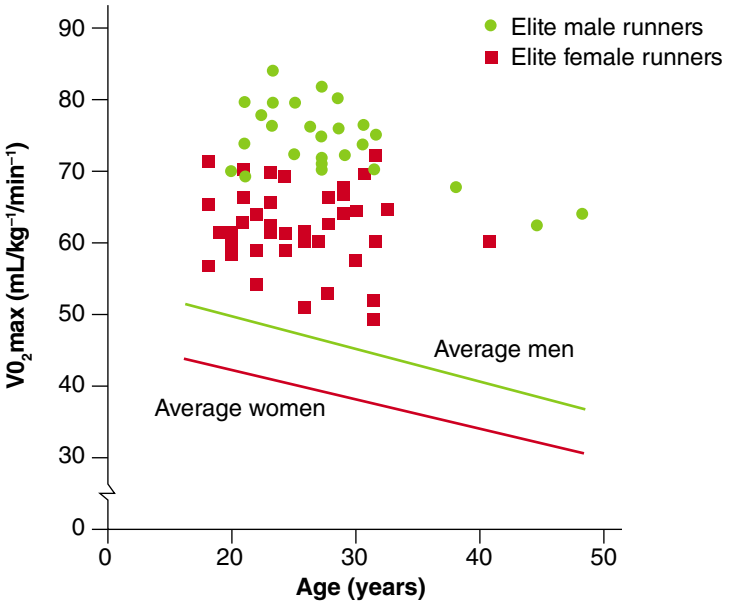


Figure 5.40: Male and female elite athletes have significantly higher maximal oxygen uptake values than average individuals. (*Source:* JH Wilmore and DL Costill, 2004, *Physiology of Sport and Exercise*, 3rd edn, p. 577, fig. 18.6 © 2004 by Jack H Wilmore and David L Costill. Adapted with permission from Human Kinetics, Champaign, IL.)

study on

Concept code: PDH-048

See more
Oxygen uptake

Practice HSC
exam questions

If VO_2 max readings are higher in the pre-training state, the improvements are smaller. In other words, sedentary people make significant improvements when compared to trained athletes following similar training programs. Increases in VO_2 max readings are accompanied by a remarkable jump in the number of oxidative enzymes. This causes mitochondria numbers and size to increase. The mitochondria use the oxygen to produce energy, leading to higher VO_2 max readings. Some increase in VO_2 max is also due to increased blood volume as a result of the endurance training program.

INQUIRY

Maximal oxygen uptake

eBookplus

The tests of aerobic power mentioned earlier can be performed in school situations because they require little equipment. However, there can be some variation in results, even with the same subjects performing the same tests on successive occasions. Use the **VO_2 max test** weblink in your eBookPLUS to investigate how maximal oxygen uptake is calculated using direct measurement. Why would the results be more accurate?

Lung capacity

Lung capacity is the amount of air that the lungs can hold.

No matter how efficient the cardiovascular system is in supplying adequate blood to the tissues, endurance is hindered if the respiratory system does not supply enough oxygen to meet demand. Oxygen is absorbed in the lungs, where **lung capacity** is important.

Total lung capacity is about 6000 mL in males and slightly less in females due to their smaller size. In general, lung volumes and capacities change little with training. *Vital capacity* (the amount of air that can be expelled after maximal inspiration) increases slightly. *Residual volume* (the amount of air that cannot be moved out of the lungs) shows a slight decrease. Overall, total lung capacity remains relatively unchanged. Following training, *tidal volume* (the amount of air breathed in and out during normal respiration) is unchanged at rest and submaximal exercise. However, it appears to increase at maximal levels of exercise.

Haemoglobin level

Haemoglobin is the substance in blood that binds to oxygen and transports it around the body.

Haemoglobin is contained in the red blood cells of the body. Each red blood cell contains about 250 million haemoglobin molecules, all capable of carrying considerable quantities of oxygen. The average male has about 14.3 grams of haemoglobin per 100 mL of blood, while the average female has 13.9 grams per 100 mL of blood. Women's lower levels of haemoglobin contribute to lower VO_2 max values.

Most oxygen in the body is transported by the haemoglobin in the red blood cells. Some oxygen is transported in body fluids such as plasma, but the amount is relatively low because oxygen does not dissolve readily in ordinary fluids. Without haemoglobin, we would need to have about 80 litres of blood (or much more than fills the average car's petrol tank) to transport enough oxygen to enable us to remain alive at complete rest.

Haemoglobin levels increase as a result of training and this increases oxygen-carrying capacity. One important way of increasing haemoglobin levels is to train at high altitudes. Figure 5.41 shows the effect of altitude on haemoglobin levels, which partly explains the success of Kenyan endurance runners in middle- and long-distance events.

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Concept code: PDH-049

See more
Haemoglobin

Practice HSC
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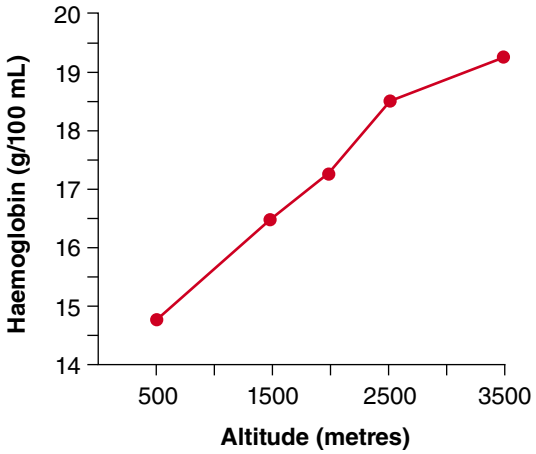


Figure 5.41: The effect of altitude on haemoglobin levels in males (*Source:* JH Wilmore and DL Costill, ibid., fig. 11.4, p. 347.)

General endurance training programs increase haemoglobin levels from about 800 grams to about 1000 grams per 100 mL of blood, representing a 20 per cent increase. This is directly attributable to an increase in blood plasma (and therefore blood volume) and a boost in red blood cell numbers. However, although the total quantity of haemoglobin may increase, the concentration may in fact lessen because more plasma, which contains mostly water, has been produced. Endurance athletes, therefore, tend to have thinner blood in terms of haemoglobin concentration, but more of it than non-athletes.

Muscle hypertrophy

Muscle hypertrophy is a term that refers to muscle growth together with an increase in the size of muscle cells.

Muscle hypertrophy is a term that refers to muscle growth together with an increase in the size of muscle cells. While length remains unchanged, the size of the muscle becomes larger as a result of an increase in its mass and cross-sectional area. Hypertrophy is induced by training programs that stimulate activity in muscle fibres causing them to grow. Without stimulation, muscle fibres can reduce in size, a condition known as muscular atrophy. Figure 5.42 shows the impact of hypertrophy on muscles in the upper arm.

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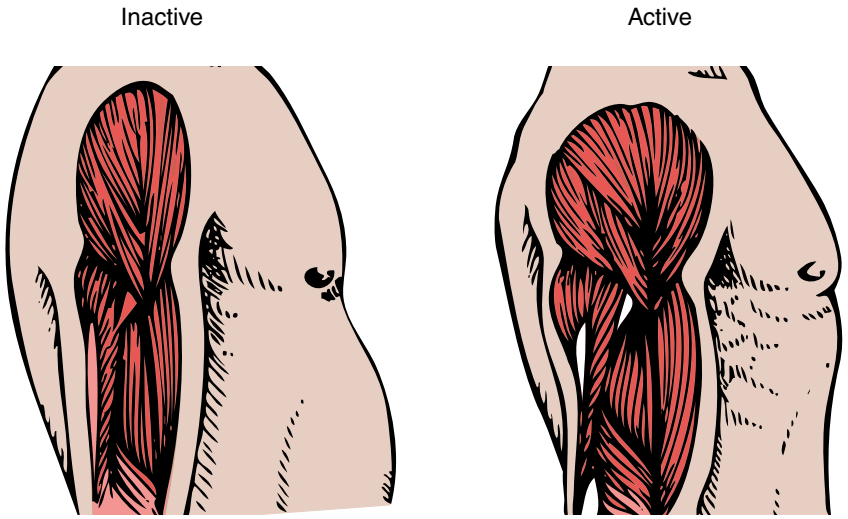


Figure 5.42: Training, particularly resistance training, causes growth in the size of muscle known as hypertrophy.

Training causes structural changes in muscle fibres, leading to hypertrophy. The growth and cross-sectional size increase of muscle is a direct result of mass increases in:

- *actin and myosin filament* — thin protein filaments that produce muscle action
- *myofibrils* — the contractile elements of skeletal muscle
- *connective tissue* — tissue that surrounds and supports muscle.

Training needs to address the overload principle to encourage muscle hypertrophy. The principle of specificity is also important in targeting muscles or regions of the body where hypertrophy is required. The extent of hypertrophy depends on:

- *muscle type* (fast-twitch or slow-twitch; see below). White muscle fibres are genetically larger in their cross-sectional area when compared to red fibres. Resistance training can cause white muscle fibres to increase their area from around 55 per cent of skeletal muscle to 70 per cent or more. It should be noted that training cannot change the type of fibre (red to white or vice versa), only the cross-sectional area.
- *type of stimulus*. As hypertrophy is enhanced through progressive overload, resistance training using low repetitions with high resistance yields the best results.
- *regularity of training*. Regular training promotes hypertrophy while irregular or absence of training may result in muscular **atrophy**.
- *availability of body hormones*. Hypertrophy is more easily achieved in males due to a higher concentration of testosterone.

Atrophy refers to wasting away or decrease in size.

Effect on fast- and slow-twitch muscle fibres

There are two types of muscle fibre:

- **slow-twitch muscle fibres** (ST) or red fibres
- **fast-twitch muscle fibres** (FT) or white fibres.

A range of red and white fibres are identified in figure 5.43. Note that the white fibres tend to be slightly larger than the red fibres.

While most people have approximately even numbers of red and white fibres, some individuals genetically have higher proportions of one type or the other. This is significant when assessing the effects of training, because different fibres respond to stimulus in different ways.

The most significant physiological adaptations to muscle fibres occur when they are subjected to training programs that are specific to their role. While all muscles shorten and lengthen during movement, the bulk of the work is performed by muscles most suited to the specific type of activity. White muscle fibres benefit most by anaerobic training, such as sprints, short intervals and resistance training. Red muscle fibres benefit most from endurance type activities that engage the aerobic system.

Slow-twitch fibres contract slowly and release energy gradually as required by the body during sustained activity such as jogging, cycling and endurance swimming. These fibres are efficient in using oxygen to generate fuel (ATP), making them resistant to fatigue but unable to produce the power of fast-twitch fibres. When the body is engaged in endurance-type activity, slow-twitch fibres are preferentially recruited for the movement because they are more efficient in meeting the immediate metabolic demands of the working muscles.

Slow-twitch muscle fibres or type I fibres contract slowly and for long periods of time. They are recruited for endurance-type activity such as marathons.

Fast-twitch muscle fibres or type II fibres reach peak tension quickly and are recruited for power and explosive movements such as throwing and lifting.

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Slow- and fast-twitch muscles fibres
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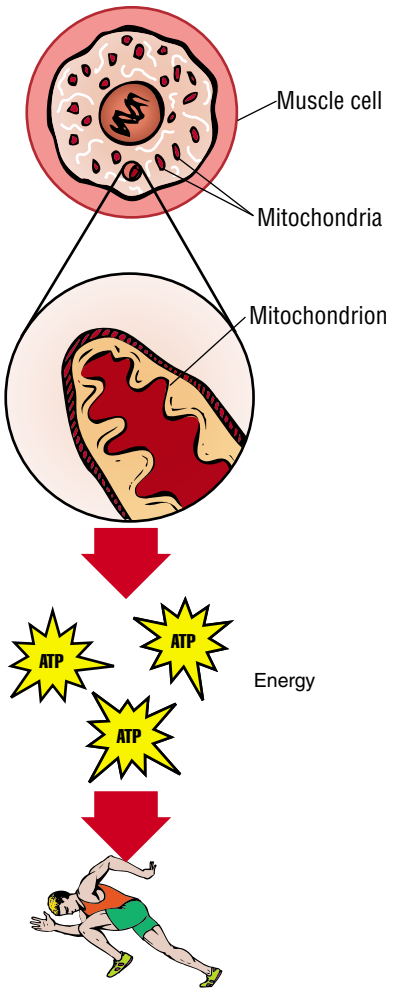


Figure 5.43: The number, size and efficiency of mitochondria in making energy (ATP) available increases as a result of training.

Aerobic training causes the following adaptations to occur in muscle fibres.

- *Hypertrophy*. Endurance activity such as jogging recruits slow-twitch fibres, which experience some growth.
- *Capillary supply*. Aerobic training causes an increase of up to 15 per cent in the number of capillaries surrounding muscle fibres. This significantly improves muscle efficiency by improving gaseous exchange together with the movement of nutrients and waste between blood and fibres.
- *Mitochondrial function*. Mitochondria are the energy factories of cells, the 'powerhouses' where ATP is manufactured. Aerobic training results in an increase in the number of mitochondria, as well as increasing their size and efficiency in utilising oxygen to produce ATP (see figure 5.43).
- *Myoglobin content*. Myoglobin is very important in the functioning of muscle action, quantities of which are characteristically much higher in slow-twitch fibres. Myoglobin is responsible for transporting oxygen from the cell membrane to mitochondria and storing it for use when necessary. Endurance training significantly increases myoglobin content, in some cases by up to 80 per cent.
- *Oxidative enzymes*. The level of activity of oxidative enzymes increases, making the production of energy more efficient.

Fast-twitch (FT) or white fibres contract quickly but fatigue rapidly, a feature of anaerobic metabolism used to supply their energy needs. There are two types of fast-twitch fibres — FT_a and FT_b. FT_a fibres are intermediate fast-twitch fibres that can produce a high output for lengthy periods because they have the ability to draw on both aerobic and anaerobic metabolism to support contraction. FT_b muscle fibres are 'classic' white fibres, possessing high amounts of glycolytic enzymes and drawing energy solely from anaerobic sources. It is thought that training intensity can alter the relative proportions of subtypes in FT muscle fibres, with high amounts of explosive work potentially changing some FT_a to FT_b fibres.

The body preferentially recruits fast-twitch fibres to perform explosive type activities such as weight-lifting, javelin throwing and sprinting. White fibres have a high anaerobic capacity because they are able to contract quickly and ultimately release energy rapidly.

Anaerobic training causes the following adaptations in fast-twitch fibres.

- *ATP/PC supply*. Fuel supply and the efficiency with which fuel is used increases.
- *Glycolytic enzymes*. These increase, improving the functioning within cells.
- *Hypertrophy*. This has the potential to be considerable and depends on the type of training, frequency and intensity.
- *Lactic acid tolerance*. Training increases the ability of FT fibres to tolerate lactic acid, allowing anaerobic performance to be sustained for longer periods of time.



INQUIRY

Principles of training, physiological adaptations and improved performance

Use the following list of questions to examine the relationship between principles of training, physiological adaptations and improved performance.

1. What type of performance is best improved by aerobic training?
2. What type of performance is best improved by anaerobic training?

3. What principles are most important in causing a training effect in predominately aerobic performances?
4. What principles are most important in causing a training effect in predominately anaerobic performances?
5. What adaptations take place in the following areas as a result of training?
   (a) resting heart rate
   (b) stroke volume
   (c) cardiac output
   (d) oxygen uptake
   (e) lung capacity
   (f) haemoglobin level
   (g) muscle hypertrophy
   (h) fast/slow-twitch fibres
6. Use sporting examples to analyse the importance of:
   (a) overload in developing muscle hypertrophy
   (b) training thresholds in improving stroke volume and cardiac output
   (c) specificity in improving oxygen uptake
   (d) reversibility on resting heart rate
   (e) variety on haemoglobin levels
   (f) warm-up and cool-down on lung capacity.



INQUIRY

Summarising physiological responses and adaptations

Copy and complete the diagram in figure 5.44 to create an overview of the physiological adaptations in response to training (refer to pages 170–7).



Figure 5.44: Physiological adaptations



INQUIRY

Top 3 physiological characteristics of an elite endurance athlete

Read the snapshot 'Top 3 physiological characteristics of an elite endurance athlete' and the case study of Cadel Evans. Identify reasons why Cadel Evans is able to perform far better than his competitors. Present the information in a table or diagram.

Top 3 physiological characteristics of an elite endurance athlete

by Eva Goes

The main characteristics you need to become an elite endurance athlete are a high VO_2 max and lactate threshold, and an excellent exercise economy.

Several factors determine your performances in endurance sports, such as muscle glycogen and capillaries, BMI, mental strength, motivation, support… The three most important physiological factors however are VO_2 max, lactate threshold and exercise economy.

Your VO_2 max and lactate threshold combine to determine for how long you can produce a given amount of energy, and exercise economy will determine how fast you can go with that energy.

VO_2 MAX

VO_2 max is the maximal amount of oxygen your muscles can use to produce aerobic energy. It depends on the maximal volume of blood your heart can pump around, and on how good your muscles are at taking up oxygen.

Male elite endurance athletes typically have VO_2 max values of 70 to 85 ml/kg/min, while young untrained men have up to 40 to 50 ml/kg/min. The values in women are always about 10% less.

Training will increase the amount of blood your heart can pump around at each beat. This amount is called the stroke volume, and it is the dominant factor of your VO_2 max. With training you will also make more capillaries in your muscles and more mitochondria (energy plants) in your cells, which will increase the amount of oxygen your muscles cells can take up and use.

Your heart's stroke volume depends on your heart's capacity to fill up with a large volume of blood during the diastole, which can then be pumped into your arteries during the systole. To an extent, it is genetically determined but it also depends on the kind of training you do and for how long you have been doing it.

As you get older, your maximal heart rate decreases by about one beat a year. Inevitably, your VO2max will decline as well.

Why is VO_2 max the maximum?

Earlier studies concluded that your heart's abilities limit VO_2 max. However, according to a new model, called the central government theory, your brain limits your performances to make sure that vital organs such as your heart continue to receive enough oxygenated blood. If not, you would collapse. In other words: the brain anticipates a collapse, and restrains you to avoid it.

This theory is still controversial, but it explains for example why at altitude (where the oxygen pressure is lower), we slow down very early during our workout. It also explains why in some studies athletes can go beyond their VO_2 max. VO_2 max is therefore not always the maximum.

LACTATE THRESHOLD

The lactate threshold is defined as the point at which blood lactate starts to accumulate substantially when you exercise harder and harder. As you produce lactate continuously, it corresponds to the moment that the production rate exceeds the clearance capacities.

Energy pathways during endurance exercise

Our cells use ATP (a high energy molecule) for energy. During easy exercise, you use mainly fatty acids to make ATP, but when you increase the intensity, you start using glycogen.

In a first step, you break down glycogen into pyruvate without the help of oxygen (anaerobic glycolysis). You will also make hydrogen ions during this process. It is a very quick way to obtain energy, but you will only obtain 2 to 3 molecules of ATP per molecule glucose.

Using oxygen however, you can further metabolise pyruvate and hydrogen ions and obtain 37 to 39 molecules ATP. This is the oxidative system, and is obviously what you need for endurance exercise, but it is a slow mechanism.

If you are exercising hard, your cells need more energy. The anaerobic system can act swiftly and deliver more ATP, but the oxidative system gets overwhelmed, and hydrogen ions start to accumulate in your cells and create an acidosis (excessive amount of acid). This is responsible for a burning sensation in your muscles, interferes with glycolysis and muscle contractions, and leads to fatigue.

(continued)

A marker of stress in muscle cells

As pyruvate molecules start to accumulate as well, they combine with hydrogen ions and form lactate. Therefore lactate helps you to delay the acidosis. Furthermore, it can be transferred to the liver, brain or other muscles, and used for energy production. This means that lactate is not the culprit of fatigue, but an indirect marker of stress in the muscle cells. It is usually expressed as a percentage of VO_2 max.

The efficiency of your muscle cells' metabolism determines your lactate threshold. You can increase it by more than twofold, and if you are lucky enough to have a high VO_2 max as well, you will be able to sustain a high oxygen consumption — and therefore a high power output — for a long time.

EXERCISE-SPECIFIC ECONOMY

In practice, the crucial question is: how fast will I go with the energy I can produce? That will depend on how much energy you need to exercise at a given speed. If your body uses less energy than your opponents, you will be able to go faster than them before getting tired.

The cost of exercising is very different from one person to another, and depends on biomechanics, anatomical factors and the efficiency of your muscle cells. Scientists believe that you will be a more efficient endurance athlete if you have more Type 1 muscle fibres.

Studies on elite athletes have shown that you can improve your economy considerably by training.

Source: Goes, E 2012, *Top 3 physiological characteristics of an elite endurance athlete*, <http://suite101.com/article/top-3-physiological-characteristics-of-an-elite-endurance-athlete-a400447>.

CASE STUDY

Cadel Evans

HEART AND LUNGS

Evans' heart is two times larger than an average person of his age and weight. His aerobic fitness is one of the highest the Australian Institute of Sport has tested. As an 18-year-old, Evans' VO_2 max (oxygen consumption per minute per kilogram of body weight) was in the mid-80s, twice as high as a normal person and higher than Lance Armstrong.

POWER AND FATIGUE

Evans has an incredible resilience to fatigue and a very high power output. A normal cyclist can cycle at 400 watts of power for 10 minutes. When tested as a teenager, Evans could sustain 400 watts for 30 minutes.

MUSCLES AND BONES

His muscles consist of slow-twitch and aerobic fibres, and he has a high blood volume because of his heart size, which means he does well in long time trials and prolonged mountain climbs.

FOOD

Cyclists' diet on the Tour de France is primarily carbohydrates balanced with protein and is a little low on fat. Cyclists consume 200–300 kilocalories and half a litre of liquid each hour.

WEIGHT

Evans dropped five kilograms in his early 20s. His body fat is less than five per cent.

Source: Extract from 'Down to Cadel and the clock', by Rupert Guinness, *The Age,* 26 July 2008, Sport, p. 5.



SUMMARY

- The human body has three systems that provide energy — the alactacid, lactic acid and aerobic systems. They are commonly called energy pathways.
- All energy systems function by converting the chemical energy in food into ATP, which enables muscular contraction.
- Fuel energy is efficiently stored in high energy bonds within adenosine triphosphate (ATP) and its backup energy supply, creatine phosphate (CP).
- There is limited ATP in the body. ATP breaks down quickly when we move and needs to be resynthesised to once again provide energy. The study of energy systems is about mechanisms for building up the partly destroyed ATP molecule.
- The alactacid system provides energy for maximum activity lasting about 10 to 12 seconds. Its fuel source is creatine phosphate and the system does not produce any by-products.
- The lactic acid system provides energy for anything up to two to three minutes of moderate to high intensity exercise and longer for low intensity exercise. Its fuel source is glycogen. In contrast to the alactacid system, the lactic acid system generates a by-product called lactic acid, which can inhibit performance.
- The aerobic system provides energy for sustained work of moderate intensity. It uses carbohydrate and fat to provide large quantities of ATP. Carbon dioxide and water are the by-products, neither of which are harmful to performance.
- The four main types of training are aerobic, anaerobic, flexibility and strength.
- Aerobic training methods include continuous, Fartlek, aerobic interval and circuit training. These help improve the efficiency of the cardiorespiratory system.
- The most common method used to improve anaerobic performance is anaerobic interval training. This is characterised by repeated bursts over short distances at high intensity.
- Four methods are used to improve flexibility: static, ballistic, PNF and dynamic. The choice of method used depends mostly on the sport or activity to follow.
- There are two types of strength training — isotonic and isometric. By far the most commonly used is isotonic, where muscle length changes as weights are lifted and lowered.
- Different types of equipment can be used to improve strength including free weights, fixed weights, elastic bands and hydraulic machines. Many factors influence choice of equipment including availability and the intention of the program; for example, power or strength endurance.
- The six most important principles of training for performance improvement are progressive overload, specificity, reversibility, variety, training thresholds and warm-up/cool-down.
- Progressive overload implies that the load needs to be increased as we become comfortable at the existing level of resistance.
- Specificity focuses on the closeness of the relationship between what we do in training and what we are required to do in the game.

- Reversibility implies that fitness, strength and flexibility will be lost once training ceases.
- The principle of variety suggests that the training program needs to include a diverse range of challenging skills to ensure that motivation remains high.
- Thresholds refer to levels of intensity. The lowest level of intensity that will produce a training effect is the aerobic threshold. The highest level is the anaerobic threshold. The zone between the thresholds is the training zone, the area where we need to be working to improve performance.
- Warm-up and cool-down are essential to any training program, and particularly for the prevention of injury.
- Physiological adaptations refer to changes that take place within the body as it responds to the stress of a training program. Heart rate is lowered, stroke volume is increased and cardiac output is increased significantly by aerobic training.
- The biggest difference between the trained and the untrained individual is in oxygen uptake. This refers to the ability of the working muscles to utilise the oxygen being delivered. Aerobic training considerably increases the functioning of the oxygen delivery system and contributes significantly to improved aerobic efficiency.
- Aerobic training improves haemoglobin levels mainly by increasing the volume of blood in the body.
- Muscle hypertrophy is a positive response to training, with fast-twitch fibres being slightly more responsive than slow-twitch fibres.
- Training improves the efficiency of both fast-twitch fibres and slow-twitch fibres. Slow-twitch fibres develop improved capillary function and, with the aid of more oxidative enzymes, enhanced ability to support endurance type movements. Fast-twitch fibres develop increases in glycolytic enzymes and increase their tolerance to lactic acid.

QUESTIONS

Revision

1. Explain the role of ATP in energy supply. (H7) (6 marks)
2. Explain how the alactacid system functions to supply energy in a 100 metre sprint. (H7) (4 marks)
3. Discuss the relationship between effort and fatigue in a 400 metre race. (H7) (5 marks)
4. Compare the efficiency of the energy systems with regard to their ATP production, by-products and rate of recovery. (H7) (6 marks)
5. Describe the fuel source for each of the energy systems. (H7) (3 marks)
6. Explain the possible causes of fatigue for a runner in an 800 metre event. (H7) (3 marks)
7. Explain how lactic acid accumulation affects performance. (H7) (2 marks)
8. Compare the work rate and fitness benefits for two athletes — one who trains regularly at a level of intensity close to the aerobic threshold and the other who trains close to the anaerobic threshold. (H10) (5 marks)
9. Identify the predominant energy system in each of the following activities and provide reasons for your selection. (H7) (10 marks)

Activity	Alactacid	Lactic acid	Aerobic	Why this system?
Shot-put				
Triathlon				
200 metre run				
1500 metre swim				
High jump				
Rock climbing				
Basketball				
Rowing				
Snooker				
50 metre dash				

10. Investigate how the energy systems function during a triathlon. (H7) (6 marks)
11. Access the **Energy Pathways** weblink in your eBookPLUS. Observe the table under the heading 'Energy system recruitment'. Note the predominance of the anaerobic pathway as a source of energy in most team games. Explain why a team coach would need to be aware of this fact when developing training sessions. (H17) (3 marks)

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12. Explain the difference between continuous and Fartlek training. (H7) (2 marks)
13. List and briefly describe six activities that you would include in a circuit that aimed to develop aerobic capacity. (H8) (6 marks)
14. List four methods of flexibility training and rank them in terms of safety. Justify your rankings. (H8) (4 marks)
15. Choose two methods of flexibility training. Describe one exercise from each and suggest how progressive overload could be used to gradually improve flexibility using that program. (H8) (4 marks)
16. Explain how PNF stretching differs from ballistic stretching. (H7) (2 marks)
17. Choose three important principles of training. Suggest how they could be used by a coach to improve aerobic capacity. (H8) (3 marks)
18. Explain why some athletes might choose to use free weights over other methods of strength training. (H10) (2 marks)
19. Explain how progressive overload is used in anaerobic interval training. (H10) (3 marks)
20. Explain how the principle of reversibility would apply to a resistance training program. (H10) (4 marks)
21. Outline the purpose of a warm-up in preparation for training. (H8) (2 marks)
22. Using a diagram, explain the difference between the aerobic and anaerobic thresholds. How can knowledge of thresholds improve performance? (H17) (4 marks)
23. Examine figure 5.37 (page 172). Explain the effect of endurance training on cardiac output. (H8) (2 marks)
24. Discuss the meaning of VO_2 max. Suggest why its measurement is commonly regarded as the most significant indicator of physical fitness. (H7) (3 marks)
25. Outline the long-term effects of aerobic training on haemoglobin levels and lung capacity. (H7) (2 marks)
26. Explain the term 'muscle hypertrophy'. What type of training program contributes most to muscle hypertrophy? (H7) (2 marks)
27. Outline the effect of training on slow- and fast-twitch muscle fibres. (H7) (3 marks)

Extension

1. Complete a test of maximal aerobic power such as the Coopers 12-minute run or the multistage fitness test. (Use the relevant weblinks in your eBookPLUS to view these.) Determine your oxygen uptake and indicate what the readings mean. Discuss how the results could be improved. (H8, H16) (6 marks)
2. Investigate the training programs of a hurdler and a marathon runner. Outline the general activities that comprise their programs. Compare each in terms of use of energy systems, flexibility exercises and resistance training methods. (8 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 6
Psychology and performance



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H8**, **H10**, **H11**, **H16**, **H17** from the PDHPE HSC syllabus.

PSYCHOLOGY AND SPORTS PERFORMANCE

The importance of psychology in sports performance has increased appreciably over the past few decades. The ability of the mind to generate thought patterns, influence emotions, stimulate or diminish arousal and create vivid images of a desired action is now better understood and has changed the way that many of us approach our sporting activities.

Research continues to suggest that there is significant potential to improve performance through mental training. Reasons why people perform differently in sporting activities relate mainly to physical factors, including genetic makeup, fitness level and skill. However, better understanding of specific psychological influences, notably motivation, interest, concentration and anxiety management is becoming increasingly important as these influences can significantly enhance or inhibit performance depending on the way they are managed.

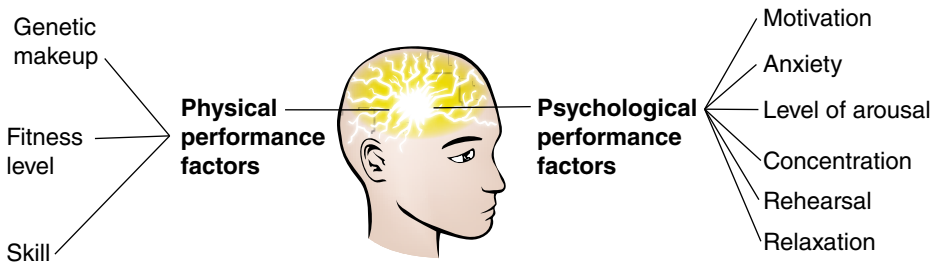


Figure 6.1: Thinking differently can create thought patterns that ultimately improve performance.

MOTIVATION

Motivation is an internal state that activates, directs and sustains behaviour towards achieving a particular goal.

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Because **motivation** is inherently abstract, it is difficult to define. One definition calls it a 'desire or want that energises and directs goal oriented behaviour'. Another refers to motivation as the 'arousal, direction and persistence of behaviour'. Most would agree that motivation is an internal state that activates, directs and sustains behaviour towards achieving a particular goal.

A high level of motivation within an individual is prized by those responsible for improving their performance. Understanding the mindset of motivation is difficult because each individual is different and may respond better to internal or external motives. What is accepted is that motivation is not a static phenomenon but rather a force that can be manipulated to help an athlete achieve their full potential. It is an energy source that has the potential to be harnessed and focused, ultimately influencing attitudes and behaviours and infusing feelings of self-belief.

Increasing the level of motivation in players may be as simple as:

- recognising individual effort
- supporting belief in one's ability
- instilling a good work ethic
- providing positive reinforcement and encouragement.

For example, a coach who praises a player when a correct movement is performed may inspire the development of a positive mindset, leading to an increased desire in the player to achieve their performance goals.

Some athletes are highly self-motivated, while others have a much more casual approach to achieving their goals. The level of motivation we are able to achieve is affected by both intrinsic and extrinsic factors, including:

- self-determination or self-drive
- expectations in terms of our personal goals
- parental pressure
- prestige
- response to the encouragement and support of others
- money
- relatedness or the desire to feel connected
- challenge.

Positive motivation

Positive motivation occurs when an individual's performance is driven by previous reinforcing behaviours.

Sportspeople commonly experience **positive motivation**, but the degree to which it is experienced varies from one individual to another. It occurs when the athlete performs because they have received rewards for similar actions in the past and they realise that continuing to perform as required results in additional rewards. To a certain extent the athlete is 'conditioned' to perform in expectation of the reward.

Positive motivation relies on continual self-reinforcement and/or reinforcement by others such as the coach, family, friends, spectators and media. If the coaching situation changes and favourable reinforcement is diminished or not forthcoming, then the athlete's effort will be affected accordingly. To maintain high levels of positive motivation, coaches must continually strive to find unique ways of reinforcing the desired behaviour in the athlete. This may require techniques such as providing incentives, developing personal progress charts or, perhaps, looking to others for reinforcement. Positive motivation can be further enhanced by recognising achievement, handling mistakes constructively, developing respect for athletes and taking the time to listen when they speak.



Figure 6.2: Crowd appreciation is a form of positive motivation for players.

Positive motivation is more effective than negative motivation. The simplest way to develop positive motivation is to establish a gradual sequence of challenges for the athlete. Challenges are positive and motivating whereas threats are negative and destructive in the long term. Threats distract the athlete from the task, because the athlete is confronted with the consequences of failing and ultimately fear of being punished. Further, positive motivation is more sustainable. Some athletes may be responsive to negative motivation on particular occasions, but positive motivation is better on an ongoing basis.

Negative motivation

Negative motivation is characterised by an improvement in performance out of fear of the consequences of not performing to expectations.

Not all motivation is driven by previous gains from performance. In some cases, athletes may be inspired to perform more from a fear of the consequences of not performing than as a result of a motivated behaviour. This is referred to as **negative motivation**.

Inspiring an athlete to perform well because they expect to be punished if they fail may work on occasions, but has serious shortfalls. Indecision, lack of creativity, fear of risk taking and susceptibility to 'choking' are some performance inhibiting behaviours that might surface in high pressure situations as a result of fear of failure. Negative motivation may cause a player to always opt for the safe play in game situations and not take risks where the reward could be victory, but unfortunately is outweighed by the consequence of failure. While some players may respond to negative motivation on an irregular basis, the general long-term effect can be the destruction of confidence, initiative and belief in oneself — the reverse of what motivation is supposed to achieve.



Figure 6.3: Frightening athletes into performing well is negative motivation.

Intrinsic motivation

Intrinsic motivation is motivation that comes from *within* the individual.

Intrinsic motivation is a self-propelling force that encourages athletes to achieve because they have an interest in a task or activity and they enjoy learning and performing the movements. This type of motivation stems from doing things that are their own reward. Intrinsic motivation originates with inner feelings and may serve to drive a need to succeed, accomplish or perform at the best level. It is self-sustaining and self-reinforcing because effort and personal accomplishment becomes its own reward. Intrinsic motivation is the preferred type of motivation because personal reward and self-satisfaction are much stronger driving forces than anything bestowed or imposed from outside.

Intrinsic motivation generally has a knowledge, achievement or experience foundation. Individuals who are driven predominantly by this form of motivation display high levels of mastery or task orientation. In other words, some might be motivated to perform just to know more or to experience something different. Others might be motivated by the need to become competent at the task; for example, to be able to hit the ball further by increasing their technical proficiency. For these athletes, establishing competence is sufficiently challenging and rewarding in itself. They often choose activities that involve a contest, finding enjoyment in rising to the inherent demands of competition.



Figure 6.4: Feeling good about sporting achievement acts as a form of intrinsic motivation.

Central to intrinsic motivation is the 'flow experience', which represents the highest level of internal motivation. The flow experience is characterised by a very high level of concentration, to the extent that an individual is completely absorbed in the task. When in this zone, performance is maintained without conscious effort. Total attentiveness to what is being done ensures that the mind remains free of interference from other distracting thoughts.

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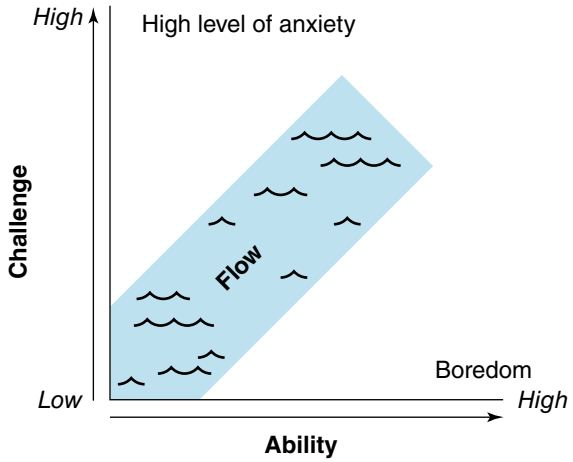


Figure 6.5: The flow experience

Studies reveal that most children and adolescents participate further and are rewarded more fully as a result of internal motivation than other factors. The sport or activity provides a continuing source of enjoyment, sufficiently motivating the individual to sustain their effort and interest.

Extrinsic motivation

Extrinsic or **external motivation** occurs when the individual's internal state is modified by sources originating from outside the person.

Extrinsic or **external motivation** is motivation that comes from sources outside a person, such as parents and coaches. It tends to have an outcome or ego orientation. While intrinsic motivation has a focus on process, such as the development of competence, extrinsic motivation focuses on the product, or what can be gained. Extrinsic motivation is seen in many forms such as praise, material rewards and financial remuneration. Effort and the desire for achievement are related to the expectation of an outside reward or fear of punishment from an outside source.

While rewards or fears may change how hard we work, they do not alter attitudes that underlie our behaviours. In children certainly, quality execution of movement skills as well as enjoyment and satisfaction need to be the focus in training and performances. Attachment to these values ensures that children continue to enjoy physical activity as they grow older. However, a focus on external rewards such as prizes and monetary incentives or a fear of retribution if one's performance is not up to standard can turn the purpose of activity into an end rather than a means. In fact, in the case of athletes whose driving force to achieve good performance stems from intrinsic sources, the use of extrinsic rewards may only serve to decrease intrinsic motivation.

Furthermore, external motivation can be manipulated by those responsible for its making. Use of bribes and coercion to succeed may work temporarily but has little chance of being sustained. External motivation has even less chance



Figure 6.6: Some young athletes are motivated by their sense of ego, pride and a strong desire for the acknowledgement of their peers.

of being successful if it challenges the values of the individual, or if their opinion of the reward is such that it is not seen to be something that is useful or fulfilling.

While the responsibility for motivation needs to be shared between the athlete and their coaches/parents/peers, sustained motivation relies much more on internal factors than on external factors. Athletes who derive motivation from satisfaction with quality performances are likely to stay motivated for longer than those who compete in order to gain rewards from external sources. A noticeable characteristic of high achievers is that they seek to match their physical and technical skill against others of similar ability, whereas lower achievers often select competitions in which they know they will be successful.

INQUIRY

Types of motivation

Form groups of three or four. Copy figure 6.7 onto a large sheet of paper. Have each student write a brief motivational statement, such as, 'Dad said I would get $5 if I win the race today'. Cut each statement out and take turns to place each one on the types of motivation sheet according to where it best fits. Many will fit in an area in between as it could represent more than one type of motivation. Justify your card placement as you select its position.

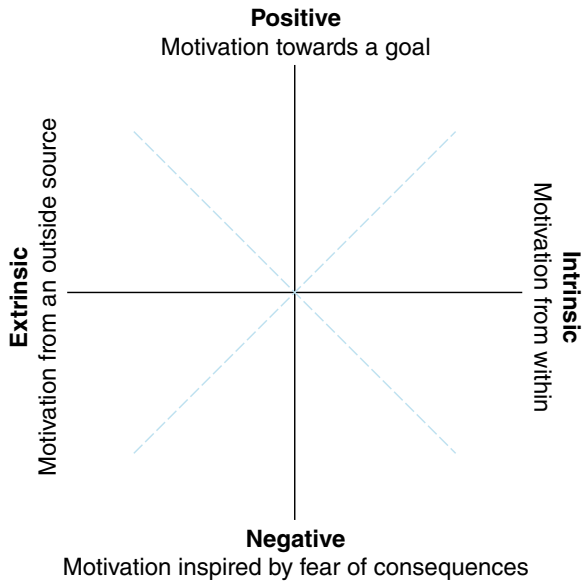


Figure 6.7: Types of motivation



INQUIRY

What motivated me?

'Research has shown that young people highly value the intrinsic rewards gained from participating in sport. Rewards such as the learning of a new skill, or merely being involved in sport with their friends, mean more for young athletes than the extrinsic rewards of receiving trophies or prizes.' (From 'How to motivate young people', Fact Sheet, Australian Sports Commission, www.ausport.gov.au)

Read the quote above, then think about your own sporting history or experiences in relation to one sport or event. Discuss how various forms of motivation have contributed either positively or negatively to your success in that sport.



INQUIRY

Motivation for sports performance

1. Using a table like the one below, choose three sports that are fundamentally different in the type of motivation required to enhance performance. A suggested range of sports includes golf, surfing, boxing, rugby league, tennis and aerobics.
2. Research a range of performance scenarios that relate to your selected sports and establish the two most appropriate forms of motivation for success in this sport. (Boxing is shown as an example for sport 1 and a relevant type of motivation has been selected and justified.) Justify your choices.

	Sport 1: Boxing	Sport 2: _____	Sport 3: _____
Form of motivation 1	*Intrinsic motivation* — important because boxing is highly competitive and demands superior fitness. The training and performance demands will not be met unless inspired by personal belief and commitment.		
Form of motivation 2			



ANXIETY AND AROUSAL

Anxiety is predominantly a psychological process characterised by fear or apprehension in anticipation of confronting a situation perceived to be potentially threatening.

Anxiety is a complex emotion identified by various levels of agitation. It is caused by reaction to a threat or perceived threat that generates a 'fight or flight' response. In other words, when we experience situations where we are at risk, uncertain, threatened or attacked, we become anxious and take steps to address the concern. From here our natural instincts take over, forcing us to confront it (fight) or escape (flight). At the extreme, anxiety disrupts and unsettles behaviour by lowering the individual's concentration and affecting their muscular control.

Sporting contests and competitions may contribute to anxiety because of the unpredictable nature of performance or the uncertainty of the outcome. Any sporting contest can give rise to anxiety when one's perceived ability



Figure 6.8: Anxiety can trigger a fight or flight response.

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does not measure up to the demands of the task. For example, a boxer might be aware that his preparation has been insufficient, but must go an indefinite number of rounds with a clearly superior opponent. The build-up of anxiety is unavoidable as the mind tinkers with thoughts of ways forward or ways out. This pessimistic appraisal causes negative stress, which underlies most forms of anxiety.

Anxiety can also be entrenched in deep-seated expectations, especially if one feels that they cannot be fulfilled. When people realise that their actual ability and possibly their level of motivation falls short in terms of the perception of others, confidence falls and anxiety rises proportionally. It's a fine line between being 'psyched up' and 'psyched out'. The person's state of mind depends almost entirely upon their perceptions and expectations.

Trait anxiety

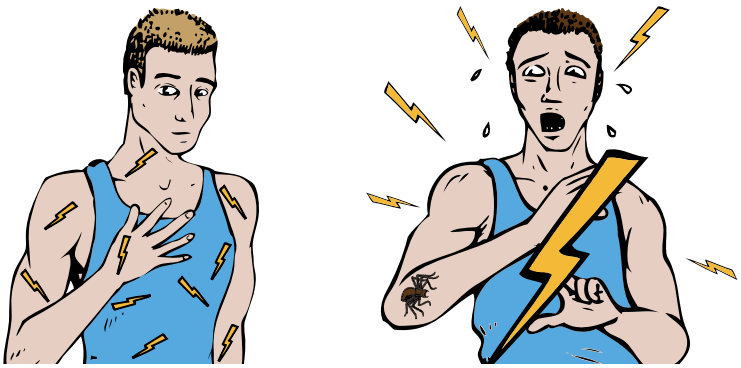
Trait anxiety refers to a general level of stress that is characteristic of each individual. It is evident in how we respond to daily situations, of which many are new and cause concern. What may prompt anxiety in one person may not generate any emotion in another. Trait anxiety varies according to how individuals have conditioned themselves to respond to and manage the stress. Increased levels of such anxiety can be controlled in most cases by the use of relaxation techniques such as progressive muscular relaxation.

Researchers have established that coaches and others in whom the athlete has a firm belief can significantly influence trait anxiety. Support, positive comments and encouragement positively affect a player's level of trait anxiety more than any other influence.

State anxiety

State anxiety is more specific. This type of anxiety is characterised by a state of heightened emotions that develop in response to fear or danger. This arousal may be visible physiologically and exhibited in certain conditions and behaviours such as nervousness, sweating and even shaking. A certain level of state anxiety might be considered beneficial in sports such as rugby where aggression can become a natural outlet. However, in sports or activities such as archery and pistol shooting where success often depends on controlled muscular responses, unrestrained anxiety can hinder performance.

At the extreme, state anxiety can contribute to a degree of physical and mental paralysis, preventing performance of a task that may otherwise be routine and has been repeated many times in practice situations. As a preventative measure, some world champion golfers, for example, use the long putter to try to maintain control of their fine motor movements at times of appreciable stress. Examples of the presence of state anxiety include missing relatively easy shots in basketball, failed goal attempts in soccer and 'breaking' at the start of important swimming and track races.



Trait anxiety State anxiety

Figure 6.9: Trait and state anxiety

Sources of stress

Stress is the non-specific response of the body to a demand placed on it.

Stress is a normal part of everyday life. However, it is also very relevant to sport performance situations. It can be felt by participants in all sports, but particularly individual sports such as tennis and diving where there may be a feeling of isolation and exposure. Stress causes a unique body reaction with which we are all familiar, particularly in times of crisis. We feel stress building within us, produced by *adrenaline* (a stimulant hormone), which readies the body for action. It is characterised by:

- *increased blood supply* to skeletal muscles
- *more oxygen* to the lungs
- *increased glucose production* to provide extra fuel
- *increased sweat production* to cool the body
- *tightened muscles* to prepare the body for action.

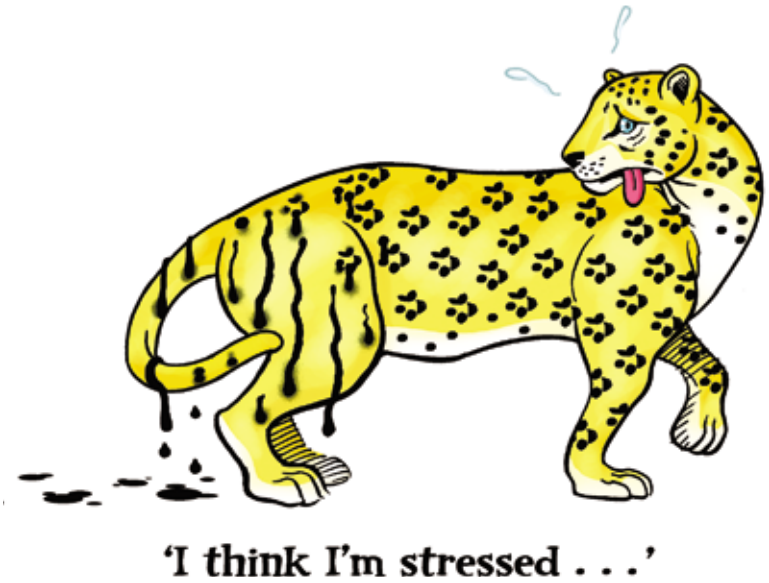


Figure 6.10: Stress is sometimes exhibited in physiological reactions.

Stress can be real or imagined. Being chased by a dog, for example, is a real stress when it actually happens. All the body reactions outlined above will intensify. However, *thinking* about the same situation or sporting situations that cause concern will also cause stress. The body will react to a perceived situation as if it is real because the mind, in responding neurologically to situations, does not differentiate between the real and imagined experience.

Just thinking about something that may make us uncomfortable — such as missing a match-winning goal in a grand final, going to the dentist or travelling in planes — can bring about symptoms such as an increased heart rate and sweating.

However, stress is a personal attribute. It depends on predisposition — that is, how each person perceives the stressors as a result of their genetic makeup and learned coping mechanisms. This reflects:

- past experience
- routines
- expectations
- the amount of support
- the frequency of similar occurrences.

Factors that produce stress are called *stressors*. In practice and competitive sporting environments, they can develop from:

- *personal pressure* — individual pressure imposed by the desire to win, achieve or fulfil goals
- *competition pressure* — pressure exerted by opponents on the field of play
- *social pressure* — pressure from coaches, parents, peers and others who are held in esteem by the athlete
- *physical pressure* — the pressure of having to perform learned skills under the demands of competition.

It is felt by many researchers that coping effectively with stress has a lot to do with an individual's perception. Particular traits such as positive expectations and confidence are important in containing anxiety that might otherwise develop because of the situation. This is not to say that the athlete will

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not experience anxiety. However, qualities such as self-assurance and self-belief help athletes interpret feelings of anxiousness as facilitative, thereby assisting rather than hindering performance. Successful athletes do not deny the existence of anxiety, commonly called 'butterflies', but are skilled at having the butterflies fly in formation.

Athletes, indeed anyone, can further learn to cope with stress by using strategies such as:

- practising relaxation techniques
- developing concentration skills that require focusing on the immediate task rather than on the perceived reaction to it
- developing confidence
- planning strategies to cope with the situation.

Optimum arousal

Arousal is a specific level of anxiety and can be experienced prior to and during a performance.

Arousal is different from anxiety. While anxiety is predominantly a psychological state, arousal is essentially a physiological process. Arousal is a necessary ingredient in sports performance, although its level can either facilitate or hinder the execution of specific skills or task components.

The individual performs a skill most successfully when the level of arousal is optimal for that particular task and that individual. A runner in a 100 metre sprint, for example, may complete a time far worse than expected. This could be partly attributable to a low level of arousal, perhaps resulting from distraction, disinterest or a depressed level of motivation. The other extreme is a state of over-arousal, whereby the athlete is unable to perform the required movements with precision because he/she is excessively tense and unable to concentrate. Levels of arousal vary considerably between individuals. Generally, athletes who have a high disposition towards anxiety require less arousal than those who have a low disposition towards anxiety.

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Both over-arousal and under-arousal contribute to adverse performance. The role of the coach and athlete is to ensure the level of arousal is optimal for each performance. All athletes respond to different stimuli to raise or lower their levels of arousal. Some can achieve optimal arousal by thinking about what they need to do in the game or activity. Others may require input from a coach, parent or peers. This suggests that arousal has drive properties — that is, the manipulation of factors that affect anxiety, such as motivation, can increase or decrease arousal.

The **inverted U hypothesis** suggests that performance improves with increasing arousal to a point beyond which performance will deteriorate.

The **inverted U hypothesis** shown in figure 6.11 illustrates the connection between arousal and performance. It suggests there is an optimal level of arousal for any performance. If an individual's level of arousal is at A on the curve, then they would be considered to be under-aroused for that activity. Performance may suffer from such factors as lack of motivation, disinterest, poor concentration and the inability to cope with distractions.

As an athlete's interest heightens, they move into the arousal zone and attain an optimal level of arousal at the peak of the curve (B). This is shown by a balance between level of motivation and ability to control muscular tension, which could be increasing as a result of the desire to perform well. Levels of arousal in the C area of the curve are excessive. If an individual is working in this area, then their feelings would be characterised by anxiousness and apprehension, reflecting their excessive concern about the performance. This leads to increased muscular tension and possible mental confusion as the individual tries to process messages during skill execution, resulting in a poorer performance.

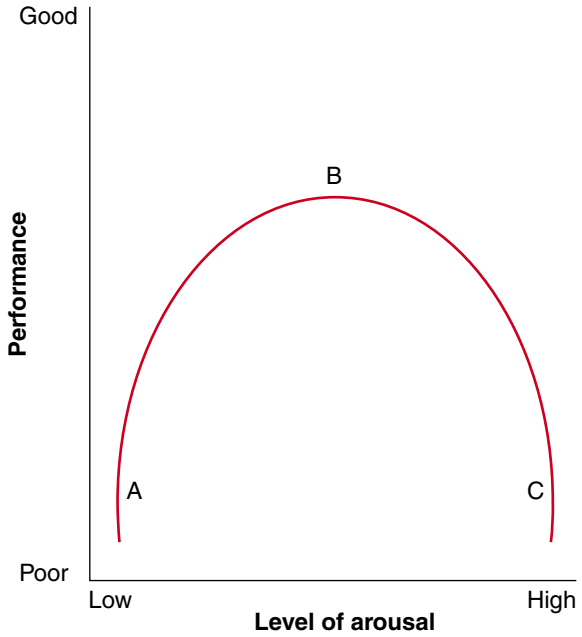


Figure 6.11: The inverted U hypothesis shows the relationship between arousal and performance.

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The optimal level of arousal varies from one skill to the next. Generally, when difficult tasks involving few muscle groups are involved — for example, archery and putting in golf — levels of arousal need not be high to be optimal. However, many other activities that may be easier to execute or that involve large body movements — for example, running and weight-lifting — require an increase in the level of arousal for performance to be optimal (see figure 6.12).

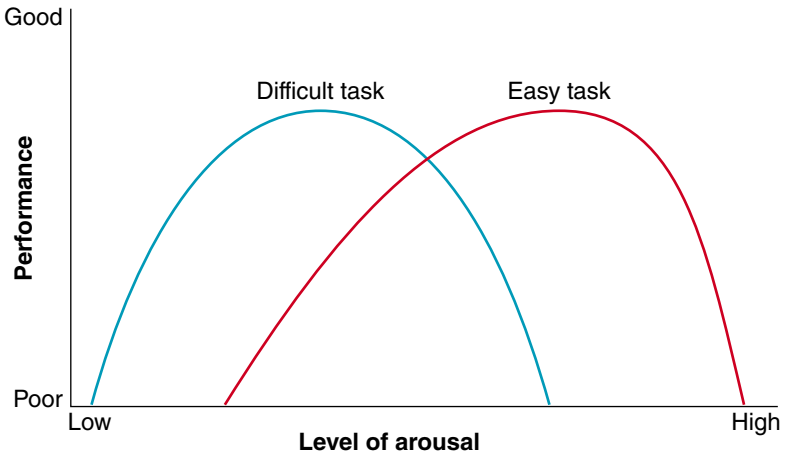


Figure 6.12: Higher levels of arousal are necessary for optimal performance in easy tasks.

Optimal arousal levels for a given task vary between athletes, and largely depend on the individual's personality and factors that include:

- *self-expectation*; that is, how the individual expects to perform
- *expectation by others*; that is, how a person perceives others, such as their coach or parents, expects them to perform
- *experience*, which determines how the individual handles the increased pressure at higher levels of competition

- *financial pressures*, such as whether the individual's livelihood depends on their performance
- *the level of competition*, such as whether the individual is playing a round or a final
- *the degree of difficulty*, with higher levels of arousal generally being associated with more difficult tasks
- *skills finesse*, with fine motor skills (for example, shooting and balancing) generating higher levels of arousal than produced by gross motor skills (for example, running).

Arousal affects performance when it becomes a focus. When the individual shifts focus from thinking about feelings to concentrating on the task, anxiety is revealed for what it is — a heightened state that can be controlled and that can actually assist performance.



INQUIRY

Comparing performances

1. Examine figure 6.13. Compare and contrast possible reasons for the performances of athlete A and athlete B using a Venn diagram such as the one in figure 6.14. (Use the overlapping area for similarities and the individual circles for differences.)

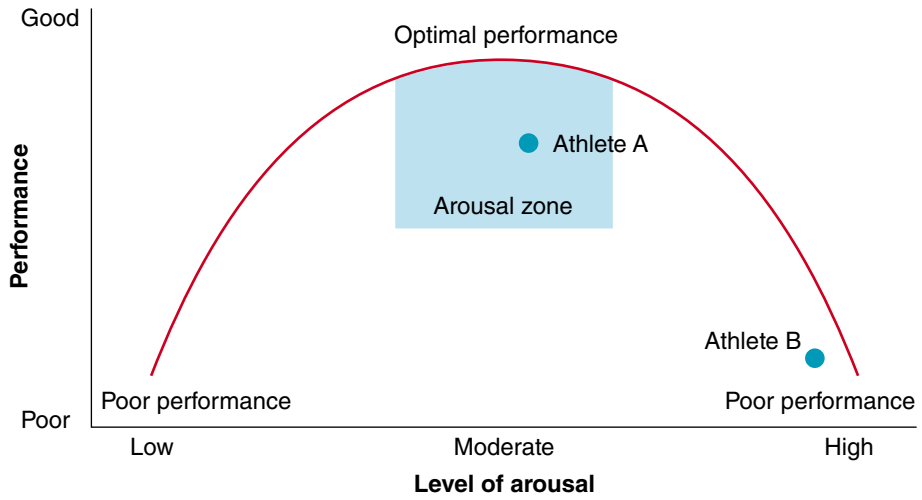


Figure 6.13: Comparison of athletes' performances

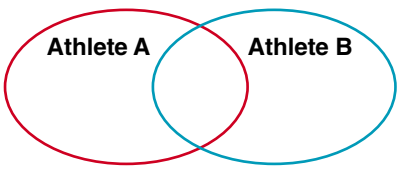


Figure 6.14: Venn diagram to compare performances

2. Examine figure 6.15, which shows arousal curves X, Y and Z. Using the ranking chart, rank the following activities performed during competition in terms of lowest to highest optimum arousal levels. Then establish which curve (X, Y or Z) best suits each athlete in terms of arousal. Justify your choices.
   - Rowing
   - Pistol shooting
   - Discus throwing
   - Weight-lifting
   - Golf swing
   - Tennis serve

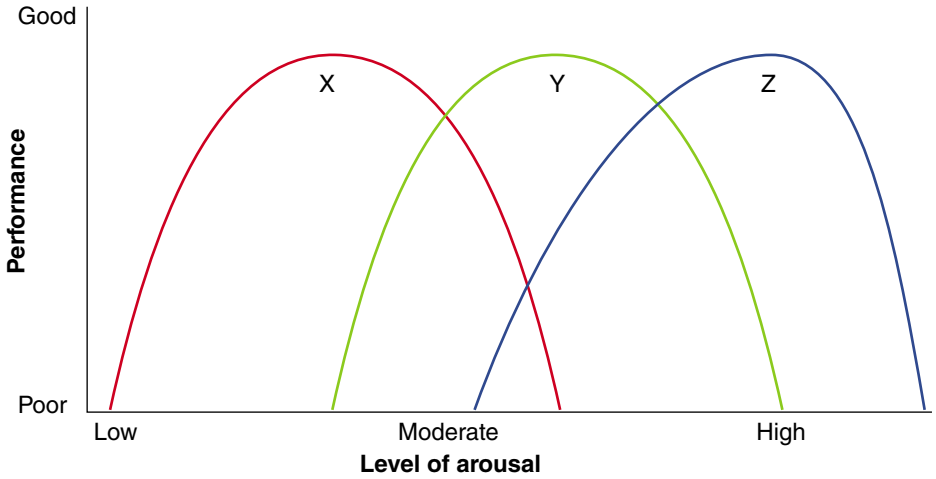


Figure 6.15: Arousal levels for different activities

Ranking chart

Ranking	Curve	Justification
1.		
2.		
3.		
4.		
5.		
6.		

INQUIRY

Anxiety and arousal

eBookplus

Explain the difference between anxiety and arousal. Use sporting examples to illustrate the effect of each on performance. Use the **Anxiety** weblink in your eBookPLUS to assist in your research.

INQUIRY

Psychologists help our young sport stars get a head start on success

Read the case study 'Psychologists help our young sport stars get a head start on success', then answer the following questions about psychologists helping our young sport stars to get a head start on success.

1. Why may it be difficult for young sport stars of today to cope with sporting success?
2. What does the writer mean by 'A lot of the work the psyche has is overcoming the boundaries the athletes set themselves'?
3. What type of pressures emanate from success at a young age?
4. The achievements of Guan Tianlang (see Snapshot article overleaf) show how talented, hard working youngsters can make it to the top. How can young athletes like Guan Tianlang better equip themselves to handle the pressures that accompany success?

CASE STUDY

Psychologists help our young sport stars get a head start on success

by Richard Noone

Kids as young as eight are turning to sports psychologists to get the edge on their rivals in the relentless pursuit of sporting success.

Industry experts believe today's aspiring champions have to cope with heavier training regimes than athletes of yesteryear and have the added pressures of rankings, selections, media attention and sponsorships — all the while balancing school.

Parents are also spending thousands of dollars on the same sports psychologists used by their children's professional heroes.

While every sport warrants a different technique, experts teach kids how to deal with anxiety, how to settle pre-game nerves, build mental toughness and how to undertake pre-game rituals. They also learn relaxation techniques and how to cope when things don't go their way.

Athletes and coaches also learn how to communicate so coaches and players can identify what's going wrong and how to fix the problem. The unprecedented pre-teen push is working, according to coaches.

Sports psychologist Paul Penna, who works with Swimming Australia and the Wests Tigers NRL club, said junior athletes make up 40 per cent of his focus performance psychology practice at the Sydney Sports Medicine Centre.

'I think there's a couple of reasons for it,' he said.

'They are certainly realising that to get through to that elite level is harder than ever before. And for parents, it's a way to give your kids the best chance possible.'

It is common for parents to pay up to $1400 for four to six sessions leading up to a big competition or team selection.

In gymnastics, where potential champions are identified as young as three or four, Gymnastics Australia's high performance manager Adam Sachs said psychologists helped pre-teen athletes learn 'potentially scary skills'.

'A lot of the work the psyche has is overcoming the boundaries the athletes set themselves', he said.

Queensland University lecturer Tracey Veivers said children as young as five or six were starting to specialise in one sport, with some kids as young as 12–13 training more than 20 hours a week.

Ms Veivers said sport psychologists tried to avoid burn-out and stop the stress and anxiety 'leading to mental illness' such as eating disorders.

'There's a lot of pressure on girls generally and you can see where they've tried to be healthy but have gone a little too far', she said.

Source: The Daily Telegraph, August 27, 2012.

SNAPSHOT

Chinese golfing prodigy Guan Tianlang youngest in Masters history

Fourteen-year-old Chinese prodigy Guan Tianlang is set to become the youngest golfer to play the US Masters.

Tianlang held on for a one-stroke win at the Asia-Pacific Amateur Championship at Thailand's Amata Spring Country Club.

Guan, the youngest player in the field and the overnight leader by two, shot a final round of one-under-par 71 to finish ahead of Pan Cheng-Tsung of Taiwan, who fired a 65 while Australia's Oliver Goss finished an impressive third a stroke further back.

Tianlang will be 14 years, five months and 17 days old when he tees off at prestigious Augusta in April, smashing the record set by Italy's Matteo Manassero in 2010 when he was aged 16.

Guan punched the air in delight and was quickly embraced by his father after clinching the win at 15-under 273 by nervelessly holing a five-foot par putt on the last hole.

Schoolboy Guan, from the southern city of Guangzhou, started playing at the age of four and won the world junior title by 11 shots last year in San Diego.

In April, he made history as the youngest player to take part in a European Tour event when he played the Volvo China Open in Tianjin at the age of 13 years and 177 days.

Source: The Australian, Novenber 5, 2012.



PSYCHOLOGICAL STRATEGIES TO ENHANCE MOTIVATION AND MANAGE ANXIETY

Uncontrolled anxiety can potentially have a negative impact on performance, but a complete lack of anxiety can undermine effort and achievement. Accomplished athletes are able to draw on strategies such as focusing skills, mental rehearsal, visualisation, relaxation and goal setting to ensure their mental and physical energy is channelled in the right direction to lead to the desired result.

Concentration/attention skills (focusing)

Concentration is the ability to link movement and awareness to the extent that the individual can focus on doing, rather than on thinking about doing.

Sport psychologists generally agree that the key to success among elite sportspeople is **concentration**, or the ability to focus on the task at hand. To understand concentration we need to distinguish between doing and thinking about doing. When an individual thinks about doing, they often separate the task from themselves as the performer. In this situation, their feelings, sensations and personal reactions become the focus. Total focus can contribute to overarousal. When an individual focuses on the task or activity, their thoughts relate more to execution. Effective concentration involves not focusing on one or the other, but maintaining an uninterrupted connection between the two.

Psychologists sometimes illustrate the concept by relating to Self 1 and Self 2. These are the internal voices and emotions that provide direction for behaviour. Self 1 tends to focus on instruction, listens to directions, asks questions and is aware of criticism. Self 2, on the other hand, focuses more on action, execution and task completion. Improved concentration is marked by less interference from Self 1 and more reliance on Self 2.

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Concentration can be improved through training that emphasises the *process* rather than the *outcome*. When an individual focuses on the process, they give attention to technique and try to understand why, for example, the shot missed the target. Focusing on the outcome places importance on the result — the success or otherwise of the shot.

Athletes need to know what to focus on at a particular time and be able to adapt to changing situations. During one stage of a basketball game, for example, a player may need to focus on the shot and exclude all other distractions; however, at other times, they may need to be aware of their own defensive position and that of team-mates. The ability to widen and narrow attention skills can be developed through training. Some coaches require athletes to develop lists that embrace their thoughts at particular stages of the game/performance.

The type of concentration required varies from one sport to another.

- Intense concentration is required in activities such as gymnastics, diving and batting in cricket.
- Intervals of high concentration interspersed with periods of less intense concentration predominate in most team games such as touch football, netball and softball.
- At the extreme is sustained concentration as might be required in triathlons, marathon running and high level tennis matches.

Athletes need to recognise the type of concentration required for their particular sport or activity, and develop skills that block out distractions and help maintain focus. Using well-established routines, avoiding negative

thoughts and utilising self-talk to enclose one's thoughts and focus points are techniques commonly used to boost concentration.



Figure 6.16: Some sports, such as diving, require intense concentration while sustained concentration is essential in sports such as triathlons.



INQUIRY

'In the zone'

1. Read the snapshot 'In the zone' and provide a definition for 'the zone'.
2. Why is 'being in the zone' difficult to manage for long periods of time?
3. Explain some ways in which players can improve their mental strength.

SNAPSHOT

In the zone

By Alan Attwood

It was the first day of the qualifying tournament for the Australian Open. All around the back courts of Melbourne Park players lunged after balls: older players with names or faces that seemed naggingly familiar; much younger players whom most spectators had never seen before; all of them good players, proficient in their shot-making, quick on their feet.

One tennis coach, watching the action, was asked the difference between those players and the world's top 10. The coach smiled; didn't say a word. Just tapped the side of his head. His unspoken message was very simple: mental toughness — the ability to perform at a peak level under extreme pressure — is often the X factor separating winners from might-have-beens.

Why do some players consistently lose in a fifth set? Or fold when just a game or only a couple of points from victory? Or seem unable to change their game even when they're going down? The answers often lie in the head, not the racquet-hand …

The mental aspect of the game … manifests itself in different ways. It might be Arthur Ashe, meditating during changes of ends, using clever tactics to defuse the firepower of Jimmy Connors in their memorable Wimbledon final of 1975. It could be Connors, years later, shamelessly playing to US Open crowds to get them on side, or — an extreme example of mental frailty — Jana Novotna folding pathetically within sight of victory at Wimbledon in 1993 …

Sports psychology is a relatively new discipline, younger than the open era of tennis. Its importance is now recognised, with one professional player on record as saying that while once it was considered 'weird' to consult any kind of psychologist to discuss sport, now it would be deemed equally weird not to.

You scan Rod Laver's autobiography in vain for references to psychology or meditation. The man who won a pair of grand slams in the 1960s boils the game down to a few fundamentals: watch the ball; bend your knees; get your first serve in. The rest, he says, 'is frosting'. But his discussion of the tactics he

employed against various opponents, and how he'd shave before a match and put whitener on his shoes so he'd look like a winner, proves he knew there is more to tennis than biffing a ball over the net.

Helen Wills knew this too. In Cannes in February 1926 the young American sweetheart took on the grande dame herself, France's Suzanne Lenglen, in a clash of temperaments as well as countries. Early in the match it struck Wills that Lenglen was not hitting as hard as some other players she had met. The difference, she wrote later, was that 'her balls kept coming back, coming back, and each time to a spot on the court which was a little more difficult to get to'.

Something else was going on, too. Her older opponent was using the sporting version of Luke Skywalker's force.

'Mlle Lenglen ... intended to bring forth the concentrated knowledge that had accumulated with her years of tournament play. She meant, also, to make the most of her understanding of strategy.' It's an early example of a player exerting mental authority over a contest — enough to get Lenglen over the line in two tight sets ...

[Billie Jean] King is responsible for one of the best, and first, descriptions of being in 'the zone'; the opposite of choking. 'It usually happens on one of those days when everything is right, when the crowd is large and enthusiastic and my concentration is so perfect it almost seems as though I'm able to transport myself beyond the turmoil of the court to some place of total peace and calm. I know where the ball is on every shot, and it always looks as big and well-defined as a basketball.'

This is obviously an enviable state, but only a few consistently manage to achieve it. Navratilova knew the feeling, but confessed that it often only took a little thing to snap her out of it. McEnroe, similarly, struggled to control his emotions. Connors, by contrast, 'always had the ability to turn his anger on and off, which amazed me', McEnroe wrote in his autobiography. 'I was a one-way street — mad, madder and maddest. There must have been thousands of times, in tense situations, when a joke was on the tip of my tongue, and instead of saying something funny, I'd let loose. Then I'd think: What the hell did I do that for?'



Dr Noel Blundell, a consultant in sports psychology for the Victorian Institute of Sport, describes McEnroe as a player who, realising that his emotional level was too low, would often use outbursts as a means of raising his intensity. He seldom needed to do this in finals because he was already at an emotional peak ...

Blundell argues that it is possible to work on such things as concentration and decision-making skills, just as it is possible to iron out technical flaws in a backhand. Players, and those close to them, need to understand that mental frailty or anxiety also has physical repercussions. Why can a big server like Andy Roddick send down a game of aces early in a set but not one in a tie-break? Because, Blundell suggests, the tension of the match situation can cause tightness in the racquet arm — just enough for serves that had been centimetre perfect to fly a fraction long.

... Blundell talks of the anxiety that comes with a fear of losing. 'The brain starts to fire at random. Neurologically, it's like an old-style telephone exchange, trying to cope with 25 different calls coming in at once. Decision-making becomes very, very difficult.' Players who have exhibited mental frailty need to understand that hitting more balls in practice isn't going to help. Different ways of thinking on court are required ...

The exemplary records of players like Federer and Sampras in finals is proof of their mental strength. When the stakes are highest, they hold firm. But Blundell says everyone, Federer included, is vulnerable at various stages of a match. An opponent must first recognise the signs, then have the skill and nous to adapt their own tactics to take advantage.

Blundell believes that, until recently, insufficient emphasis has been placed on the psychological development of Australian players. But he sees welcome signs of change. Sand-dunes and weights alone won't cut it any more. We've entered an era of the zone, of visualisation, of CDs and DVDs to calm the subconscious. Nobody whitens their shoes anymore. Yet still some of Laver's truisms apply. Watch the ball as well as that motivational DVD.

Source: The Age, 13 January 2006, Supplement, p. 22.

Mental rehearsal/visualisation/ imagery

Mental rehearsal is the technique of picturing the performance or skill before executing it.

Mental rehearsal, sometimes called visualisation or mental imagery, has been shown to enhance not only competition performance, but also the acquisition and building of motor skills. Mental rehearsal is a commonly used technique in many forms of physical activity. Weight-lifting, gymnastics and high jump are examples of sports that frequently use it. Mental rehearsal involves the mental repetition of a movement or sequence to increase the mind's familiarity with the desired motion. It relies on the power of imagery — that is, seeing clearly in the mind what is required of the body in the movement. It involves recalling and then reliving the execution of a skill or performance.

Mental rehearsal has a number of advantages, the most important of which is to improve concentration. If done properly, mental rehearsal also provides the athlete with additional practice and may remove the need for total reliance on physical training. It is commonly used by athletes when they are unable to train through inclement weather, illness or injury. However, mental rehearsal does have an apparent flaw in that it is difficult for the coach to control the thoughts of his/her athletes.

Some players may tend to daydream and embrace their performance images in an unproductive manner, while others lack the drive to back up mental rehearsal with devoted physical practice. Nevertheless, mental rehearsal is a chance for 'perfect practice', although the extent to which 'perfect practice makes perfect' is debatable.

The importance of mental rehearsal to improving performance is that it:

- elevates the body to the desired level of arousal
- provides a clear idea of what has to be done
- heightens concentration
- narrows thoughts to the task.

However, to be totally effective, mental rehearsal requires:

- vivid, realistic pictures at performance speed in the mind
- at least one and possibly more rehearsals
- a narrowing of thoughts to exclude distractions
- a sense of 'experiencing' — seeing colours, hearing sounds, feeling the movement and noticing the crowd
- seeing a successful performance — to visualise failure is to experience failure
- practice, so the process can be 'turned on' when required.

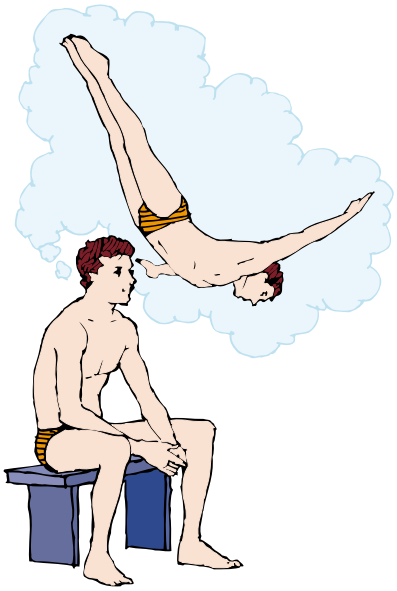


Figure 6.17: Effective mental rehearsal requires concentration and clear images.



APPLICATION

Experiencing mental rehearsal

Choose a skill such as a long jump, discus throw or soccer kick for goal. Take five minutes to apply the principles of mental rehearsal to performing the skill. Execute the skill as closely as possible to the way in which it was imagined.



INQUIRY

Evaluating mental rehearsal

Comment on the ease or difficulty of sustained concentration on a specific performance in the above application. How could your technique be improved? How could it be applied to non-sporting tasks?

Relaxation techniques

Relaxation techniques are a series of techniques that seek to control the body's response to stress.

While optimal arousal is desirable for good performance, over-arousal will tarnish even the best efforts. **Relaxation techniques** may assist the athlete in control of arousal.

Without the use of relaxation techniques when necessary, an athlete may be unable to reproduce in competition what has been learned in training because other factors interfere with their concentration.

Techniques commonly used by athletes include:

- *progressive muscular relaxation*, which involves relaxing muscle groups using special exercises (a good technique if arousal is excessive)
- *mental relaxation*, which involves relaxing the body through controlled breathing, relaxing the mind and gaining a 'floating' feeling
- *self-hypnosis*, which involves using the power of suggestion to have the mind accept a particular level of anxiety in a specific situation
- *mental rehearsal*, which involves concentrating on rehearsing the performance of the task rather than on how you feel about it
- *meditation*, which involves narrowing one's thoughts using simple repetitive images and sounds
- *centred breathing*, which involves controlling breathing to release tension before a performance.

It is important that each athlete finds the relaxation technique that suits them personally. Some may respond best to physical techniques such as progressive muscular relaxation, while others will benefit from a technique with a mental focus, such as yoga.

study on
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Figure 6.18: Relaxation involves both physical and mental techniques.



APPLICATION

Experiencing relaxation

In a small group, investigate one of the relaxation techniques discussed here. Teach your group's technique to the class in a brief practice session.



INQUIRY

Applying relaxation techniques

Do you feel that any of the relaxation techniques discussed here could be applied to improve your sporting endeavours? If so, which technique(s)? How and when would you use it/them?

Goal setting

Goals are targets that we direct our efforts towards. They can relate to either performance or behaviour.

The establishment of **goals** is important to improve both individual and team preparation. By empowering athletes with the responsibility to set their own goals, they are more likely to seriously attempt to fulfil them. Goals provide athletes with a reason to persevere with training over extended periods. They provide focus, give direction, and help people to realise their aspirations. Not only can goals redirect an athlete who is unable to see the end result of training, but they can also provide the essential formula for success. Providing a goal–training relationship exists (that is, the intensity and aims of training relate to specific performance aspirations), then today's goals will become tomorrow's realities.

Goals may be short or long term, and behaviour or performance oriented. Short-term goals are the most important because they serve as checkmarks by which other goals can be measured. The approach to achieving short-term goals should not be inflexible and it shouldn't be of concern if one or a number of goals are not achieved. Situations arising from personal circumstances and possibly injury may interfere with the timeframe over which achievement of a goal or goals is sought. In this case, discussion and renegotiation is a preferable solution rather than reinforcing feelings of failure and disappointment.

The types of goal that are important to athletes are:

- *Short-term goals.* These are goals that can be achieved in a limited period of time; for example, 'I will complete at least three endurance training sessions this week'. They are stepping stones to achieving long-term goals.
- *Long-term goals.* These goals can be achieved only over a long period of time; for example, to complete the City to Surf fun-run.
- *Behavioural goals.* These goals are arrived at by players and relate to improved behavioural expectations in training, competition or both. They are observable, measurable behaviours rather than aspirations. An athlete may aim, for example, to be more punctual at training, to control their temper on the field, or to refrain from criticising other athletes. Some coaches use behavioural goal agreements to monitor desired improvements in player behaviour and to highlight the importance of developing a workable relationship in this area. Figure 6.19 is an example of a behavioural goals agreement.
- *Performance goals.* These goals relate to an athlete's desired level of success; for example, a state, national or even Olympic medal. Ideally, the athlete should write down these goals and put them on a noticeboard so they remain a focus.

NAME:		DATE:		
Behaviour	**Goals**	**Poor**	**Adequate**	**Very good**
1. Punctuality	• Arrives 15 minutes early • Warms up • Signs on		✔	✔ ✔
2. Self-discipline	• Listens to instructions • Trains at home • Makes eye contact • Doesn't talk during instruction	✔ ✔	✔	
3. Leadership	• Helps others with their skills development			

Figure 6.19: Example of a behavioural goals agreement



Figure 6.20: Goals provide direction and act as benchmarks of achievement.

INQUIRY

The psychology of winning

Read the following snapshot, 'The psychology of winning'. Use the table below to explain important points made by Owen Thomson when commenting on psychological strategies used by athletes.

Why is motivated to succeed better than motivated to avoid failure?	
Why use 'self-talk'?	
Why have specific goals?	
How do athletes manage anxiety?	
How do athletes avoid 'fear of failure' mentality?	
Why focus on positives?	
Why focus on the process, not the outcome?	

The psychology of winning

By Owen Thomson

The vast majority of us will never experience the unbridled joy of setting a world record, winning Olympic gold or spraying victory champagne over hordes of adoring onlookers. But that doesn't mean our lives and those of elite sporting champions are without parallel. After all, it could be argued that the mind-set required to get the ball over the try line is the same one we use to clinch a deal or job promotion. Or that the sight of a track athlete clipping a hurdle is a metaphor for the times we falter at life's stumbling blocks.

According to those whose task it is to finetune the minds of sport's elite, the psychological tools used to hone drive, desire and self-belief to record levels can be applied just as effectively to more ordinary situations. 'I think elite sport and everyday life are very similar,' says Gavin Freeman, a senior psychologist from the Australian Institute of Sport (AIS), whose tenure has seen him work with archers, boxers and soccer and water polo players. 'From a psychological perspective, what individuals in both areas are going through is much the same. If you look at an athlete's motivation to succeed and compare it to a normal individual's, the theory is almost identical.'

It's no secret that maintaining motivation is one of the most difficult long-term tasks we'll ever face. Freeman believes that we all fall into one of two categories: those motivated to succeed and those motivated to avoid failure. And just which type we are has a profound impact on our approach to challenges and our chances of success.

'The individual who's motivated to succeed will see any setback as a stepping stone to success,' he says . . .

Freeman says that, by contrast, those motivated to avoid failure will bypass negative evaluation. Either they won't try hard — and then they'll have a built-in excuse — or they'll put themselves in non-challenging situations where they're guaranteed success . . .

Another important key to meeting challenges is to be aware of 'self-talk' — that little voice inside our heads that can reinforce both positive and negative thoughts, according to Jocelyn Penna, a sports psychologist from the Sydney Sports Medicine Centre at Olympic Park. 'We talk to ourselves all the time,' she explains. 'We need to get to know that internal dialogue so we can make it work for us. Sometimes it will say, "I'm looking forward to a particular challenge; I'm happy with myself." But if it frequently says things like, "I'm going to mess up, it's going to be bad," you're not going to succeed as well as you can. In the lead-up to any event, you need to focus on saying, "I've planned for this, I've followed my plan, I've done all that I can and I've tried my best." We can apply this strategy to job interviews, exams or corporate meetings.'

It's vital, Penna says, to make a conscious effort to alter a tendency towards negative self-communication . . .

Penna, who has worked with athletes at the NSW Institute of Sport, says that a sense of life direction is crucial to self-worth and that our efforts need to be targeted and concentrated. 'It's important to have specific goals,' she says. 'But while thinking about the outcome — whether it be a gold medal or a job promotion — might be motivating, it's not going to get you where you're going. You need to think about the week-by-week, day-by-day, even hour-by-hour things that you need to do to get you there. It's about stringing together a series of smaller triumphs that add up. For an athlete, that might mean remaining focused at training. Or there might be an aspect of their technique that they'd like to work on. They'd then go to training each day with that in mind.'

If there's one thing few of us are no stranger to, it's nervous anxiety in the lead-up to a significant event . . . Job interviews, performance reviews and even first dates can all create tummy-churning tension.

The short-term solution can be as simple as diverting our attention, says Dr Clark Perry, former senior psychologist at the AIS and managing director of corporate training company PST Systems. 'Centred breathing is a technique where you concentrate on the rising and the falling of your breath,' he explains. 'Focus on what you're doing now, not what you're about to do. This is something you'll often see tennis players do before a serve: they regroup, collect their thoughts, forget the last point.'

Significantly, Perry says such exercises are only Band-Aid solutions that won't fix underlying issues. 'It's important to ask: why am I anxious? Is it because I'm not prepared or am I afraid of failing?' he says. 'If it's the latter, ask, "Why am I afraid of failure?" '

While dealing with success can be a challenge, facing up to an ultimate lack of it is even more so.

And Perry says it's our concept of failure that we need to rethink most of all. Rather than undergoing the pain of dealing with failure, he believes we need to train ourselves not to be afraid of it in the first place.

'You've got to be able to honestly look in the mirror and say, "I'm not afraid to fail. If I become bankrupt tomorrow, you know what? I'm OK. I'll do whatever I need to do",' he says. 'If you can legitimately say that, all of a sudden, success comes flying to you. Focus on being the best you can possibly be, not on the end result. The best athletes do just that. Cricket legend Sir Donald Bradman said many times that he never went out to achieve records. He went out to face the next ball. Then the next one, then the next one.'

Perry says that while fear of failure can indeed drive us to success, it won't sustain us in the long term: 'Many athletes motivated by the fear of losing have come on and won something and then retired. That's because fear is not a sustainable motivation.'

The good news, says Jocelyn Penna, is that situations where we've failed totally are rare. Rather, she believes there is always at least one positive to draw from any less-than-perfect outcome — even in the case of a track sprinter who blows a start and secures last place before leaving the blocks.

'Hopefully, he's able to identify what the problems were and fix them,' she says. 'He'll have adjusted whatever is necessary to get him to where he needs to go next time. You can learn so much from something like that — and jump far ahead as a result. We need to focus on the things we've done well because if we focus on the negatives, we have little fuel to get up and keep going.' ...

Despite the fact that many of us will strive, sacrifice and give our all, it's a fact that not all of us will achieve what we set out to ...

So how can we reconcile the fact that our most wasn't enough? The experts say it's about focusing on the knowledge we did our best and recognising we learned a lot, improved ourselves as individuals and, hopefully, enjoyed ourselves along the way.

'Don't focus on the outcome,' says Clark Perry simply. 'Focus on the process because that's something you can control. We don't have control of the outcome anyway — in sports and a lot of things in life . . .'

Source: Sun-Herald, 21 May 2006, *Sunday Life Magazine*, p. 18.



INQUIRY

What motivates Libby Trickett?

Read the following case study on champion swimmer Libby Trickett. The case study reveals evidence of a number of attributes/characteristics that have been important to Libby's success. These include:

- pride
- focus
- training tolerance
- dream
- technique
- confidence
- motivation
- trust
- talent
- perseverance.

Find examples/references to these attributes in the snapshot and rank them according to what you think was most important to Libby's success. Briefly explain each within the context of the snapshot. Discuss your rankings with the class.

CASE STUDY

Libby Trickett: heart of a lion

By Grant Stockwell

It's approaching 6.30 am on a foggy Friday and New Farm swim sensation Libby Trickett is battling a huge hangover.

Trickett has just arrived at the Chandler pool, the place where she first notified the world of her immense talent, and she's yawning like a new-born baby recently woken for its morning feed.

The golden girl of Australian swimming has dragged herself out of bed despite the lingering effects of the previous day's activities and

(continued)

despite her obvious fatigue, she's determined to play on.

Alarmingly, Trickett's hangover is self-inflicted and to further complicate the issue, her fellow Olympians and squad mates Christian Sprenger and Melanie Schlanger are also under the weather on the morning after the day before.

But their coach, revolutionary tactician Stephan Widmer couldn't be happier with his star pupils' condition.

'That's just the way they have to be, they're going through what they call the heart-rate hangover and for me, as their coach, that means they have trained hard the previous day,' Widmer says casting an eagle eye over his prize stock.

'They do a hard session on Thursday afternoon and it's getting toward the end of the week, they would also be feeling a bit of accumulative fatigue but they'll bounce back.' . . .

'You try to minimise its effects as much as possible, but the fact is, just like a real hangover, there's nothing you can do to cure it.' This is where, Widmer assures me, Olympic Games gold medals are won and lost — the endless hours of lonely torture where swimmers churn through up to 60 kilometres a week with only their mind as companionship in a campaign which will ultimately be defined by a millisecond.

Welcome to the lonely, repetitious and more often than not unglamorous world of an Olympic swimmer — or as Widmer says, an Olympic dreamer.

'It's all about the dream, if they don't have the dream they don't have anything,' he says.

'You can have all the talent in the world but you need more than that to be world class.' After stretching her aching limbs and engaging in some words of mutual encouragement with her teammates, Trickett gets to her feet and slowly peels off her winter woolies and ugg boots to reveal a set of muscled shoulders and powerful thighs.

Standing on the starting blocks either side of the towering Sprenger, Trickett and Schlanger resemble two little tug boats stoking their engines in preparation to tow an aircraft carrier out to the Pacific Ocean.

But, as soon as Widmer signals game on, it's a level playing field.

For the next three hours it's each person for themselves as the trio punish their bodies in a torturous session of stroke analysis, start and tumble turn practice, limb restricted time trials before winding up with a Pilates class under the tutelage of 1996 Atlanta Olympian Jade Winter.

It's a case of being marginally cruel to be unforgettably kind.

With his assistant coach Brant Best operating an underwater camera, Widmer patrols the deck like a caged lion as his swimmers churn the water. Draped around his neck are his most constant companions, the valuable tools he refers to as the 'lie detectors'.

'The stopwatch never lies, I know and they know (the athletes) exactly what their personal bests are for each individual routine I put them through,' Widmer says.

'If they are not trying their best, the lie detectors will pick it up.'

'It's about commitment, it's about determination, perseverance, self-belief but most of all it's about heart, and that's what Libby's got, a very big heart.'

Minutes later Trickett unknowingly gives me a glimpse of that big heart Widmer spoke of.

She's just finished a 100 metre time trial where her hands are tied together on a kick board in front of her and her only propulsion is her legs.

'One minute 16 seconds, that's as fast as she's ever done that in,' Widmer says.

As he speaks, Trickett is almost limp as she stands at the end of her lane, gasping for her breath in the midst of an asthma attack.

'People see that and they see me walk past and pat her on the shoulders and say "good swim Libby" and they think I'm Mr Cruel,' Widmer says.

'But I know her; I've seen her have countless asthma attacks since I started coaching her. When she's gasping I just tell her "breathe out Libby, breathe out" and normally within minutes she's ready to go again.' Like so many champion Australian swimmers Trickett suffered severe asthma as a child and the incurable condition still affects the 23-year-old so badly that she had to call in sick seven days earlier, forcing this interview date to be postponed.

But, as is normally the case with successful sporting partnerships, Trickett admires her coach and openly admits to doing whatever it takes to please him.

'If he's pleased that means I'm doing what he wants me to do and reaching the goals he has set for me. He hasn't killed any of us yet, I trust him,' Trickett says.

'He definitely tries to push our boundaries and personally I've gone by far beyond where I ever thought I would be.'

'Your lungs are screaming for air and your muscles feel like they're about to explode but that's all part and parcel of the training and in some respects we enjoy that because it usually means great things in the future.' Widmer rightly makes no excuse for the pain he puts his athletes through in their quest for Olympic glory in Beijing in August.

'They know not to whinge too much or yell back at me, that (behaviour) wouldn't last around here and they know that,' he says.

'If they are sometimes complaining and their motivation is low I look at them and say: "I don't like you as an athlete, that is why I want to hurt you more in training".'

'I just tell them to have a cup of concrete, harden up.' Trickett admits to downing a few cups of concrete in her time at Camp Widmer but is happy to reveal it's been a while between drinks.

'That was one of the few phrases that he started during a team building exercise we did last year but it's been a while, we've all been good about not having to have a cup of concrete.' Widmer concurs with his gun's assessment and admits Trickett is easily prepared both physically and mentally because of her honesty and openness.

'I can see when she walks into training how she's feeling, she wears her heart on her sleeve, you can see it in her eyes,' Widmer says ...

[Trickett says:] 'I'm pretty much an open book. So I think it's a good thing, it is part and parcel of me, for better or for worse, it's who I am.' And for Trickett herself, competing at the upcoming Olympic Games is like climbing a mountain she once never dared step foot on.

'I never thought I would get this far. It's getting pretty exciting and I'm definitely confident and focused in my preparation at this point.' ...

Source: *City News*, 16 July 2008.

SUMMARY

- Motivation is an internal state that activates, directs and sustains behaviour towards achieving a particular goal. It is important to remember that motivation is not a static phenomenon, but a force that can be manipulated to help an athlete achieve their full potential.
- Motivation can be positive or negative. Positive motivation is good because it reinforces actions and behaviours that are correct or that the player will benefit from if repeated. In contrast, negative motivation inspires the athlete out of fear of the consequences of not performing, and subsequently is not sustainable.
- Motivation comes from inside (intrinsic), and is also influenced by outside (external or extrinsic) sources. Both forms are valuable, but intrinsic motivation is more sustainable.
- One important difference between intrinsic and extrinsic motivation is that while intrinsic motivation has a focus on process such as the development of competence, extrinsic motivation focuses on the product, or what can be gained.
- Anxiety refers to the development of physical and mental tension when the individual perceives a situation as potentially threatening. Different people experience trait and state anxiety at different levels.
- Stress is the non-specific response of the body to a demand placed on it. It can be real or imagined, but becomes a problem when it is the athlete's focus. Athletes can use relaxation techniques to control stress.
- Arousal refers to the level of anxiety before and during a performance. The performance will be best when the level of arousal is optimal. The inverted U hypothesis illustrates the relationship between arousal and performance.

- Athletes can use a number of techniques to enhance motivation and manage anxiety, including concentration/attention skills, mental rehearsal, visualisation, relaxation and goal setting.
- Concentration is more about doing than thinking about what is to be done. Concentration skills need to be learned. Once learned, they can positively contribute to a desirable level of arousal.
- Mental rehearsal is the technique of picturing the performance or skill before performing it. It relies on the power of imagery, but requires practice and development for positive results.
- Anxiety and arousal can be controlled and channelled into performance improvement. A number of techniques are available, so the athlete must experiment and work out which methods make optimal arousal attainable for specific performances.
- Goals are targets that the individual aspires to achieve. They can be short or long term, and behaviour or performance oriented. They have many features, but most importantly they must be attainable. If an individual cannot achieve their goals, they will lose interest and direction.

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QUESTIONS

Revision

1. Define motivation. Outline factors that affect our level of motivation. (H11) (3 marks)
2. Explain the difference between positive and negative motivation. (H11) (2 marks)
3. Choose a sport or activity in which you regularly participate. Explain the motivational forces that have driven you when you have played your best. (H8) (4 marks)
4. Motivation can be positive or negative, and intrinsic or extrinsic. Discuss the advantages of positive, intrinsic motivation in the competition preparation of an athlete over six months. (H8) (5 marks)
5. Discuss the types of motivation a player could experience in a netball team, both in the time immediately before the game and during the game. (H11) (4 marks)
6. Choose three psychological strategies used by top athletes to improve performance. Explain each strategy and suggest why it improves performance. (H11) (6 marks)
7. Explain the difference between trait and state anxiety. (H8) (2 marks)
8. What is stress? Identify strategies that can be used by athletes to better cope with stress. (H16) (3 marks)
9. Explain the difference between stress and arousal. (H8) (2 marks)
10. What is the inverted U hypothesis? How can it explain failure to achieve a best performance in
    (a) a team sport
    (b) an individual sport such as archery? (H17) (4 marks)
11. Discuss the factors that could contribute to differing levels of arousal in individuals. (H8) (4 marks)
12. Explain how and why an individual may need to control arousal while performing a fine motor skill such as pistol shooting. (H8) (2 marks)
13. Discuss the strategies required to improve the concentration skills of a high jumper. (H11) (4 marks)
14. Read the information at the **Psychology** weblink in your eBookPLUS. What are the 4Cs and why are they important to successful performance in sport? (H8) (4 marks)

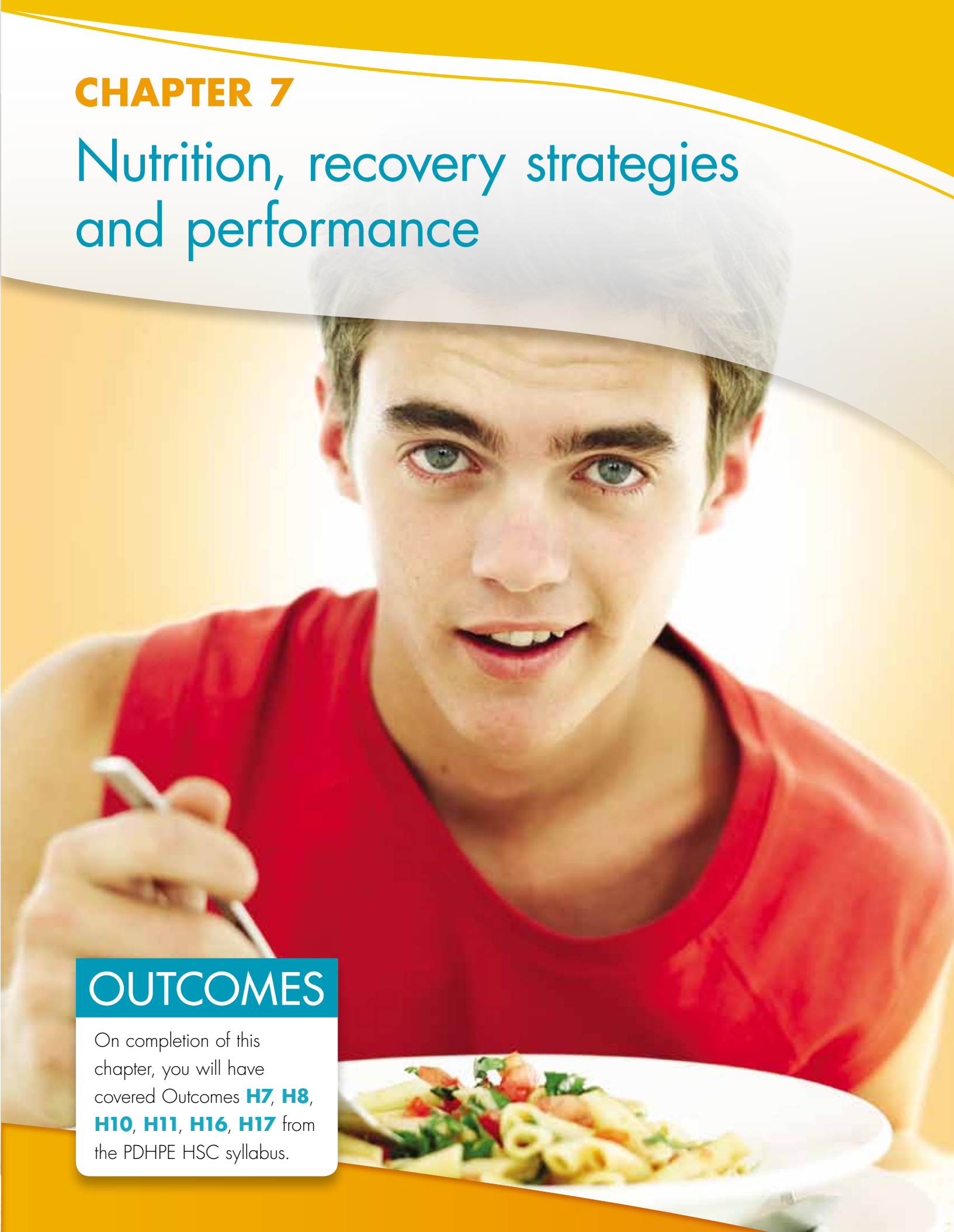
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15. What is mental rehearsal? Explain how the technique can be used to improve skill performance. (H11) (3 marks)
16. What is goal setting? Suggest how it can be used to motivate and orientate players. (H11) (3 marks)

Extension

Choose an athlete in any sport or activity. Investigate their life history and itemise the psychological factors that have contributed to their success. Discuss how a range of these factors apply to your own sports history. (H16, H17) (8 marks)

CHAPTER 7

Nutrition, recovery strategies and performance



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H7**, **H8**, **H10**, **H11**, **H16**, **H17** from the PDHPE HSC syllabus.

NUTRITIONAL CONSIDERATIONS

Programs designed to improve performance must be supported by solid nutritional practices. This involves many factors such as what to eat and drink, being aware of the most appropriate time for food intake and having recovery strategies in place to recoup expended energy. While complete nutritional balance is essential for optimal physical performance, the specific roles of carbohydrates and **hydration** are the two most important considerations.

Hydration involves supplying sufficient water to the body's cells.

Foods not only contain nutrients that power essential body functions, but are the life source of energy supply. Because different foods have differing amounts of energy (carbohydrate supplies 16 kJ/gm, protein supplies 17 kJ/gm, and fat 37 kJ/gm), the type of food consumed prior to competition directly affects the quantity of energy available.

Fluid is also important because it is the body's medium for cooling heated muscles and ultimately preventing dehydration. It assists in temperature regulation by transporting heat to the outside of the body. It is also important because it prevents damage to organs by diluting toxic waste, aiding oxygen transport to cells, assisting transport waste from the body, and helping eliminate carbon dioxide via the blood plasma. Thus, a deficiency in fuel or fluid supply contributes to a substandard performance and can place the health of the athlete at risk.



Figure 7.1: Fluid, like food, is an important nutritional consideration in endurance activity. If hydration is inadequate, an athlete's health can suffer.

Pre-performance

Food consumed prior to activity is useful only if digested and its energy and nutrients made available to where they are required in the body. Glycogen reserves, for example, can be lowered by 55 per cent as a result of sustained aerobic activity lasting one hour and fully depleted in a two-hour session. Even bouts of explosive activity lasting from one to five minutes, as in interval training, basketball and football (depending on activity time, intensity and rest intervals), can cause acute depletion in the exercised muscles. Fluid levels rarely keep pace with the body's requirements, and they need to be repeatedly replaced.

There are a number of important considerations for athletes to be aware of as part of pre-performance nutritional strategies:

- what type of food to eat and in what amount
- when to eat and drink
- how to carbohydrate load if required.

Type of food

Foods high in fat, protein and fibre such as meats require longer periods to digest than most other foods. Consuming large amounts of these types of food may lead to discomfort and possible indigestion. If solid food is difficult to digest, 'liquid meals' (drinks with high carbohydrate content) are recommended. Correctly prepared, they can be an adequate source of nutrition and energy, and significantly contribute to hydration. Athletes are advised to eat mostly complex carbohydrates (pasta, cereal, bread, fruits), because these provide slow energy release. It is strongly suggested that athletes do not experiment with unfamiliar food products on the day of competition.

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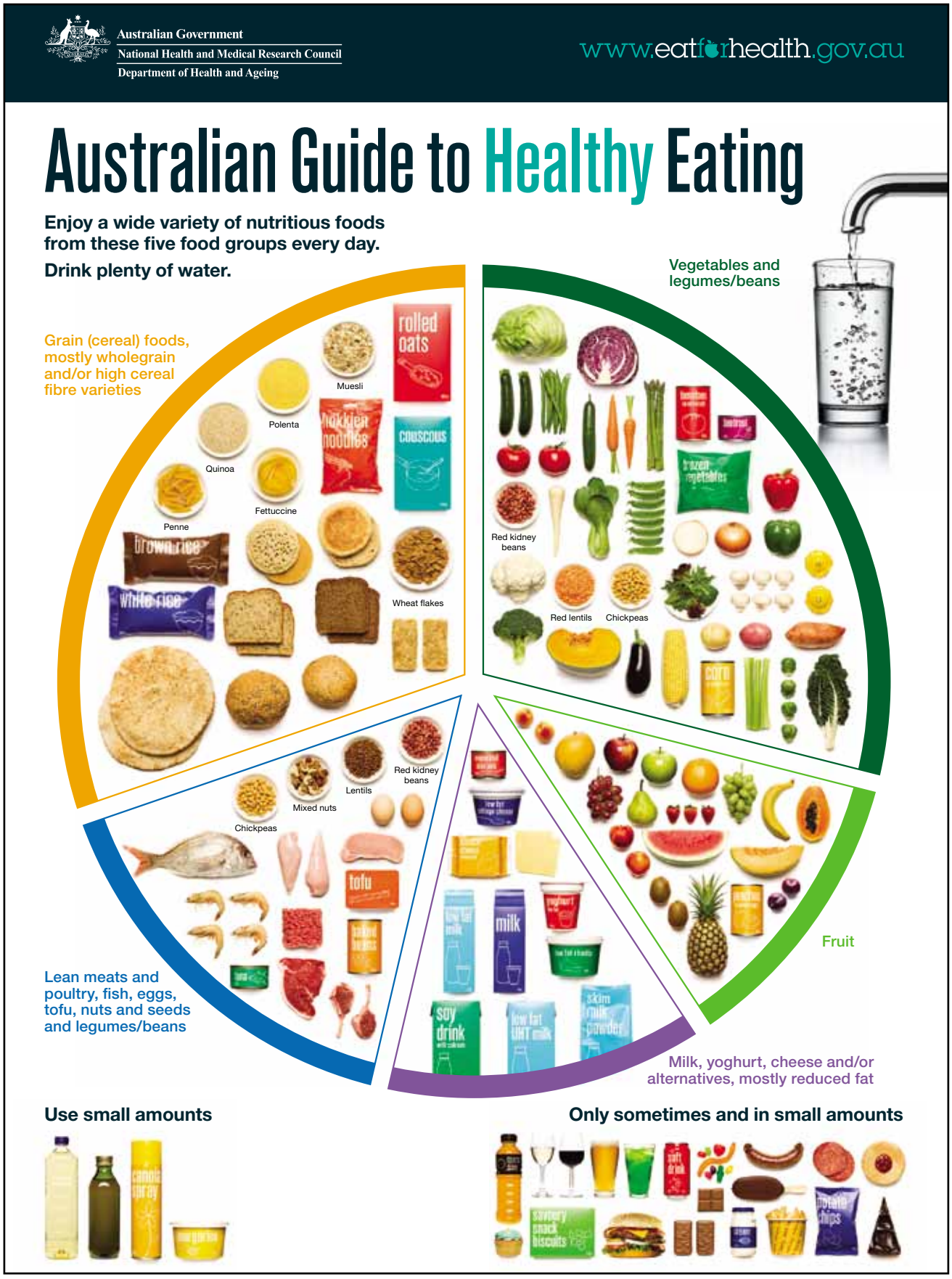


Figure 7.2: A well-balanced diet provides a variety of food in proper proportions.



Figure 7.3: Excessive amounts of food have a detrimental effect on performance.

Amount of food

Food ingested before a performance has the potential to cause discomfort. This may be increased by an existing or developing level of anxiety. Generally, the appropriate quantity of food relates to the type of competition, with competitors in sustained, endurance type competition (such as triathlons) requiring more kilojoules to fuel their metabolsim than those in less demanding events. Additionally, large amounts of food are prone to causing more discomfort in high intensity or sustained events like running as opposed to events like cycling, skiing and swimming where athletes have the benefit of support in one form or another.

When to eat

Most athletes feel comfortable having a normal meal three to four hours prior to competition. As the time period to competition becomes shorter, food intake should be in the form of snacks and liquid preparations. Limited solids can still be consumed up to two hours prior to competition, while carbohydrate solution drinks are preferred in the 30 minutes prior to the event.

Table 7.1 provides an example of foods that benefit athletes in the hours prior to competition.

Table 7.1: Suggested food intake prior to performance

Three to four hours before exercise	One to two hours before exercise	One hour or less before exercise
• crumpets with jam or honey + flavoured milk • baked potato + cottage cheese filling + glass of milk • baked beans on toast • breakfast cereal with milk • bread roll with cheese/ meat filling + banana • fruit salad with fruit-flavoured yoghurt • pasta or rice with a sauce based on low-fat ingredients (e.g. tomato, vegetables, lean meat)	• liquid meal supplement • milkshake or fruit smoothie • sports bars (check labels for carbohydrate and protein content) • breakfast cereal with milk • cereal bars • fruit-flavoured yoghurt • fruit	• sports drink • carbohydrate gel • cordial • sports bars • jelly lollies

Source: Australian Institute of Sport, fact sheet, 'Competition and training', www.ausport.gov.au/ais/nutrition.

Hydration

People competing in competition or events should drink adequate fluid in the preceding days, particularly for an endurance event such as a marathon or triathlon. This increases the body's weight, particularly if glycogen has been increased in the diet (because each gram of glycogen stores 2.6 grams of water with it). Many coaches now monitor the weight levels of athletes before endurance events to ensure adequate pre-event hydration suited to the individual athlete. As a general rule, 500–600 mL of fluid should be consumed in the two to three hour period prior to endurance performance and 250–300 mL in the last quarter hour.

Carbohydrate loading is the technique of loading the muscles with glycogen in preparation for a high-intensity endurance activity of more than 90 minutes.

Carbohydrate loading

Carbohydrate loading is a technique used to maximise the body's storage of glycogen in preparation for a high-intensity endurance activity of more than



Figure 7.4: Carbohydrate loading is much more than maximising carbohydrate intake.

90 minutes. Average muscle glycogen levels are approximately 100–120 mmol/kg, but can increase by up to one-third in response to carbohydrate loading. This is significant considering that glycogen is the most important fuel for endurance events.

Although popular for many decades now, the practice of carbohydrate loading has been modified in recent years. The technique originally required a depletion stage followed by a loading phase to ensure glycogen saturation. Depletion was achieved through hard training and diet modifications that restricted consumption of carbohydrate rich foods. A loading phase followed that involved the reverse — rest and a very high-carbohydrate loaded diet. While being nutritionally unsound, this method created problems for many athletes in that energy levels were markedly reduced following the depletion stage, leading to lethargy, irritability, poor concentration and possible lack of motivation. In some cases, glycogen stores were so low that the athlete was unable to recover full supplies before the event.

It is now believed that athletes involved in short-term, low-intensity activities do not need to 'glycogen load'. A normal diet supplies sufficient amounts. In the case of endurance athletes, muscle saturation of glycogen is best achieved through:

- a balanced diet that is high in carbohydrates, providing about 7–12 grams per kilo of body mass (weight). Complex carbohydrates such as breads, rice, grains and pastas are ideal. These may need to be ingested with simple carbohydrates such as soft drink, honey and jams to ensure carbohydrate intake is maximised.
- **tapering** of training for two to four days before competition, enabling glycogen supplies to maximise. People who need to carbohydrate load will already be involved in training schedules that regularly utilise stored glycogen, so the body's ability to store fuel will be greater than that of non-athletes (see figure 7.5).

Tapering refers to a period immediately before competition when the volume and intensity of training is reduced.



Figure 7.6: Carbohydrate loading can improve endurance performance.

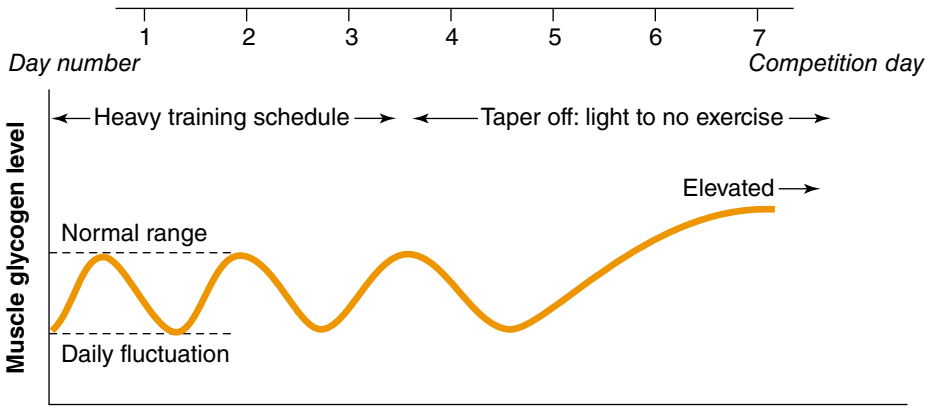


Figure 7.5: The modified carbohydrate loading program

Increased muscle and liver glycogen accumulated as a result of a proper carbohydrate loading program has a positive effect on endurance, improving performance in the order of about two to three per cent. This makes the practice a significant pre-competition strategy for activities such as triathlons, marathons, cycling and endurance swimming. However, it is important that procedures are fully understood and implemented effectively for full benefits to be realised. For instance, athletes who fail to taper, consume too much fibre or consume insufficient carbohydrate (preferring other nutrients instead) will fail to have glycogen reserves maximised during the loading process.

Fuelling for prolonged events — carbohydrate loading

During many endurance events, glycogen stores reduce to critically low levels, resulting in a reduction in power output and, possibly, skill. Starting the competition with elevated muscle glycogen stores can help postpone such fatigue. Carbohydrate loading increases muscle glycogen significantly (50–100 per cent) above normal resting values. This potentially results in a 20 per cent enhancement of endurance or, in fixed distance events, an improved race time of 2–3 per cent. It may also improve movement patterns and maintain skill at the end of prolonged team games.

Carbohydrate loading strategies have evolved significantly over the last 30 years. The most recent evidence suggests that optimal muscle glycogen levels can be achieved in well-trained athletes by combining an exercise taper with a high carbohydrate intake (7–12 grams per kilogram body mass). In most cases, 36–72 hours will be required to fully carbohydrate load.

Carbohydrate loading for endurance and ultra-endurance events

Aim for a daily carbohydrate intake of 7–12 grams per kilogram body mass over the period of loading. For example, an athlete of 65 kilograms might aim for a daily carbohydrate intake ranging from 455 grams to 780 grams. The following meal plan provides a guide to such targets.

Timing	Food item	Carbohydrate content
Breakfast	2 cups of cereal	50 g
	1 cup of skim milk	15 g
	2 large white toast slices	40 g
	1 tablespoon jam	14 g
	1 glass of juice	25 g
Snack	1 serve of protein powder drink	44 g
	1 glass of skim milk	15 g
Lunch	2 rolls with salad filling	60 g
	Banana	20 g
	1 tub of low-fat flavoured yoghurt	26 g
Snack	Sports bar	42 g
	600 mL sports drink	36 g
Dinner	3 cups of cooked pasta with tomato-based sauce	120 g
	1 slice of bread	15 g
Dessert	250 g tinned fruit	
	3 scoops of low-fat ice cream	35 g
		30 g
Approximate carbohydrate content of total diet		**587 g**

Source: Australian Institute of Sport, *Current Concepts in Sports Nutrition*, Australian Sports Commission.

Carbohydrate loading for endurance events has the benefit of delaying the point at which the muscles being repeatedly used run out of fuel. This is illustrated in figure 7.7, which shows that a high-carbohydrate diet can delay fatigue by an hour or more.

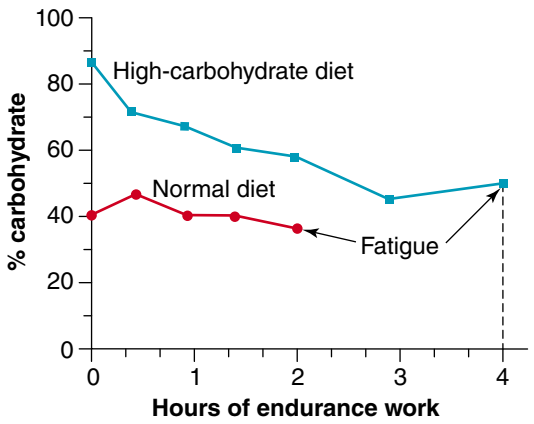


Figure 7.7: A high-carbohydrate diet delays the time at which exhaustion develops.
Source: E Fox, *Sports Psychology, 2nd edn.*, 1984, The McGraw-Hill Companies, Inc., p. 43.

During performance

Endurance events, particularly in hot and possibly humid conditions, can have a significant impact on the body's fuel and fluid supplies. In these events, the need for carbohydrate and **electrolyte** replacement depends on a number of factors including intensity, duration, humidity, clothing type and individual sweat rates.

Electrolytes are salts and minerals, such as sodium, potassium, calcium and magnesium, that are important for many body functions such as chemical breakdown and nerve conduction. Electrolytes can be lost through perspiration during exercise.

Nutritional considerations for performances need to address the following.

- The aim is to conserve muscle glycogen and maintain blood glucose levels.
- Carbohydrate supplementation is needed to avoid glycogen depletion. Be aware that at exercise intensities above 75 per cent of aerobic capacity, liquid carbohydrate feeding (sports drinks) can delay glycogen depletion by up to 30 minutes.
- Glycogen supplementation is not needed for low-intensity, short-duration exercise.
- Adequate hydration by regular fluid intake must be maintained. Athletes should have a fluid replacement plan that matches their body's requirements (see page 219) and the exercise duration and intensity. It is suggested that 200–300 mL of fluid, preferably in the form of a sports drink, be taken in every 15–20 minutes during exercise. Sports drinks contain liquid carbohydrate and serve both to hydrate and energise.
- An athlete should not wait until thirst develops before replenishing lost fluid.

To prevent thermal distress conditions during performance, adequate hydration is necessary. Hydration involves not only the supply of sufficient fluid, but also the development of mechanisms to keep fluid loss during exercise to a minimum. To ensure adequate hydration, athletes (and anyone exercising in the heat or for long periods) need to develop fluid intake and retention strategies that will prevent **dehydration**. The following are the most important.

Dehydration is an excessive loss of water.

- *Hydrate before, during and after physical activity*. Thirst is not a good indicator of the body's need for fluid; by that time, dehydration has already started to take effect.
- *Drink every 15 to 20 minutes while running*. Runners lose between three and five cups each hour, so it is important never to miss an opportunity to 'top up'.
- *Drink water or low-carbohydrate concentration sports drinks*. Cool plain water or sports drinks that have four to eight per cent carbohydrate concentration are recommended. Concentrations higher than eight per cent are not recommended because they slow the body's absorption rates.
- *Ensure that you have trained properly and acclimatised to race conditions*. Trained and acclimatised athletes are able to control their body temperature more effectively than those who are untrained and who have failed to acclimatise (see figure 7.8).
- *Wear clothing that 'breathes'*. Light 'airy' clothing promotes heat loss through convection and evaporation.
- *Avoid activity in times of high temperature and high humidity*. In zone 3 climatic conditions (as illustrated in figure 7.9), body heat cannot be lost through evaporation because the air is already saturated. Exercise is considered safe when the temperature is below 30°C and the relative humidity is below 90 per cent.

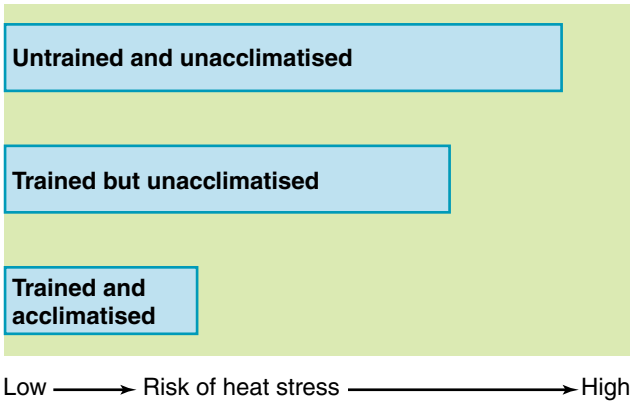


Figure 7.8: Training and acclimatisation are the key factors in controlling body temperature.

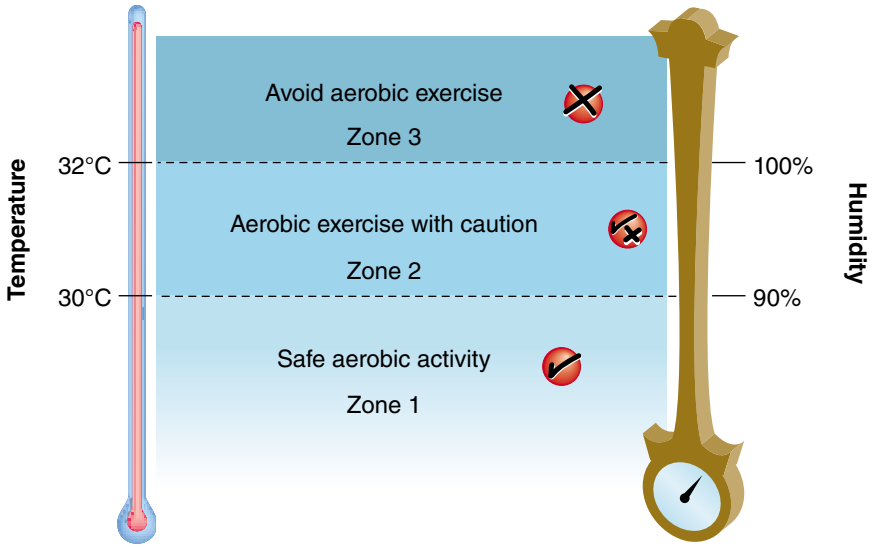


Figure 7.9: The combination of high temperatures and high humidity poses the biggest danger to athletes engaged in physical activity.

- *Avoid excess fat and any salt and alcohol (which act as diuretics).* The use of salt tablets is unnecessary and to be discouraged, because most people receive sufficient salt in their normal diet.
- *Do not run if suffering from fever.* The core body temperature is already elevated during fever, and physical activity increases the body temperature and endangers the athlete's life.
- *Learn to recognise the symptoms of heat stress.* The symptoms are chilling, unsteadiness, dry skin, loss of focus and profuse sweating.



INQUIRY

Fluid — who needs it?

Read the snapshot 'Fluid — who needs it?', then discuss the variables that would make the fluid replacement plan for an untrained 100 metre swimmer different from that of a trained marathon runner.

Fluid — who needs it?

Don't get into the habit of eating or drinking in a marathon race: some prominent runners do, but it is not beneficial. JE Sullivan, 1909

Fortunately, sports science has progressed a long way since then and we now know that the regular ingestion of fluids is essential for sporting performance.

Hypohydration (total body water below normal) impairs the body's ability to regulate heat, resulting in increased body temperature and an elevated heart rate. Perceived exertion is increased, causing the athlete to feel more fatigued than usual at a given work rate. Mental function is reduced, which can have negative implications for motor control, decision making and concentration. Gastric emptying is slowed, resulting in stomach discomfort. All these effects lead to impairment in exercise performance. Most types of exercise are adversely affected by hypohydration, especially when they are undertaken in hot conditions, and negative effects have been detected when fluid deficits are as low as 2 per cent (i.e. a deficit of 1.2 litres for a 60-kilogram athlete).

The good news is that by drinking regularly during exercise, athletes can prevent declines in concentration and skill level, improve perceived exertion, prevent excessive elevations in heart rate and body temperature, and improve performance — good justification for every athlete and coach to make fluid replacement a key priority during training and competition.

How much should athletes drink during exercise?

Fluid requirements vary remarkably between athletes and between exercise situations. Fluid losses are affected by:

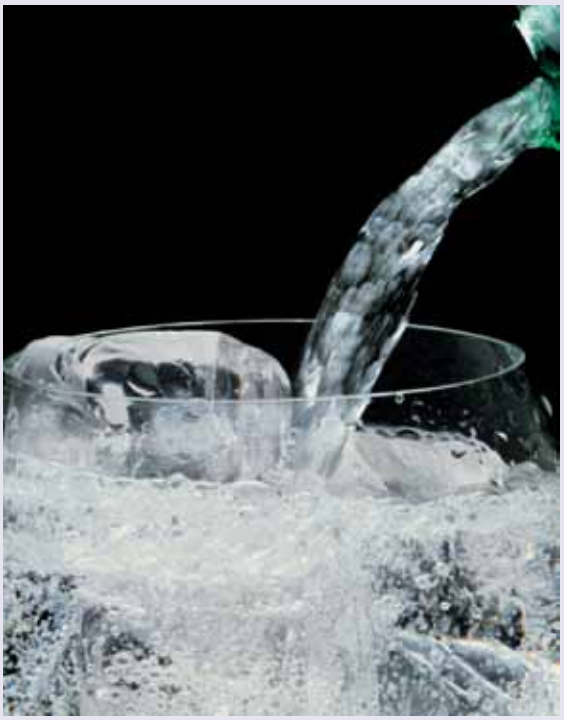
- genetics — some people innately sweat more than others
- body size — larger athletes tend to sweat more than smaller athletes
- fitness — fitter people sweat earlier in exercise and in larger volumes
- environment — sweat losses are higher in hot, humid conditions
- exercise intensity — sweat losses increase as exercise intensity increases.

It is impossible to prescribe a general fluid replacement plan that will meet the needs of all athletes. Fortunately, athletes can easily estimate their own fluid requirements by weighing themselves before and after exercise sessions. Each kilogram of weight lost is equivalent to one litre of fluid. Adding on the weight of any fluid or food consumed during the exercise session will provide an estimate of total fluid loss for the session. For example, an athlete who finishes an exercise session 1 kilogram lighter and has consumed 1 litre of fluid during the session has a total fluid loss of 2 litres . . .

Once an athlete's individual sweat losses are known, a plan can be prepared to help the athlete achieve better fluid replacement in subsequent exercise sessions. Fluid replacement plans will differ according to the athlete and the opportunities for drinking during the sport. However, where possible it is better to begin drinking early in exercise and adopt a pattern of drinking small volumes regularly rather than trying to tolerate large volumes in one hit. Most athletes can tolerate 200–300 millilitres every 15–20 minutes but tolerance will vary according to the exercise intensity.

How much do athletes actually drink?

Typically, athletes replace 30–70 per cent of sweat losses during exercise. Fluid replacement is an issue



(continued)

for all sports, including those such as swimming and water polo conducted in wet environments, and sports conducted in air conditioned stadiums . . .

What should athletes drink?

Research shows that fluid intake is enhanced when beverages are cool (~15°C), flavoured and contain sodium. This makes sports drinks an ideal choice during exercise. Sports drinks are not gimmicks. They are legitimate products that are well researched and proven to improve fluid intake and performance. A lot of science has gone into developing the flavour profile of sports drinks so that they encourage fluid intake during exercise. In addition, sports drinks contain carbohydrate at a concentration (4–8 per cent) that allows refuelling to take place during exercise . . .

Water is still a suitable option during exercise. However, water drinkers need to be aware that water does not stimulate fluid intake to the same extent as sports drinks. Drinking to a plan is therefore crucial when drinking water. Don't rely on thirst . . .

Source: Department of Sports Nutrition, AIS, www.ausport.gov.au/ais/nutrition.

Summary of fluid guidelines

- Begin each exercise session in fluid balance. This requires drinking regularly throughout the day leading up to training or competition. Have a drink with all meals and snacks.
- Immediately before exercise commences, consume 200–600 millilitres of fluid.
- Develop a plan for fluid intake for all exercise sessions longer than 30 minutes. Aim to match previous fluid losses as closely as possible (within 1 per cent of body mass). Take into account all the opportunities within the sport.
- Begin drinking early in the exercise session and continue to drink small amounts regularly. Sports drinks or water are the best options.
- Replace any residual fluid deficit after exercise. You will need to drink 150 per cent of any fluid deficit in the 4–6 hours after exercise to account for ongoing sweat and urinary losses. When fluid losses are high and/or rapid rehydration is required, sodium replacement may be required. Sports drinks, oral rehydration solutions and salty foods can all contribute to sodium replacement . . .

Post-performance

Proactive recovery emphasises immediate refuelling and rehydration that continues until a pre-event state is obtained.

A post-performance nutritional plan aims to return the body to its pre-event state as quickly as possible, enabling full training to resume in preparation for the next phase of competition. This is best achieved through **proactive recovery**. This means that refuelling and rehydration begin immediately and continue for 8–12 hours following the performance. This enables optimisation of body repair and regeneration processes.

Some find it difficult to establish an accurate amount of carbohydrate replenishment necessary to enable complete replacement of muscle glycogen stores. Research suggests that following endurance activity such as cycling or marathon running, a carbohydrate intake of 50–100 grams in the first two hours is highly beneficial. This initial intake is then followed by intakes of 50–75 grams every two hours until a total of 500–600 grams of carbohydrate has been consumed.

The best way to recover is to act quickly and eat food with high carbohydrate content. This is best achieved by:

The **glycemic index** is a ranking system for carbohydrates based on how they affect blood sugar level.

- immediately replacing depleted muscle and liver glycogen stores. An intake high in carbohydrate and inclusive of food and drinks with a high **glycemic index** (GI) is most beneficial. The positive impact of foods with a high GI relative to those with a low GI is illustrated in figure 7.10.

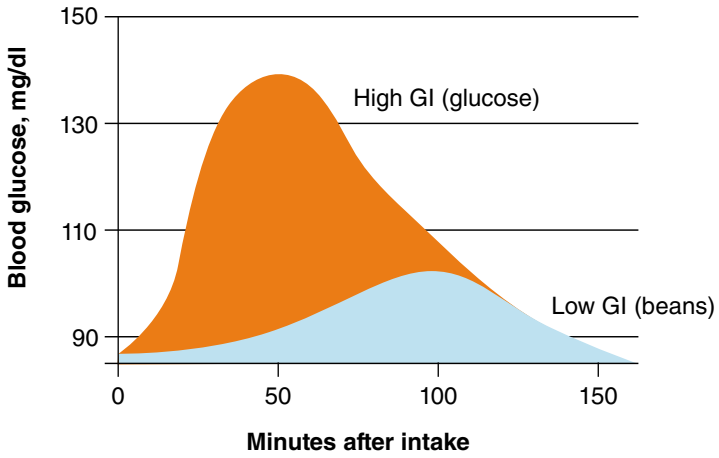


Figure 7.10: High GI foods raise blood glucose levels more and at a faster rate than low GI foods.

- rehydrating to replace fluid and electrolytes lost during the event. A program for rehydration requires special fluid intake (water/carbohydrate solutions of five to eight per cent) in quantities larger than normal as voluntary fluid intake in response to thirst is insufficient in the initial stages of recovery. Some researchers suggest consumption of up to 150 per cent of fluid losses to enable full recovery.
- active rest that enhances the manufacture of red blood cells, new proteins and specific cellular components damaged by stress-related movements.

INQUIRY

Dietary requirements of different sports

Draw an enlarged copy of the following table into your workbook. Choose three sports or activities that are different in their dietary requirements and performance needs. Choices may include activities or sports such as the City to Surf marathon, sprinting, discus throwing and basketball. Use the table to compare the before, during and after the event dietary requirements for athletes competing in these events.

	Sport 1	Sport 2	Sport 3
Pre-performance			
During performance			
Post-performance			

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INQUIRY

Nutritional considerations

Use the following mind map to summarise the nutritional considerations for before, during and after event performances.

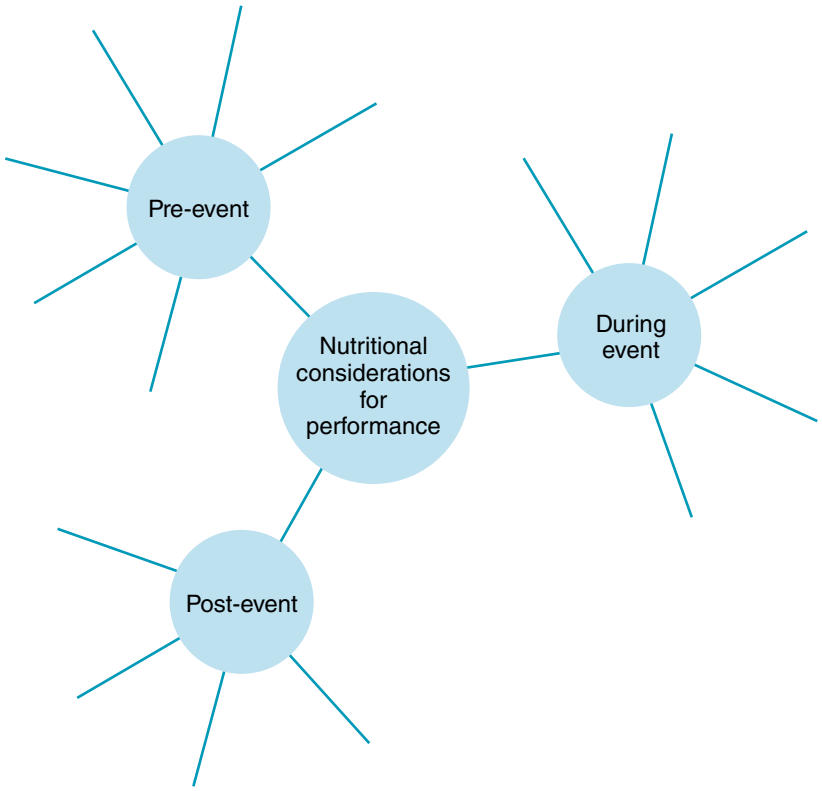


Figure 7.11: Nutritional considerations for performances



APPLICATION

Talk by an elite athlete

Invite an elite athlete to your school. It could be one of your ex-students who trains regularly and enters higher level competitions. Ask them questions about their training regime, nutritional consideration, pre-event, during event and post-event strategies and practices. Make notes and summarise your findings.



SUPPLEMENTATION

Dietary supplementation is found in many forms, including vitamins, minerals, protein, caffeine and creatine products. Supplement intake is routine for many competitors because it is believed to improve athletic performance. However, while perhaps supplying a psychological boost, supplements may be of little value if the diet is already well balanced in terms of nutritional requirements.

Vitamins

Vitamins are inorganic compounds that are essential to maintaining bodily functions.

Vitamins are required in only very small quantities in the body. They do not contain energy, but they function as catalysts that help the body use energy nutrients. In this capacity they assist such functions as energy release, metabolic regulation and tissue building.

The body is unable to manufacture vitamins, so diet must supply them. A balanced diet is important because food is the main source of vitamins.



Figure 7.12: The preferred source of vitamin intake is through a balanced diet. Super-supplements using capsules do not improve sports performance and can be dangerous to health.

However, some athletes are inclined to take supplements even though their normal diet contains all the necessary vitamins. If supplementation involves the use of multivitamin capsules that do not provide more than 100 per cent of daily requirements, then there is probably no cause for concern. However, such capsules can be expensive and wasteful, as the body has no use for and excretes most of the excess vitamins.

The intake of excessive quantities of vitamins (super-supplements or megadoses) is not only unnecessary but potentially dangerous. The body can store vitamins A and D, excess amounts of which may contribute to muscle and joint pain and headaches. Furthermore, overdoses of vitamin A can cause nausea, loss of appetite, fatigue and skin dryness. Some athletes feel that strenuous exercise produces stress, and may require antioxidant vitamins (specifically, vitamin C, vitamin E and beta-carotene). Research on the effects of megadoses of these vitamins is inconclusive at this stage. But it is known that super-supplementation does not improve performance. Fruits and vegetables are strongly recommended as ideal sources of antioxidants.

The value of a balanced diet is that the intake of vitamins is cheap, plentiful and regulated. Any need for supplementation is really a need to develop positive nutritional habits. Supplementation should not be a response to a desire for improved performance, but rather arise out of special needs — for example, ill health or the unavailability of a normal diet while travelling.

Minerals

Minerals are inorganic substances found in the body that are necessary for it to function adequately.

Like vitamins, **minerals** belong to the group of micronutrients that are essential for the body to function properly, but do not provide energy. Iron and calcium are the two minerals that are most commonly deficient in athletes, and inadequate supplies will affect performance and contribute to health problems.

Iron is found in haemoglobin, which comprises most of the red blood cells in the body. These cells collect and transport oxygen, delivering it to where it is needed. Diminished haemoglobin levels affect performance because the muscle cells are deprived of oxygen, which is needed to break down the nutrients and produce energy.

A condition commonly associated with activity is 'sports anaemia'. Most frequently experienced in the early stages of heavy training programs, it is characterised by a lack of energy and general fatigue. The condition tends to subside if training is gradual, progressive and supported by a balanced diet. It is unknown exactly why 'sports anaemia' develops. However, it is thought to be attributable to either a lower iron intake relative to the boost in exercise, or the body's use of protein for functions other than red blood cell production. Again, a balanced diet is an excellent source of iron. High amounts are found in lean meat, while grain products and dark, leafy green vegetables such as spinach and lettuce are other valuable sources.

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Figure 7.13: Examples of foods rich in iron

People most at risk of iron deficiency are:

- endurance athletes, as a result of sweat loss
- females, as a result of menstrual blood loss
- vegetarians, as a result of a lack of red meat in the diet
- adolescent males, as a result of a growth spurt.

Unlike iron deficiency, which impacts on energy supply, calcium deficiency is more specific to health. Calcium is vital for bone structure, making bones strong and healthy. The quality of bone tissue deteriorates gradually from the age of about the mid-twenties, and this contributes to osteoporosis (brittle bones), which can be experienced (particularly by women) later in life. Adequate calcium intake during childhood and adolescence has a positive effect on bone quality during later life. Important sources of calcium are dairy products, leafy green vegetables and fish such as salmon and sardines.

Again, athletes should look to dietary sources rather than supplementation to gain adequate calcium.

People most at risk of calcium deficiency are:

- females, as a result of an insufficient intake of dairy products
- females whose menstrual cycles have ceased, leading to a loss of calcium from bone tissue.

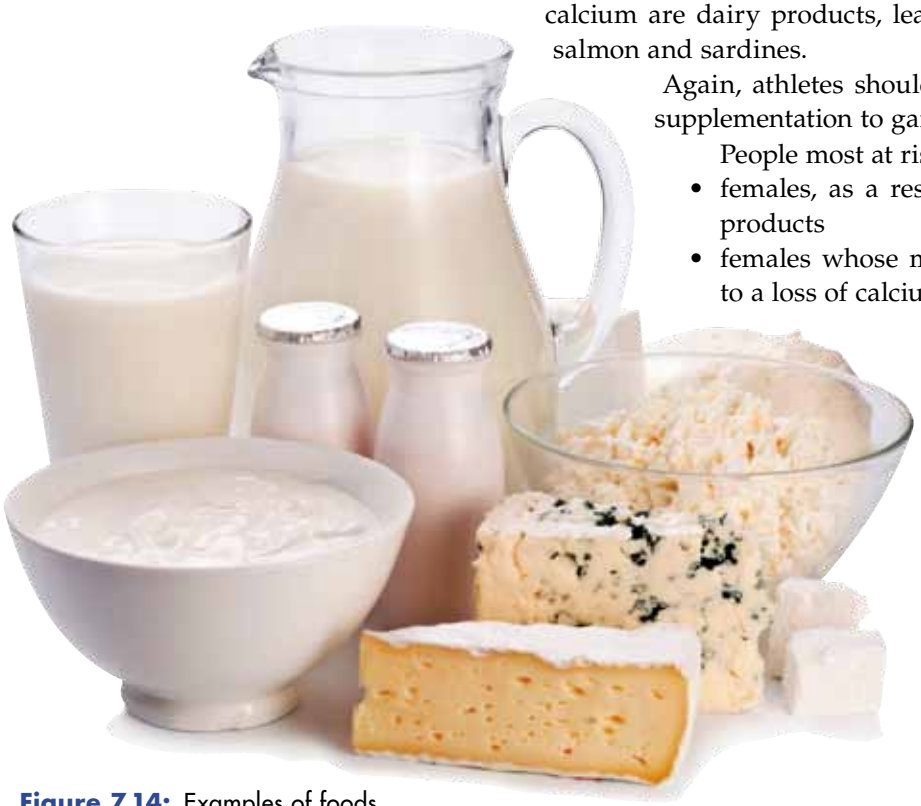


Figure 7.14: Examples of foods that are good sources of calcium

Protein

Protein supplements have had strong favour with weight-lifters, body builders and strength athletes for a long time. These supplements may be natural or synthetic and available in powder, fluid or solid formulations. Many athletes believe that protein supplements are important because of their muscle building qualities, with higher intake positively affecting muscle size. This belief stems from the accepted role of protein in the body.

Protein's primary importance to the body is its structural role in holding the cells together and in the growth, repair and maintenance of body tissue. It also has a functional role in hormone production and nervous system transmissions. Protein is composed of various types of amino acids. It can be a source of energy under extreme conditions, when carbohydrate and fat supplies are in very short supply or exhausted. Most people need to consume about one gram of protein for each kilogram of body weight. Well-balanced diets containing fish, chicken, red meat, cheese, breads, cereals and some types of bean contain ample protein.

It is well established that the general population consumes protein in proportions higher than required for general health maintenance. In the average Australian diet, 12 to 15 per cent of the recommended intake should consist of protein. Studies indicate that this level is easily achieved, with most people attaining 150 per cent of the recommended intake. Athletes, because of their high energy usage, may consume amounts in excess of this.

On the whole, research supports the idea that most athletes do not need or benefit from protein supplementation. While there may be a case to support some supplementation in specific cases such as strength athletes, endurance athletes in heavy training and possibly adolescents undergoing a growth spurt, the majority of the population, including athletes, are well served by a balanced diet. Surveys reveal that most athletes consume well in excess of 1.2–2.0 g/kg body mass per day, making supplementation both needless and wasteful. In addition, many protein supplements contain additives that have no health benefit and may increase the risk of certain cancers. Most agree that in the rare case that more protein is required, changes in the dietary balance is the preferred method of supplementation.

Furthermore, excess protein can negatively affect health. High amounts of protein can increase the amount of calcium excreted in the urine and possibly contribute to osteoporosis. Unlike carbohydrates that can be stored in the body, excess protein must be eliminated. The processing and filtration of additional urea can interfere with kidney function. Diets high in protein such as those containing large amounts of meat and dairy foods can contribute to obesity as a result of their high fat content. Of concern also is the fact that they may replace important foods such as fruits and vegetables, which provide both energy and most of the essential nutrients.



Figure 7.15: Examples of foods that are good sources of protein

Caffeine

While much of the evidence relating to caffeine and performance is still inconclusive, there is general agreement on areas relating to cognitive function, anaerobic performance and aerobic performance.

Caffeine does appear to improve cognitive processes, such as alertness. Many studies report improved concentration, 'clear headedness', improved memory and reasoning following consumption of mild amounts of caffeine. Similarly, studies agree that caffeine does not appear to enhance performance in short-term high intensity activities such as sprinting. Some studies report the **diuretic** properties of caffeine, suggesting that it should be avoided as it may contribute to dehydration. This might be the case for athletes working in hot, humid environments, but in general, for athletes accustomed to its use, the link with dehydration is not well supported.

A **diuretic** is a drug that increases the amount of fluid (water and urine) passing from the body.

Caffeine has **ergogenic aid** properties, which means that it improves performance by assisting specific metabolic processes. The most favourable evidence supporting ergogenic aid properties of caffeine relates to endurance sports such as marathon running. In the case of endurance performance, it is the ability of caffeine to mobilise fat stores in the body and convert them into free fatty acids that is important. Working muscles oxidise free fatty acids, making them a usable source of energy. It is believed that caffeine promotes 'glycogen sparing', a process whereby fat is metabolised early, sparing finite reserves of glycogen and subsequently prolonging the point at which exhaustion will occur. Research suggests that glycogen sparing is most significant in the first 15 minutes of sustained endurance activity where it is reported that glycogen consumption can be decreased by as much as 50 per cent under normal circumstances.

An **ergogenic aid** is a substance or practice that improves or is believed to improve physical performance.



Caffeine and performance



Use the **Caffeine** and health weblink in your eBookPLUS and read the information on caffeine and health, including its effects on physical performance. Summarise the pros and cons associated with caffeine use to improve physical performance.

Creatine products

The body has two sources of creatine — production by body cells and food intake, particularly from meat. Food intake in a normal diet accounts for about one gram of creatine per day. It is in the muscle that creatine is converted to creatine phosphate and thereafter assists in the resynthesis of ATP. It is therefore important in making energy available to sustain short duration explosive activity such as weight-lifting and sprinting. Because creatine cannot be stored in the body, the idea of supplementation is supported by many athletes, particularly those who are involved in predominantly anaerobic programs.

While manufacturers of creatine products continue to market its performance enhancing properties, including increasing strength, delaying fatigue and burning fat, many researchers have found little, if any benefit. For instance, there is no evidence so far to support the claim that fat metabolism is improved. The body is unable to store excess amounts of creatine so supplementation has little effect on athletes who already consume high amounts of protein.



Figure 7.16: Creatine supplements are readily available, but their perceived benefits and possible health risks are still the subject of research.

Where muscle creatine storage levels are low, as might be the case with vegetarians, there may be a case for limited supplementation. Where this occurs, small amounts (two to three grams) taken a couple of times each day and co-ingested with carbohydrate and water provide the best results. Use of creatine products can raise creatine levels in muscle by 20–30 per cent, but this happens only if there is a considerable gap between the existing level and the point of saturation. Again, the benefits, while only marginal, will be with those in explosive type activities rather than those in endurance type events.

Some users of creatine products believe the substance might be directly related to muscle cramps. Others believe that, while true, this is probably the result of excessive doses rather than the specific properties of creatine. Creatine supplementation also causes increases in weight, a reason why some athletes avoid the product. On the positive side, research has established that muscle hypertrophy is more easily achieved when training is assisted by creatine supplementation, hence its popularity with strength trainers.

Much is still inconclusive in regard to creatine supplementation. While there may be some benefits in assisting some anaerobic based activities, little else may be gained from consumption. While there is probably no harm in small doses for exercising athletes, larger doses of creatine may have health risks including the possibility of developing renal disease.

INQUIRY

Cases for and against using supplementation

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In your workbook, enlarge the following table. Complete it by analysing evidence for and against supplementation to improve performance. Use the **Supplementation** weblinks in your eBookPLUS to assist you in developing your arguments.

The case FOR supplementation	The case AGAINST supplementation

RECOVERY STRATEGIES

study on
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Recovery strategies aim to ensure that the athlete is able to resume normal training and competition within the time span of the training program. Workouts and performances can weaken athletes, even those who are hardened, well conditioned and well prepared.

Active rest is still regarded as the most beneficial form of recovery. Rest allows both physiological and psychological revitalisation to take its course. During rest, muscles repair and rebuild while energy and fluid levels are restored to pre-event levels. Recovery is important to avoid symptoms of overtraining that may be evident in feelings of staleness, lack of interest and an inability to put in effort despite wanting to do so. The difference between programs that target active or accelerated recovery as opposed to programs that do not is illustrated in figure 7.17.

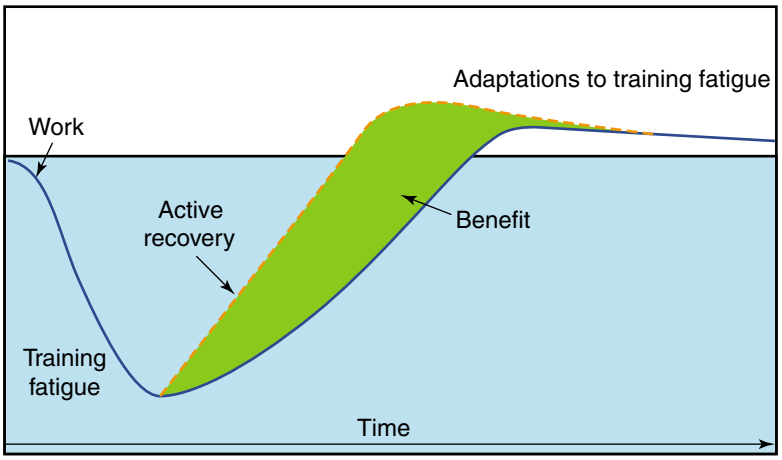


Figure 7.17: The pace at which adaptations take place is increased by using positive recovery strategies.

Recovery can be short term or long term, depending on the type of event or activity. Short-term recovery refers to the period immediately following training, game or performance. Short-term recovery requires activities such as cool-down following training, together with low intensity exercise to promote soft tissue repair and disperse lactic acid. The nutritional component of this period of recovery is characterised by replacement of fluid and energy supplies as quickly as possible.

Long-term recovery refers to recovery between competitions or following periods of peaking where the body needs to be rested from the demands of regular training. Long recovery periods are part of the annual plan in advanced training programs. An example is rugby league footballers having an extended break from training in the period following the grand final. Nutritional goals for long-term recovery relate to a continuation of healthy eating practices and avoidance of weight gain despite lower activity levels.

Recovery strategies can be categorised as physiological, neural, tissue damage or psychological. Elite athletes use a range of strategies designed to enable them to resume full training in the shortest possible time.

Physiological strategies

Physiological strategies need to focus on two elements — the removal of metabolic by-products and a nutritional plan to replace lost fluids and energy-rich nutrients. An effective cool-down is the recommended manner for removal of metabolic by-products.

Cool-down

The purpose of a cool-down following exercise is to gradually reduce heart rate and metabolism to the pre-exercise state. In doing this, a number of other elevated body functions, such as ventilation rate, blood distribution and adrenaline levels, gradually return to normal.

Vigorous or sustained exercise that is not concluded with a cool-down may result in blood pooling, causing dizziness. A proper cool-down also assists in the removal of waste products including lactic acid, which contributes to muscle stiffness and soreness. It may also assist in preventing muscle spasms, cramps and possibly assist in preventing delayed onset muscle soreness (DOMS).

While the cool-down needs to be active, it should also be gradual. An effective cool-down should consist of 5–10 minutes of walking/jogging/slow swimming, with the aim of slowly returning the body to pre-exercise temperature. Also important is static stretching. Muscle fibres involved in exercise tend to shorten and may lose alignment as a result of aggressive movements. Static stretching assists in lengthening, relaxing and realigning muscle fibres, making the normal range of movement easier to accomplish.

Some athletes now use compression garments as part of their cool-down procedure to assist the dispersion and removal of metabolic waste. Research suggests that wearing compression garments during the recovery period may have considerable physiological benefits. These include:

- improved blood lactate removal
- reduced symptoms associated with delayed onset muscle soreness (DOMS)
- less swelling in muscles and joints
- reduced muscle fatigue
- reduced sensations of post-exercise soreness.



The cool down

1. Use a table like the one below to construct a cool-down program consisting of five different activities for an athlete in each of the sports listed.

Shot-put	Touch football	Endurance swimming
1.	1.	1.
2.	2.	2.
3.	3.	3.
4.	4.	4.
5.	5.	5.

2. Comment on the need to make cool-down programs specific to the type of activity.

Nutritional plan

A sound nutritional recovery plan addresses both fluid and solid intakes, with some products having the advantage of catering for both areas.

Fluid recovery

Effective measures to address dehydration need to be taken as part of pre-event and during event management plans. Despite this, the body loses considerable

fluid in endurance events posing the threat of dehydration. Dehydration is characterised by:

- an increase in pulse rate
- an increase in core body temperature
- a decrease in blood pressure
- a decrease in water in the cells
- a gradual decline in circulatory function.

The amount of fluid loss varies from one individual to another and is influenced by altitude, temperature, exercise intensity, exercise duration and sweating. Thirst is not a good indicator of dehydration as fluid losses can advance more rapidly than the thirst mechanism can adjust. Urine that is dark in colour is a good indicator of dehydration. If this occurs, fluid needs to be consumed until urine colour turns pale or slightly yellow.



Figure 7.18: Recovery of fluid losses is important to prevent dehydration.

Elite athletes weigh themselves before and after exercise, the weight difference representing fluid loss. Extended exercise in normal conditions can result in the loss of 0.5–1.5 kilograms of fluid per hour, or more than two per cent of body weight. In this case, drinking 600 mL for every half kilogram lost is recommended. However, as a general rule, drinking with intermittent sipping over an extended period gradually replaces lost fluid. Severe dehydration may require 24–48 hours to enable fluids to be totally replaced.

The type of drink chosen can also enhance the hydration process. Real fruit juices and milk drinks are encouraged along with drinks such as Gatorade because of the potential to replace a full range of nutrients including carbohydrates, vitamins and potassium.

Fuel recovery

Many athletes find it difficult to consume large amounts of foods immediately following a game or extended period of exercise. However, the need to replenish depleted glycogen and blood sugar in the first 30 minutes to two hours following exercise is of paramount importance to fuel recovery. During this period, muscles are most receptive to glycogen enrichment. If fuel recovery is postponed for more than two hours up to 50 per cent less glycogen is absorbed by fatigued muscles.



Figure 7.19: Glycogen recovery is greatest if fuel is replaced within two hours following exercise.

Research with athletes suggests that consumption of at least 50–100 grams of carbohydrate within two hours of intense exercise is necessary to initiate fuel replenishment. Some protein should also be ingested, but the ratio of carbohydrate to protein should be in the order of 4:1. Some protein is important because the amino acids repair damaged tissue. Further, protein enhances insulin supply, which increases the ability of muscles and the liver to store glycogen. However, excessive protein intake at the expense of carbohydrate is not recommended because of its inability to replenish glycogen.

In general, a high carbohydrate diet that is balanced in terms of macronutrient energy supply (carbohydrates, protein and fat) is recommended during exercise recovery. The focus on carbohydrate-rich food should continue for days if endurance exercise such as cycling or long distance running contributed to fuel losses. Examples of carbohydrate-rich foods and drinks include fruit juices such as orange juice, rice, pasta, bread, milk, yoghurt and fruit (fresh and dried).

Neural strategies

Neural strategies such as hydrotherapy and massage aim to relax muscles that have been fatigued or damaged as a result of high intensity exercise. Strenuous exercise affects the central nervous system and this may contribute

to fatigue. Neural strategies, integrated with other recovery strategies, have become popular in recent years, particularly with teams involved in collision sports such as rugby league.

Hydrotherapy



Figure 7.20: Indoor heated pools provide an ideal setting for hydrotherapy.

Hydrotherapy involves the use of water to relax, soothe pain and assist metabolic recovery. Water provides support for movements, and eliminates jarring and straining movements that are associated with land drills and field exercises. Typical hydrotherapy methods involve use of steam rooms, spas, underwater massage (for example, a spa with jets) and heated swimming pools.

With hydrotherapy, active exercise can be incorporated through use of gravity assisted movements such as jumping. Swimming, assisted flotation exercises and even movements such as sprinting, jogging and combat exercise can be performed in a gravity assisted environment, lessening the risk of injury. Sports centres with heated swimming pools are ideal for hydrotherapy sessions. In some cases, hydrotherapy can be used in conjunction with cryotherapy (use of cold) techniques to help accelerate blood flow.

Three popular hydrotherapy techniques used with elite athletes are:

- hot water immersion (HWI)
- cold water immersion (CWI)
- contrast water therapy (CWT).

Hot water immersion causes dilation (widening) of blood vessels in the body's extremities. As the temperature of the body's surface area increases, blood flows more freely to the limbs, lowering blood pressure and enhancing the removal of waste.

Cold water immersion has the opposite effect on blood flow. Immersion in cold water (usually about 10–15 °C) causes blood flow to the extremities to be reduced. This occurs due to decreased heart rate and constriction of the blood vessels in response to the sudden drop in temperature.

Best results are obtained when HWI is alternated with CWI in what is called *contrast water therapy*. Here, the athlete moves between pools or showers that that are either hot or cold. This practice enhances the cycle of blood vessel dilation/constriction thereby increasing blood mobility through the tissues. This causes a more rapid dispersal of waste, reduces muscle soreness and promotes a faster recovery.

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APPLICATION

Hydrotherapy session

Contact a sports centre and organise a hydrotherapy session in a heated swimming pool. In small groups, plan a range of activities such as swimming without using leg movement and relay running. At the conclusion, evaluate the session in terms of perceived benefits to sportspeople who have just finished a game or gruelling endurance session.

Massage

Sports massage can be performed prior to or following an event. It is a specialised form of massage because, used as a recovery strategy, it serves a number of purposes. Used post-event, sports massage extends from the cool-down, focusing on body and mental relaxation. This is important as exercise induced



Figure 7.21: Many different types of massage are used by sportspeople.

tension can cause stress on joints, ligaments, tendons and muscles. By providing this level of support, the most important contribution of massage could well be in the form of injury prevention.

Post-event massage claims to help relieve swelling, reduce muscle tension, assist in eliminating toxic by-products, promote flexibility and generally prepare the athlete for the next training session or performance. Recovery strategies may necessitate an additional form of massage called rehabilitation massage where the focus is on injury treatment, specifically cramps, muscle damage, ligament repair, bruises, aches, general discomfort and soreness. Properly used, massage shortens the recovery time between training workouts and events.

Massage needs to directly address the needs of the athlete arising from the demands of the sport. Depending upon the sport and the stress it imposes, different muscle groups need to be addressed. For example, a netball centre court player who spends considerable time leaping, passing, sprinting and changing direction has different massage demands to a cyclist.

Massage therapists have a range of techniques they can utilise, some of the more popular methods being compression massage, cross-fibre massage, Swedish massage and tender point massage. Use the **Massage** weblink in your eBookPLUS to find out more about these and other forms of massage.

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Tissue damage strategies

Cryotherapy involves the use of cooling to treat injury or quicken recovery from performances, particularly those that involve collisions and/or sustained intensity.

Tissue damage may be minor, as in the case of soreness, or more long term as might be the case with bruising or muscle tears. Various forms of **cryotherapy**, which involves the use of cooling, have become popular in this recovery strategy.

Ice is the most used form of cryotherapy because of its ability to slow down the tissue inflammatory process, preventing the build-up of waste. If this is not removed quickly, it contributes to muscle soreness and stiffness and reduces flexibility.

The ICER principle, used in the rehabilitation of soft tissue injury without the initial REST is frequently used, even if tissue damage has not occurred. Using a damp cloth to avoid direct contact, apply ice on and off for 10-minute intervals, for up to 40 minutes (10 minutes on followed by 10 minutes off, then 10 minutes on and 10 minutes off again). The process can be repeated periodically for a day or two, particularly if injury to the area is evident. Compression, elevation and rest are also used to enhance recuperation. See chapter 11 for more details on RICER.

Ice baths have become popular in sports like touch football, rugby, soccer and endurance racing. This technique calls for immersion of affected body parts (often most of the body) in a bath of ice for a short period of time. Cold baths work on the principle that decreased temperature contracts blood vessels, decreasing their diameter. On emerging from the bath, the body warms and blood vessels enlarge. This allows fresh, oxygen-rich blood to flow into the muscles, stimulating recovery. As the plunge into an ice bath presents quite a shock to the body, short periods of one minute are recommended initially, building to longer periods as the body gradually adapts.

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Figure 7.22: Ice baths and ice packs are commonly used as part of cryotherapy techniques.

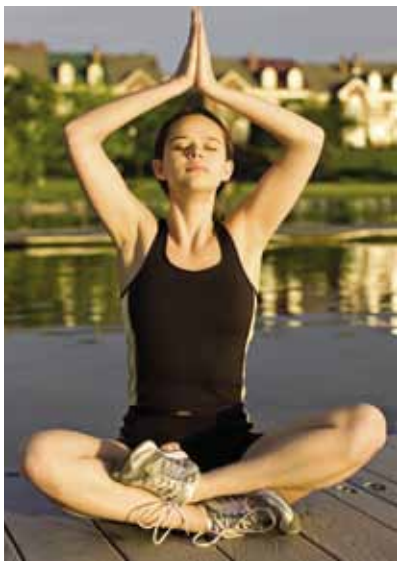


Figure 7.23: Relaxation is an important psychological recovery strategy and may require considerable experimentation to find the most rewarding method.

Psychological strategies

While many of the strategies discussed provide significant physiological benefits, relaxation techniques target both the body and the mind. Following hard training and demanding performances, athletes may experience symptoms of low concentration, lack of motivation and increased levels of anxiety. Use of psychological strategies represents an important phase in emotional and possibly spiritual recovery.

The choice of relaxation method(s) is quite individual and involves experimentation to establish which technique works best. Debriefing sessions and performance evaluations are necessary but must be positive, focusing on the process and not the outcome. Mind relaxing activities such as reading, listening to music, and watching movies or television are helpful and used by most athletes. The benefits of other more specialised psychological techniques such as progressive muscular relaxation, flotation, meditation, visualisation, centred breathing and positive self-talk are realised if practised frequently. Some physical/social activities such as light cross-training and/or golf are preferred by others.

A body that harbours mental or physical tension is not able to sleep and experience full recovery. Adequate sleep is still regarded as probably the most important recovery strategy, although too much sleep can be detrimental, contributing to feelings of sluggishness and lethargy. Relaxation techniques reduce tension, thereby facilitating both physical and psychological recovery.



INQUIRY

Features and benefits of recovery strategies

Make an enlarged copy of the table below in your workbook. For each of the listed recovery strategies, provide examples and outline their main features. In the right column, suggest benefits to performance. The websites listed in the **Recovery strategies** weblinks in your eBookPLUS may assist you.

Recovery strategy	Examples and features	Benefits
Physiological		
Neural		
Tissue damage		
Psychological		

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See more
Decision making



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INQUIRY

The ten top recovery strategies for training and racing tips

Read the snapshot 'The ten top recovery strategies for training and racing tips.' Then imagine a scenario where you are in training for a half marathon and will compete in a couple of weeks. You now need to get your recovery strategies organised so that you are well prepared for the day. Review the following recovery strategies and select the 6 that you feel would be of most benefit. Rank your 6 from *absolutely essential* to *least essential* and then justify your ranking.

SNAPSHOT

The ten top recovery strategies for training and racing tips

1. Skins™ Recovery Garments have some great research behind them in promoting recovery by helping flush out the waste products caused by exercise that cause the muscle soreness. Great to wear after hard sessions or even to sleep in, and definitely travel in. I never thought I'd see the day when big, tough footy blokes would voluntarily wear tights, but it's definitely here, so come and join the fun and do what the pros do.
2. Sleep — ex AIS recovery expert Angela Calder recommends good quality and enough sleep as the most important passive form of recovery. When training hard 8–10 hours is recommended per night, however in real life very difficult to get. Do your best!
3. Ice baths — great for flushing out these same waste products out of your legs. The idea is to cause your blood vessels to constrict in the cold water, and then straight away immerse in warm water which quickly dilates the blood vessels. The ice bath for best results should be at a temperature between 10–15 degrees, but real men have it much colder. 1 min in the cold and 1–3 mins in the hot, and repeat three times.
4. Pool sessions — Spending time in the pool immediately after training is good in so many ways. The cooling of the water reduces the micro swelling and muscle damage caused through exercise, that's why you see footy teams half in the water on the freezing days in winter the day after their match. Better done straight after the match or run, but you get the idea. The increased pressure of the water helps push the waste products out of the legs and the movement in the water helps mobilise the joints.
5. Recovery days — for all athletes and exercises it is recommended to have at least one full day off training each week. Your body and mind needs rest to improve from training. That's right I'm telling you to have a rest and don't feel guilty about it!
6. Offload weeks — similarly with the rest day all athletes and trainers need to cycle in recovery weeks to their training. A basic rule is to decrease the volume or mileage in training whilst maintaining the intensity. Sorry no rest here. Every fourth week works well, they help by reducing the risk of illness, injury and refreshes you mentally so you are ready to rip into training the next week.
7. Icepacks and frozen peas — for any injuries, even mild ones. Elite sportsman will ice injuries up to ten times in a day for the first 48 hours. Frozen peas are the best ice pack of all times because they mould into shape beautifully and can be refrozen. Please don't eat after several uses.
8. Fluid intake and hydration — eating and drinking for improved physical performance is so different to eating for weight loss. I need you to fully recover from each training session as quickly as possible so you get the best out of every training session. Re-fuelling immediately after training with a carbohydrate and protein source is critical to get the recovery process started. Hydration or drinking fluid is so important, your body can't function anywhere near it's best when dehydrated,

and research tells us 95% of the world's population is chronically dehydrated. That means, yes, you and I don't drink enough.

9. Massage — although there is not a great deal of research to suggest this helps greatly in recovery, it is the most popular and by far the most enjoyable and easily my favourite.
10. SKINS Recovery Tent — get yourself to the SKINS recovery tent after the SMH Half Marathon for your massage, stretch down and Gatorade and a few little surprises. You will feel a million dollars after a visit there. I may not win the half marathon, but I will win the race to the recovery tent!

Source: Sydney Morning Herald, May 19, 2013.

SUMMARY

- Nutritional considerations that affect performance need to address pre-performance, during performance and post-performance aspects.
- Carbohydrates and water are essential components of any pre-event meal. The necessary quantity depends on factors such as activity duration, climatic conditions and body size.
- During events, nutritional considerations relate to maintaining hydration levels and enriching glucose levels if performances are extended.
- The post-event focus should be on high fluid intake coupled with a food intake with a ratio of 4:1 carbohydrate to protein. The first two hours following exercise is the most important refuelling period.
- Carbohydrate loading is important for endurance events. However, the athlete should achieve glycogen saturation by tapering their training intensity and increasing the carbohydrates in their diet. The traditional method of carbohydrate depletion followed by carbohydrate loading should be avoided because it is nutritionally unsound.
- Adequate fluid is essential because it is a component of blood plasma volume. Inadequate fluid intake leads to dehydration.
- Vitamin supplementation is usually unnecessary because the body obtains sufficient vitamins through a normal diet. However, athletes need to ensure adequate intake of iron and calcium, because they sometimes suffer 'sports anaemia' and low levels of calcium for various reasons.
- The perceived benefits of supplementation, specifically protein, caffeine and creatine, relate mostly to the type of event and individual circumstances. If protein and creatine levels in the body are satisfactory as a result of a balanced diet, supplementation can be a waste of money.
- There may be some advantage in supplementing caffeine, particularly in aiding endurance performance. Caffeine assists 'glycogen sparing', which preserves glycogen stores, enabling effort to be sustained for a longer period of time.
- To maintain body temperature, the athlete must be aware of strategies that conserve body fluid and adopt practices that replace fluid. Endurance exercise results in dehydration, which can have serious health effects.
- Adequate hydration requires the consumption of fluid before, during and after exercise. Fluid losses greater than one per cent affect performance, while progressive fluid loss adversely affects health.

- Neural strategies, such as hydrotherapy and massage assist in waste disposal within muscle, ensuring an uninterrupted continuation of the training program.
- Cryotherapy uses cold in the form of ice packs and ice baths to assist in eliminating metabolic waste following strenuous exercise.
- Psychological strategies such as relaxation are as important as physiological strategies in completing total recovery following strenuous activity.

QUESTIONS

Revision

1. Describe the nutritional considerations of which an athlete must be aware prior to performance. (H8) (3 marks)
2. What are the key pre-performance considerations of which an athlete must be aware? (H8) (3 marks)
3. What is carbohydrate loading? How can it be used in designing programs to improve endurance performance? (H11) (4 marks)
4. Establish the basic differences between a pre-event and post-event dietary intake for endurance athletes. (H16) (3 marks) (2 marks)
5. Outline the importance of fluid and carbohydrates to endurance performance. (H8) (2 marks)
6. What is glycogen sparing? How does it work to conserve fuel during endurance events? (H7) (3 marks)
7. Discuss strategies that athletes may adopt to counteract the effects of dehydration during endurance events. (H17) (5 marks)
8. Discuss the basic requirements of a diet that would support a sustained training program and suggest how it differs from a normal diet. (H7) (5 marks)
9. Vitamin and mineral supplementation is common, although unnecessary in many cases. Discuss situations in which supplementation of vitamins and minerals could be an advantage to the athlete. (H17) (4 marks)
10. Comment on the effect of protein supplementation on performance. (H8) (2 marks)
11. Analyse why caffeine may have a positive effect on endurance performance. (H8) (5 marks)
12. 'Creatine supplementation is a waste of money.' Discuss. (H17) (4 marks)
13. Explain the importance of cool-down in recovery from physical exertion. (H10) (3 marks)
14. Use examples to suggest why neural strategies might assist in recovery from exercise. (H10) (6 marks)
15. How does cryotherapy assist in rehabilitating tissue damage? (H10) (2 marks)
16. Use examples to describe psychological strategies that athletes use in recovery from strenuous activity. (H11) (5 marks)

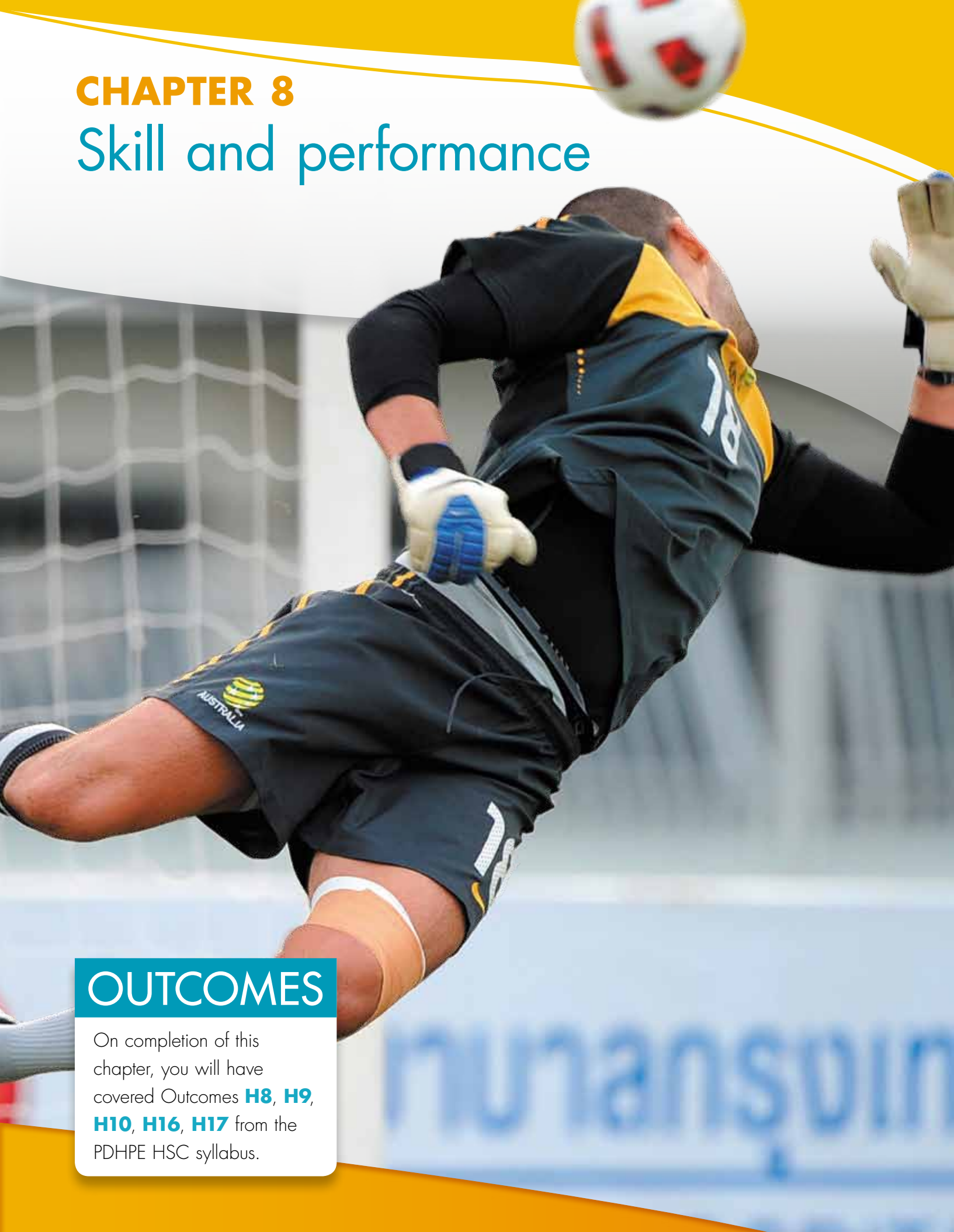
Extension

Outline the nutritional and hydration strategies a triathlete needs to adopt before competing in an event held on a summer's day. (H17) (8 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 8
Skill and performance



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H8**, **H9**, **H10**, **H16**, **H17** from the PDHPE HSC syllabus.

Acquisition is gaining possession of something.

Skill is the ability to consistently perform movements with control and precision. The **acquisition** of skill is a gradual developmental process that requires that our cognitive (thinking) processes work with our physical abilities to learn how to perform movements that previously were unfamiliar to us. Part of the physical learning process is the gradual development of our sensory awareness, as our ability to execute movement changes from being a conscious to an unconscious effort.

The pace of skill acquisition varies from one learner to another. Underlying problems such as lack of coordination, poor acceleration or slow reflexes may make progression from basic to movement mastery slow and possibly difficult. Again, inherent (inherited or inbuilt) and other factors such as age, sex, ability, motivation, environment and our cognitive processes markedly affect the rate of skill acquisition. Understanding factors that influence skill acquisition is an important step in performance improvement.



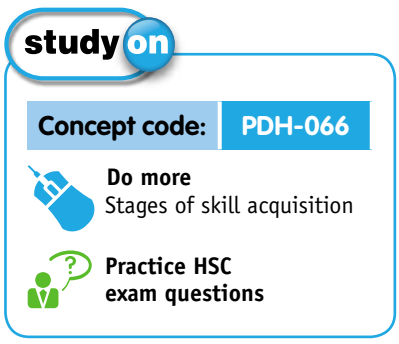
Figure 8.1: Acquiring skills is not a straightforward process and learners may encounter obstacles along the way.



STAGES OF SKILL ACQUISITION

The learning of motor skills has been categorised into a three-stage process:

- the cognitive or planning stage
- the associative or practice stage
- the autonomous or automatic stage.



Cognitive stage

Cognitive refers to mental processing of information, thinking and understanding.

The first stage of skill learning is the **cognitive** stage. The fundamental requirement here is that the athlete gains an understanding of the task required. This necessitates knowing what to do and an insight about how to do it. Conceptualisation — or the generation of clear mental pictures of the task — is essential for good movement reproduction. Demonstrations, videos and information highlighting the important points can help guide the learner through the skill. However, coaches must be careful to avoid 'information overload', which would confuse the learner.

It is expected that the learner will encounter problems, the number and magnitude of which will depend on the difficulty of the skill. The learner may experience error, awkwardness and some disorientation. Thus, learners must receive continuous feedback or information on their progress. If they



Figure 8.2: Learning what is involved in hitting a golf ball is characteristic of the cognitive stage of learning.

Associative means connecting or linking ideas.



Figure 8.3: The ability to perform a skill usually improves with practice.

Autonomous means being in full control of actions so they become automatic.



Figure 8.4: Eventually the learner can perform the skill automatically.

experience much difficulty, the skill could possibly be broken into smaller movements for practice. During this stage, the learner should experience some success. All positive learning should be reinforced and encouraged. Many coaches give drills at this point to improve the learner's coordination and feel for the desired movement.

Rates of progress through the cognitive stage vary from one individual to another. Much depends on how the sequences of skill building are organised, both physically and in the mind of the learner. Depending on the difficulty of the skill (or complexity of the task), it could be learned in anything from a few minutes to a much longer period. Some difficult skills (such as handstands and somersaults) may never be mastered by some people.

Associative stage

The second stage of skill acquisition is the **associative** stage, which is identified by an emphasis on practice. The learner, having acquired an idea of what the skill is, needs to repeat the movement to enhance the synchronisation of their mind and muscles. Errors still occur, but are smaller and less frequent than in the cognitive stage. Feedback is again essential to improve the skill, which the learner repeats frequently in practice. A sense of fluency or smoothness develops as the learner's kinaesthesis (sense of movement) improves.

Practice improves the way the skill is performed. The learner eventually experiences some success; for example, a basketballer gains assurance as he/she develops the ability to dribble with left and right hands. These successes are felt more frequently with additional practice and feedback. Gradually, the learner feels more at ease as their confidence increases.

Learners can remain at this stage for a long period, even years. Some may never progress to the next stage. However, given sufficient practice, most reach the level at which the skill execution is reasonably automatic. But this does not imply perfection, because performances at the autonomous level vary in their quality.

Autonomous stage

The third stage of skill acquisition is the **autonomous** stage, which is characterised by the ability to automatically execute the skill. Execution of the movement is now properly sequenced and performed instinctively. The performer has consolidated the many discrete skills (commonly called subroutines) that comprise the action. Their movement has a characteristic fluency as the subroutines sequence and blend in aesthetically pleasing motions. This is referred to as *temporal patterning*. The movement looks good because it is efficient, with the muscle groups working in order and producing only the necessary movements at the required time.

The most important feature of performers in the autonomous stage is that they are able to attend to other cues while giving little thought to how to perform the skill. In a netball game, for example, the problem is not how to make a pass, but who to pass to and what type of pass to make, considering the position of the defence. Practice is still important during the autonomous stage, but mostly involves simulating the competition situation. Unless specifically practised to improve technique, training sessions for an athlete at this stage should incorporate pressure drills. This helps the athlete adapt their skills to the real performance.

Table 8.1: The three stages of skill acquisition

Cognitive stage	Associative stage	Autonomous stage
Identified as the basic or understanding stage of skill learning	Identified as the intermediate or practice stage of skill learning	Identified as the advanced stage at which skills are performed reflexively
Focus on *what* to do	Focus on *how* to do the skill	Focus on *other tasks*
Frequent large errors	Some errors but not so large	Few errors
Learner is often unable to recognise error.	Learner is able to recognise errors.	Performer is able to detect and correct errors as they occur.
Learner needs to see, feel and experience the movement.	Learner needs to practise.	Performer needs to adapt the movement to pressure situations.
An exploratory stage	Kinaesthetic development improved through practice	Movements rehearsed under varying conditions
Demonstration is the best means of communication.	Demonstrations are important.	Demonstrations are only essential to refine particular movements.
Learners must identify subroutines.	Emphasis is on temporal patterning. The player will know the subroutines and is competent in assembling them into the required skill.	Temporal and sequential patterning of subroutines is automatic.
Slow learning speed and inefficient movement	Moderate speed and reasonably efficient movement	Speed and efficiency that relate to the specific requirements of the situation
Support from teaching aids (demonstrations, pictures, videos, etc.) is required to enhance visualisation of the skill. The teaching focus is conceptualisation.	Further improvement requires practice of set patterns of movements in controlled situations.	Improvement requires manipulation of the environment (for example, increased game pressure) to ensure the skill is able to be reproduced under varying conditions.



APPLICATION

Observing progress through the stages of skill acquisition

Choose two or three students to develop a skill such as spinning a basketball on the fingertip, juggling, throwing with the non-dominant arm, or using small kicks to keep a soccer ball in the air. Designate a specified period of time — say, 10 to 15 minutes, although progression to stage three may take much longer. Observe the students as they progress through one or more stages of skill acquisition within the time.



INQUIRY

Factors that influence progress in learning a motor skill

Describe the rates of advancement through the learning stages. Discuss factors that allow some students to progress faster than others.

CHARACTERISTICS OF THE LEARNER

The speed with which learners are able to acquire certain motor skills depends on a number of factors, of which most are inherent features. These alter considerably from one person to another. Variations in age, height, muscle fibre composition, sex and weight, to mention a few, mean that any two people will not acquire similar skills at the same pace. Some people are better at jumping than running; others display more talent in gymnastics than in athletics, and so on. Our differences make us unique, and we must take them into account when learning motor skills. Some characteristics of learners that affect the rate of learning are personality, heredity, confidence, prior experience and ability.

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Personality

Personality refers to an individual's characteristic way of behaving.

Traits are characteristics or observable features of a person.

Personality develops as a result of the individual's infinite social interactions and learning experiences throughout life.

The manner in which personality blends with learning is often seen in an athlete's behaviour. Coaches describe athletes in terms of observable **traits** such as consistency, reliability, level of motivation and ability to express feelings. From a motor learning point of view, certain aspects of personality tend to be more favourable with certain learning environments.



Figure 8.5: Aspects of personality that contribute to a learner's characteristics

Elite coaches tend to recruit and develop not only those with physical talent, but also those who possess positive learning attributes. These attributes include such personal characteristics as cooperativeness, willingness to listen, determination, enthusiasm, dedication, level of motivation, aggressiveness, and willingness to take risks and to learn. Learners whose personality reflects positive ways of behaving are more receptive to instruction and advice, more cooperative in performing set tasks and more helpful in creating a productive learning environment.

Heredity

Heredity refers to genetic characteristics inherited from our parents.

Individuals are endowed with certain characteristics inherited from their parents. These are unchangeable and limit the dimensions of their potential. Hereditary factors determine the 'ceiling' for performance. They limit how fast we can run, how high we can jump and possibly our ideal position in a sports team (based on build and speed). The environment determines if we can reach the limits set by **heredity**.

The following important hereditary characteristics influence success or otherwise in specific athletic events.

- *The relative percentage of fast-twitch to slow-twitch muscle fibres.* Athletes with a higher percentage of fast-twitch fibres are naturally more suited to sprint and explosive events, whereas those endowed with slow-twitch fibres tend to be more successful at endurance events.

Somatotype is a person's body type or shape (ectomorphic, mesomorphic or endomorphic).

- ***Somatotype***. The tendency towards ectomorphy (linearity), mesomorphy (muscularity) or endomorphy (roundness) determines an individual's suitability for many activities. Ectomorphy is favoured for high jumpers, for example, whereas mesomorphy is more favoured for netball centres and lightweight boxers.
- *Gender*. Higher levels of the hormone testosterone in males give them the potential to make greater increases in strength and power than females. For this reason, most sports have separate competitions for each gender.
- *Height*. Differences in height (and weight) provide considerable physical and biomechanical advantages to some players and make the learning and execution of required skills a less difficult process.
- *Conceptual ability*. The ability to visualise a movement and make it materialise is a significant factor, particularly in the first stages of learning.

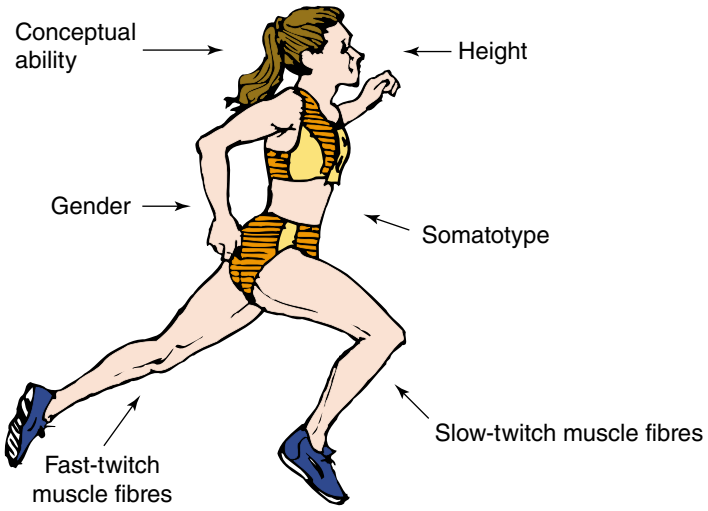


Figure 8.6: Hereditary factors affect performance considerably.

An important point to remember is that the ability to learn a skill may or may not be related to success in competition. For example, a small, stocky person may readily learn to high jump using the correct technique, but may be unsuccessful in competition because other competitors are taller, leaner and better suited to jumping. Thus, skill learning and execution may be successful and rewarding, but may not lead to competitive success.



INQUIRY

Characteristics of the learner

Read the snapshot 'The mystery and myths of muscles', then discuss the importance of hereditary factors to success in athletic events.

SNAPSHOT

The mystery and myths of muscles

For years it was axiomatic [well understood] that performance differences were linked to muscle composition. It was long believed that muscles had two types of fibres — Type I, or slow-twitch fibres, which contribute to endurance; Type II, or fast-twitch, which are constructed for power movements, such as leaping or sprinting. Sprint athletes may have 75 per cent or more fast-twitch fibres, whereas distance runners usually have 75 per cent or more slow-twitch fibres. Dozens of studies have documented that whites on average 'naturally' have a higher percentage of slow-twitch fibres than West African blacks, who generally have more fast-twitch fibres. So what is the significance of these differences?

Fibre distribution appears to be determined more by genetics than the environment. It's estimated that 40 per cent of the phenotypic variance of fibre type is due to environmental influences such as exercise, whereas 45 per cent is associated with genetic factors (the remaining 15 per cent is due to sampling error). Although physical activity can improve fitness, it cannot alter a person's biological endowment.

But scientists have also come to understand that the fast-twitch/slow-twitch model is too simplistic. There are, in fact, two types of fast-twitch fibres, one more metabolically efficient. Training can convert the less metabolically efficient fibres into more efficient

ones — for instance, when trained athletes run so fast that they go into severe oxygen debt, forcing the muscles to use oxygen more efficiently. However, training cannot significantly convert fast-twitch fibres to slow-twitch ones, or vice versa, although people do gradually and permanently lose fast-twitch muscles as a result of ageing.



Just how crucial is endowed fibre type in athletics? Geneticist and exercise physiologist Claude Bouchard, known as a guru on muscles and metabolism, and exercise biochemist Jean-Aimé Simoneau, colleagues at Laval University in Quebec City, addressed that issue by comparing French–Canadian and West African students. Using long needles inserted into the thighs of test subjects, Bouchard's team extracted tiny sections of fibres (which look to the naked eye like pieces of raw meat). They were chemically treated to reveal metabolic differences, put on a glass slide and slipped under a high-powered microscope, where they appeared as a collage of tiny red and white crocodile scales. The African subjects, by a ratio of approximately two to one, had more of the larger fast-twitch fibres. The researchers concluded that the force-generating capacity of Type II muscle fibres at high velocity, the speed and tempo of movements, and the capacity of an individual to adapt to exercise training are all genetically influenced.

Scientists studying the debilitating effects of muscular dystrophy may even have stumbled upon a 'smoking gun' that bolsters the genetic case for population-linked differences in sprinting capacity. While searching for a gene responsible for muscle weakness caused by the disease, researchers at the New Children's Hospital in Sydney found that 20 per cent of people of Caucasian and Asian background have what they affectionately called a 'wimp gene', a defective gene that blocks the body from producing a-actinin-3, which provides the explosive power in fast-twitch muscles.

Meanwhile, samples drawn from African Bantus, specifically Zulu tribal members, showed that only 3 per cent had the wimp gene. The discovery could explain why 'some people train for ages but remain 80-pound weaklings, while others develop muscles very quickly', said the team leader, Dr Kathryn North, head of the Neurogenetics Research Unit. She and her colleagues speculate that the need for the 'speed gene' is dying out because the speed to hunt animals or flee from enemies is no longer necessary for survival — although it certainly helps in sprinting.

The genetic evidence underscores what we find in athletes. Even though fibre composition can significantly affect physical performance, a favourable composition is not sufficient by itself to ensure high performance. Since endurance is only about 25 per cent inherited, training plays an integral role — but more so in blacks than whites. Experiments show that with only a modest amount of training, blacks can experience an explosive rise in exercise capacity, while even with far more effort whites don't improve nearly as much.

In contrast, scientists believe that no amount of training can break through genetically imposed, inherited limits on anaerobic capacity — the ability to sprint and jump. Thus, although fibre type alone does not itself guarantee a champion, if an athlete does not have a certain proportion of fast-twitch muscles, he or she can't hope to be a champion sprinter or jumper. In practical terms, this suggests that sprinters are born, not made.

Source: Extract from J Entine, *Taboo: Why Black Athletes Dominate Sports and Why We Are Afraid to Talk About It.*

Confidence

Self-confidence is a firm belief in one's own ability.

Self-confidence is critical not only to improvements in skill acquisition, but also to the performance of many tasks faced in everyday living. Confidence develops from experiencing success in learning situations. Incidents that result in successive failures may destroy confidence (unless presented as positive learning opportunities).



Figure 8.7: Confidence can be inflated by the power of self-belief.

Confidence unlocks energy and creativity. It releases the power of belief — the notion that something worthwhile can be achieved through perseverance and effort. Furthermore, confidence underpins the collaboration process with coaches and other learners. Confident people are able to help others as well as themselves. Confident learners approach skill learning situations with feelings of being able to rise to the challenge and that the outcome will be favourable regardless of difficulty.

Self-image is a big part of confidence and is powerful in governing our behaviour. Coaches who use skills practices or drills that make it difficult for a learner to achieve can contribute to the learner's development of negative feelings and doubt in their own ability. Coaches need to develop drills and strategies that are sequential, and that make achievement progressive, gradual and within one's ability level. Positive achievement enhances confidence, nurtures self-image and provides the foundation for future skill building.

INQUIRY

Confidence

eBookplus

Use the **Self-confidence** weblink in your eBookPLUS and review the article on the importance of self-confidence in achieving swimming goals.

1. How is confidence defined?
2. How is confidence best achieved?
3. Discuss how attitude towards a goal affects one's ability to achieve it.

Prior experience

It is often easier to learn a new skill if similar movements have already been successfully acquired. This prior experience — an experience linked to the influence of an already learned task on one to be acquired — has the potential to accelerate the learning process. Some suggest that *transfer of learning* is an important reality in the acquisition of new skills. Others suggest that the amount of transfer depends on the learning situation and many other variables such as the learner's perception or ability to make connections between the two.



Figure 8.8: Prior experience is considered an advantage in learning new skills.

In a group situation, learners will be quite diverse in terms of background experience. Some may find *lateral transfer* — that is, transfer from one task to another similar task (for example, from backhand in squash to backhand in tennis) — relatively easy. More difficult may be *vertical transfer*, which is mastering a lower order task as a prerequisite for something much more difficult within the same activity. For example, how important is having learned the dolphin kick using a kickboard to learning butterfly swimming?

Agility is the ability to move the body from one position and direction to another with speed and precision.

The degree to which prior experience influences skill acquisition and ultimately performance is variable among learners. While not measurable, we see prior experience in a good basketballer quickly adapting to netball, a batsman in cricket to golf or a gymnast to diving. It is evident that basic motor skills such as coordination, balance, **agility** and speed are systematically developed generally through game based activity, club sports and school physical education programs. It appears that these influences contribute significantly to a learner's general development and represent a platform for building further improvement.

Ability

Ability is the ease with which an individual is able to perform a movement or routine.

Acuity is sharpness.

Ability is seen in the way in which an individual is able to learn, process and implement new skills. Ability incorporates a range of factors, such as sense **acuity**, perception, reaction time and intelligence, which combine to allow the individual to do readily what is intended. Good sense acuity, for example, enables the individual to gather cues from instructional situations quickly. Learners with good sense acuity 'grasp' key concepts, ideas and movements easily, and move through the early stages of learning promptly.

Some learners possess an ability to react quickly to specific stimuli. This is a considerable advantage in contests such as track events in which response time to the sound of the gun can mean the difference between winning and losing. Others possess an ability to readily comprehend practical tasks, solve problems, generate solutions and make rational decisions in task application. Such talents may be useful in captaincy roles and other organisational positions.

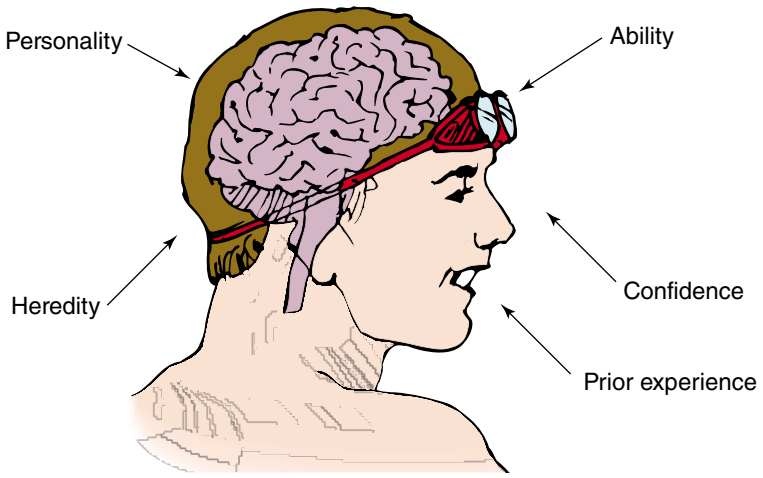


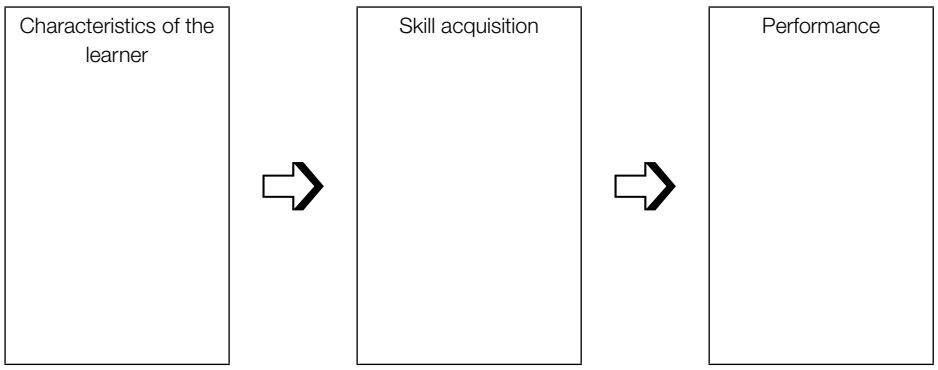
Figure 8.9: Characteristics that affect the performance success of the learner



INQUIRY

Influence of learner characteristics on skill acquisition

Draw an enlarged copy of the flow diagram below into your workbook. In the first box, identify the characteristics of the learner. Use the middle box to suggest how these characteristics might impact on skill acquisition. Use the third box to imply how all these factors affect performance.



The learning environment refers to everything outside the learner and embraces the skill itself, the situation in which it is practised, information from coaches and even the influence of the surrounding weather conditions. The environment can have a positive or negative impact on the learning process.

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Practice HSC exam questions

The nature of skill

All skills have observable characteristics, so can be grouped according to specific criteria. Skills are commonly classified as open or closed; gross motor or fine motor; discrete, serial or continuous; and self-paced or externally paced. Most skills fit a number of classifications.

Open and closed skills

Open skills occur in an environment that is unpredictable and frequently changing.

Many skills (particularly those associated with team games) are described as **open skills** as a result of where they are learnt. These are executed in unstable environments.

Uncertainty about how to perform the skill can be due to such factors as changing weather, a player-affected surface (such as a cricket wicket that is breaking up) or even the use of unconventional tactics in a team game. The outcome is that players need to modify their techniques to adapt to the instability. 'Seasoned' players have an advantage in such situations because they are able to draw on knowledge from past experiences. However, open skills can be considerably difficult for learners, causing distraction, indecision and even annoyance. This may contribute to inattention and loss of focus.

Closed skills occur in an environment that is stable and predictable.

A contrasting environment is evident where **closed skills** are practised. The closed environment is much more conducive to skill learning because the learner is not distracted by other factors. Skills performed in a closed environment can be planned well in advance or can be made to fit the predicted environmental setting. Delivering the ball in tenpin bowling is an example of a closed skill because the environment (the bowling lane, ball, pin placements and weather conditions) are the same each time the movement is executed. However, if a changing environment is part of the competition event, then learners need to be gradually exposed to it in practice.

Few skills fit perfectly into open or closed categories. Most can be placed on a continuum that illustrates a progression from closed to open (figure 8.10).

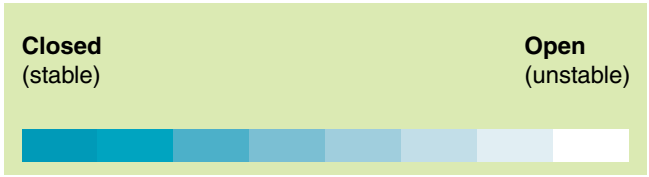


Figure 8.10: A continuum for illustrating open and closed skills



Figure 8.11: Surfing is an example of an open skill due to the unpredictability of the environment.

INQUIRY

Open and closed skills

Draw a continuum similar to the one in figure 8.10. Place the following skills at the positions you feel are appropriate on the continuum.

(a) putting in golf
(b) tackling in football
(c) surfing
(d) weight-lifting
(e) indoor trampolining

Justify your decisions.

Gross motor and fine motor skills

Gross motor skills require the use of large muscle groups for execution.

Fine motor skills require the use of only small muscle groups to perform the movement.

Gross motor skills are commonly found in team games and many competitive and recreational activities such as bushwalking and skiing. Examples of gross motor skills are running, leaping, vaulting, diving, tackling and surfing.

Fine motor skills are found in activities that require finesse and limited movement. Examples of fine motor skills are typing, tying shoelaces and writing. Some isolated movements — such as catching in cricket, playing darts, serving in table tennis and putting in golf — are examples of fine motor movements found in sports. The execution of each of these movements requires precision and exactness, controlled by the smaller muscle groups.

As with open and closed skills, fine motor and gross motor skills rarely fit a single classification, and often can be placed along a continuum (see figure 8.12).

Figure 8.12: A continuum for illustrating gross motor and fine motor skills



Figure 8.13: Examples of gross motor and fine motor skills can sometimes be found in the one sport. Examples in cricket are batting and bowling (gross motor) and catching the ball (fine motor).

INQUIRY

Gross motor and fine motor skills

Draw a continuum similar to the one in figure 8.12. Where would you place the following skills:
(a) archery
(b) swimming
(c) juggling
(d) throwing
(e) goal shooting in netball?
Justify your decisions.

Discrete, serial and continuous skills

Discrete skills have a distinctive beginning and end that can be identified.

Serial skills involve a sequence of smaller movements that are assembled to make a total skill.

Skills can be classified as *discrete*, *serial* or *continuous* according to where they begin and end. An example of a **discrete skill** is a forward roll: it begins with the placement of the hands on the mat, and finishes following a roll to the feet.

An example of a **serial skill** is the place kick in football, as illustrated in figure 8.14. Here, a number of discrete skills (forming a mound, placing the ball, moving back, moving forward, kicking the ball and following through) are assembled to form a larger skill. A player in the beginning stages of learning the place kick would need to focus on each of these discrete movements separately. Even skilled players may need to break the serial skill into discrete movements to focus on a particular aspect that is causing concern.

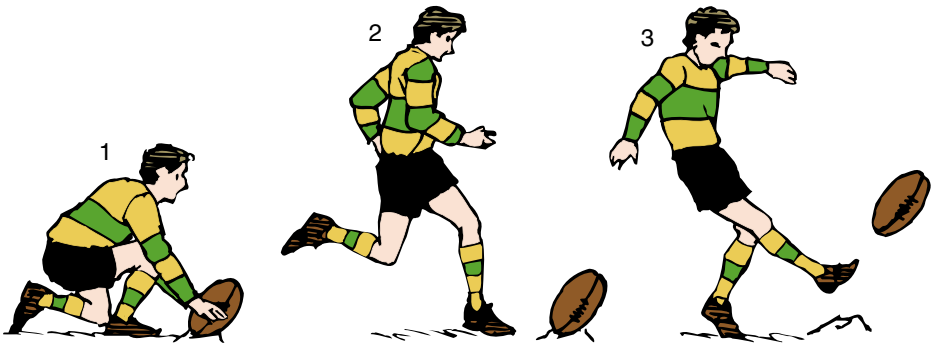


Figure 8.14: A serial skill

Continuous skills have no distinct beginning or end.

Some skills are repetitive and may appear ongoing and unbroken within a particular period. These are described as **continuous skills**. Examples of continuous skills are swimming, jogging, rowing, skiing and rock climbing. The length of these activities is unspecified. Again, discrete, serial and continuous skills can be categorised on a continuum (figure 8.15).

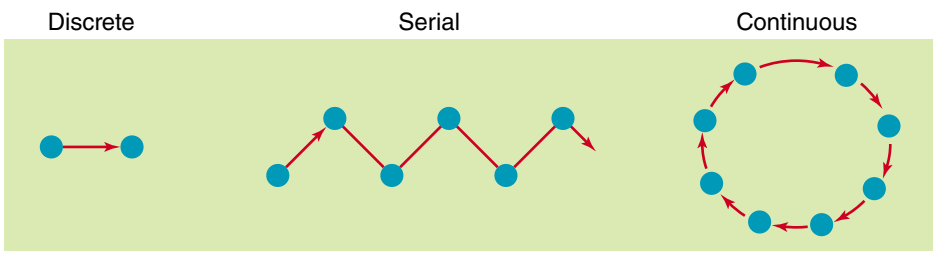


Figure 8.15: Discrete, serial and continuous skills

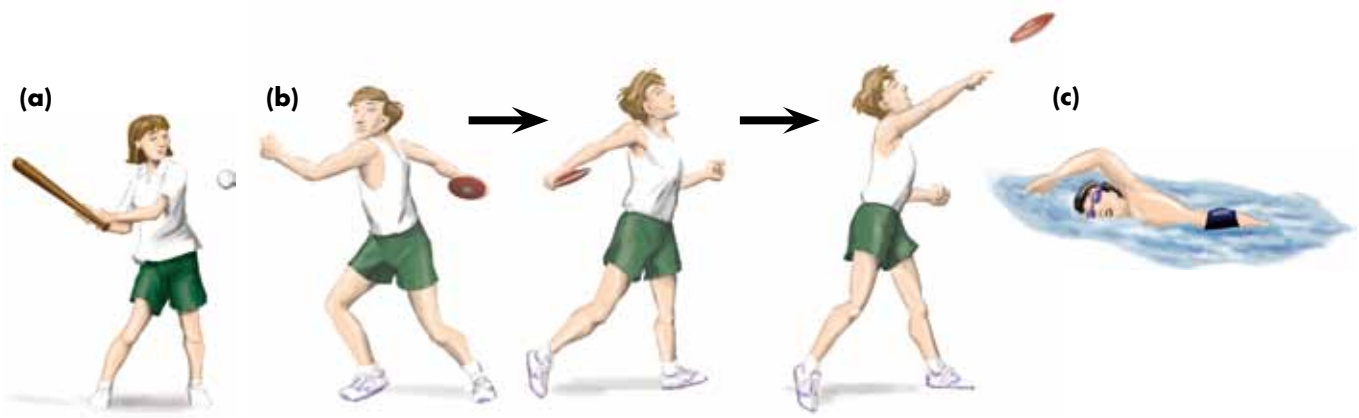


Figure 8.16: **(a)** Discrete, **(b)** serial and **(c)** continuous skills in action

INQUIRY

Discrete, serial and continuous skills

On a continuum from 'discrete' to 'continuous', identify where you would place the following skills:

(a) canoeing
(b) trail-bike riding
(c) sailing
(d) performing a vault in gymnastics
(e) throwing a javelin
(f) performing a gymnastics routine.

Justify your decisions.

Self-paced and externally paced skills

Pacing refers to the performer's control over the timing of skill execution. Some skills are self-paced while others are externally paced.

Self-paced skills are movements for which the performer determines the timing and speed of execution.

Externally paced skills are movements for which an external source controls the timing.

Examples of **self-paced skills** are kicking a football in practice and serving a tennis ball. In each case, the performer determines the time and pace of execution. With **externally paced skills**, factors external to the performer set the time for execution of the movement. Examples of such skills are dancing and rhythmic gymnastics, because music requires the performer to move in accordance with its rhythm and tempo.



Figure 8.17: The difference between self-paced and externally paced skills

INQUIRY

Self-paced and externally paced skills

1. Identify:
   (a) five self-paced and
   (b) five externally paced skills.
2. Explain why your selections fit these classifications.

study on

Concept code: PDH-069

Practice HSC exam questions

Performance elements

The performance elements, namely decision making, strategic development and tactical development, are often overshadowed by a focus on teaching and developing skill fundamentals. We sometimes see players demonstrate proficiency in practice sessions, but they are unable to respond successfully to opponents in games because they lack the knowledge, confidence and decision making skills necessary to take advantage of the situation.

While some players appear superior in certain performance elements, such as the ability to 'read' a game, others need to develop this capability through practice. Teaching and coaching strategies that emphasise the **game-centred approach** provide the opportunity to develop performance elements because tactics, moves and game plans can be analysed following planned stoppages in play. Using this approach, players see the relevance of a skill or move because poor execution, the usual cause of stoppage, has drawn attention to it. The analysis is immediate and the feedback instant, with relevance established to that part of the game. The development of performance elements can be enhanced by the use of technical equipment such as coaching boards, and practical application by way of play drills, small games and match practice to provide experience.

The **game-centred approach** aims to focus on the whole game and all components, rather than a sequence of basic skills assembled within a game format. The emphasis is on integrating thinking and learning rather than skill development in isolation.



Figure 8.18: Good performance is more than doing, it's about thinking what to do and how to go about it.

Decision making

Decision making is best improved by having to make decisions in performance-like situations. Of course, decision making needs to be appreciated within the framework of the rules, playing conditions, agreed team strategies and opposition tactics. Productive decision making is best achieved through:

- *observation.* Many coaches use coaching boards and demonstrations to reveal the inner workings of planned strategies to assist learners. They also recommend observation of other players and their movements on the field of play, particularly skilled performers.
- *questioning.* Decision making is improved by highlighting options and having players work through game-like **scenarios**. For example, when moving objects representing players around on a coaching board, players need to be asked questions like 'what would you do if this opponent moved here?' and 'how do we create a gap between these two players?'

A **scenario** is a situation or scene.

- *whole, part, whole approach.* A game strategy needs to be taught as a whole so players can see the overall plan. Following that, individuals need to learn their specific roles. Learner players should walk through moves initially to acquire the feel of where to be, what to do and when to do it. The build-up to game execution speed needs to be gradual, with emphasis on good technique and correct execution. Finally, the strategy should be assembled and practised against a non-invasive opposition.
- *variation.* During training, it is important to explore variations when rehearsing strategies. By changing the defensive alignment, for example, players are encouraged to explore more innovative and imaginative options.
- *creativity.* A democratic approach to strategic development encourages all players to identify with each problematic situation and solve it as a group. This is preferable to following strict, coach-imposed directions all the time because players like to feel that they can make a worthwhile contribution. Creativity as opposed to 'paralysis by analysis' is more productive in developing decision making skills.

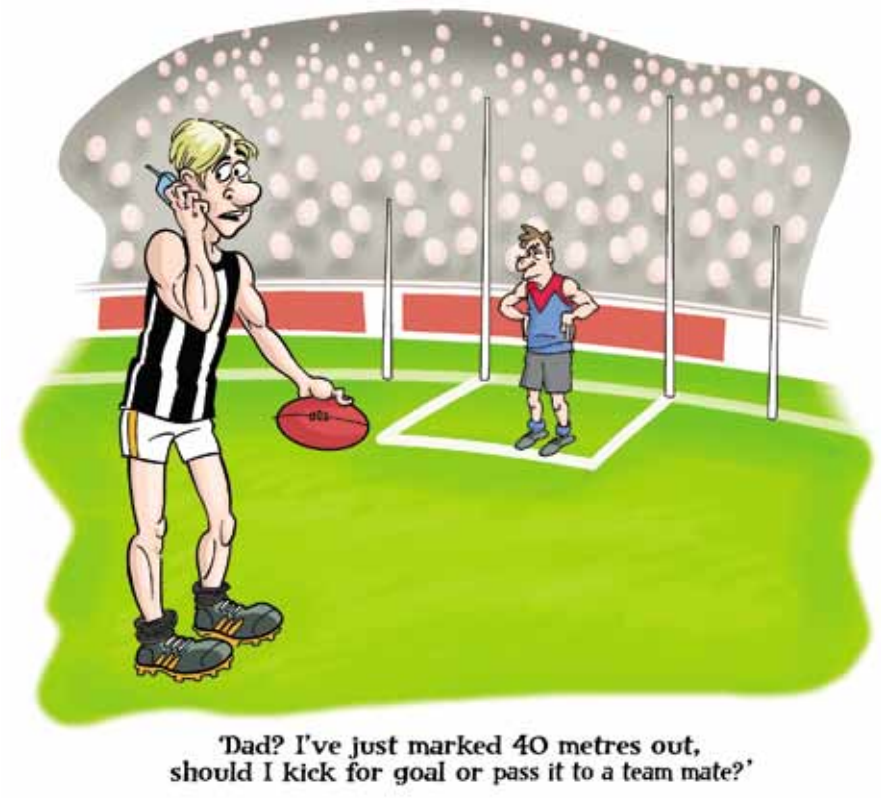


Figure 8.19: We get better at making important decisions by having the opportunity to practise in situations where they have to be made.

Strategic and tactical development

Strategic understanding refers to the way we play, where we should be at a particular time and what to do, such as return the ball in tennis using backhand. Tactical awareness, on the other hand is about utilising ways of gaining an advantage over an opponent; for example, using a cut-out pass in rugby league or 'double teaming' an opponent in basketball.

Like skill development, tactical awareness matures gradually through using drills and mini-games that provide players with match-like situations. During simulation drills, players learn to identify specific situations, size up options, make decisions and respond through carefully thought out actions. For example, a three-on-three touch football drill might focus on how to cause a mismatch in numbers, creating an overlap of attacking players.

Strategic and tactical development is built on the following principles.

- *Technical efficiency*. Players need to utilise correct technique in the execution of skills. This enhances their level of consistency in execution of movements and strategies. How often do we see a brilliant move falter at the very end due to a poor pass or dropped ball?
- *Understanding*. Players need to fully understand what is required, options and variations possible and what to do should things not work out. Just prior to a game or during the half-time break is not the appropriate time for introducing new strategies as they will not be fully understood.
- *Skilful execution*. Strategies work properly only if practised in training in drills that seek to replicate game-like situations. While it is good to learn moves without the frustration of defence, pressure must be gradually applied to foster the development of creative options. This is best enhanced through invasive or part invasive game-play drills that encourage players to make decisions and create options.

Table 8.2 shows areas where tactical development may need to take place. It considers the player, fellow team players and the opposition. The questions are typical of those that need to be considered in strategic and tactical development plans.

Table 8.2: Tactical development focus issues

Tactical development area	Team players	Opposition players
Space	• How much space can I use? • Where do I go before the move? • Is the gap big enough? • Where do I go after the move? • Will the player with the ball have enough space?	• How do I confine my opponent's space? • To where do I move to frustrate my opponent?
Force	• How much do I apply? • Have I got sufficient energy to do what I want?	• Is force necessary to achieve my goal? • Is there a better way if my opponent is bigger?
Time	• When is the right time to execute a movement? • How do I create enough time to allow me to do what I want?	• How do I take time away?
Direction	• Will this take me forward? • Will the angle squeeze too much space from my fellow players?	• Which direction will cause biggest problems — straight or angled?
Myself	• Have I got the skills and talent to do this? • Do I understand what has to be done? • Am I confident in my ability to pull this off? • Is it part of the team plan? • Is the risk worth it?	• Will this help me get the upper hand over my opponent?
Other players	• Where do others fit in? • Will they understand what I am doing? • Can they do what I am asking of them?	• Do I need to consider more than my immediate opponent?

APPLICATION

Performance elements

As a class, choose a game such as touch football or netball where one student who is a capable player could act as coach. Play a game using the game-centred approach. Stop the game at least three times and highlight areas of play that could be improved. Use a game-related drill or walk-through strategy to improve execution of skills, plays or moves during each stoppage.

INQUIRY

Evaluating the game-centred approach

As a group, discuss the following questions.

1. Did the approach assist in decision making?
2. Did players better understand what had to be done using this approach?
3. How could the approach be improved to further develop performance elements?

Practice methods

The learning environment is further affected by the training systems and routines designed to teach particular skills. These are called *practice methods*.

Massed and distributed practice

Massed practice and **distributed practice** methods are approaches that coaches commonly use to teach skills more effectively in the available time.

Massed practice involves a continuous practice session, with the rest intervals being shorter than the practice intervals.

Distributed practice (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals.

The choice of these routines depends on the amount of time required to teach a particular skill. Massed practice requires performers to take infrequent breaks between long periods of instruction and skill development routines. An example would be a gymnast learning a handstand, where drilling continues until fatigue or other factors make further practice of limited benefit.

Massed practice works best when performers are:

- highly motivated
- fresh
- unable to attend a number of sessions.

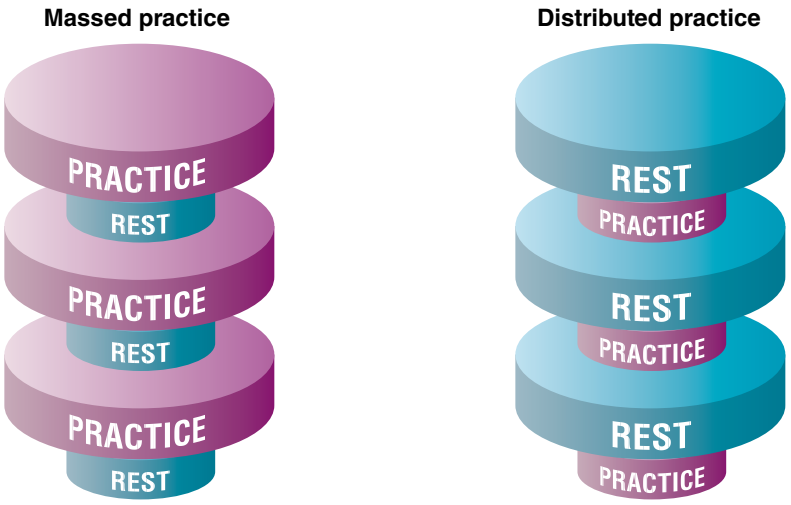


Figure 8.20: Massed and distributed practice

It is often preferable to spread the periods of intensive work more liberally, as with distributed practice. In a distributed practice situation, the gymnast would practise the handstand over a number of sessions, or perhaps on different occasions during the one session. Relief could be gained by either using frequent breaks or alternating between activities.

Distributed practice works best when:

- the performer lacks interest
- the task is difficult
- motivation is low
- the task causes fatigue
- excessive work causes discomfort (for example, heading a soccer ball).

Whole and part practice

The **whole practice method** is applied when a skill is practised in its entirety.

The **part practice method** is applied when a skill is broken into smaller components and each discrete subskill (subroutine) is practised separately.

While some skills are relatively easy to learn, others such as somersaults and handstands require considerable practice. It is often difficult for learners to conceptualise and integrate the smaller parts that need to be assembled to form a complex skill. For this reason, coaches may decide to use **whole practice**, **part practice** or a mixture of both to assist the performer's learning process.

The layup in basketball is an example of a skill that can be taught effectively using either the part or whole method. If using the whole method, the coach would demonstrate and teach the skill as a complete unit. If using the part method, the coach would break the layup into a series of discrete skills:

- dribbling to the basket
- catching the ball and landing on the correct foot
- stepping on to the opposite foot and driving up to the basket
- shooting and landing.

The learner would then practise each movement and assemble them at the end.

Considerable research has been conducted to determine the best method of practice. Results are still largely inconclusive, but the part method is commonly used for teaching both new skills and complex skills. Most researchers feel the method selected should be adapted to the needs and skill level of the learner. Many coaches use a combination of methods, such as whole–part–whole: first, the total skill is demonstrated and practised; second, as difficulties arise, the discrete segments are extracted from the total movement and analysed separately; and third, as the segments are mastered, the skill is reassembled, practised and again rehearsed as a unit.

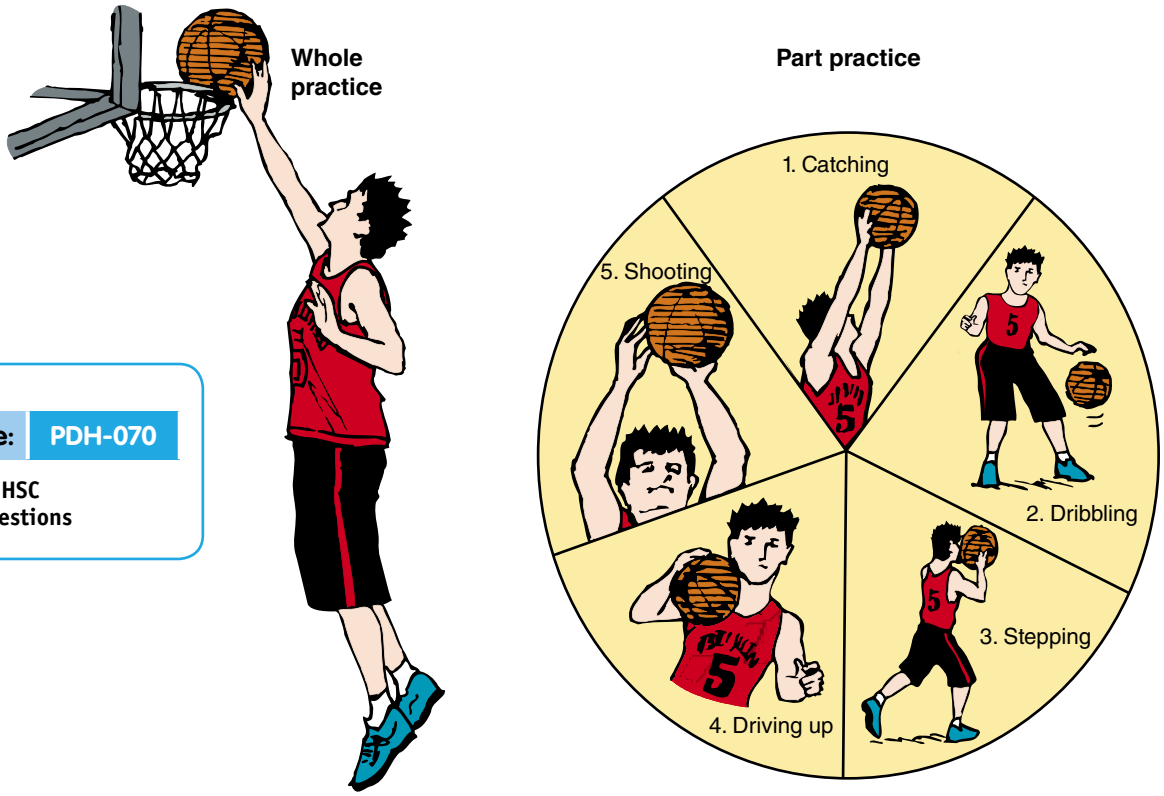


Figure 8.21: The difference between the whole (left) and part (right) methods of practice

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APPLICATION

Whole and part learning practice

Establish two groups within the classroom. Each group should try to learn how to juggle three tennis balls, throwing each ball from the left to right hand, then into the air and catching it in the left hand. Group 1 will learn the skill as a whole movement, while group 2 will progressively develop the skill, mastering the use of one ball and progressing to three. Allow 10 minutes, then assess each group's performance.

INQUIRY

Comparing whole and part practice methods

1. From your observations in the previous application, which group was the most successful?
2. Why were the learning rates of the two groups different?

Feedback

Feedback is the information provided to the learner about the nature or result of their performance.

Feedback constitutes an important role in the learning process because it provides guidance and helps the performer eradicate movement error. The many types of feedback include internal, external, concurrent, delayed, knowledge of results and knowledge of performance.

All learners derive feedback from performing a particular skill and possibly some from other sources such as a coach. The movement may or may not closely resemble the skill as it was taught and demonstrated. If the learner is performing the action for the first time, then there is probably an element of awkwardness evident in the application. Further practice is necessary to improve the learner's perception of and feel for the skill. A cyclic process of skill refinement continues until the learner is accomplished in the movement or attains a level of competence commensurate with their ability.

The relationship between feedback and performance is important.

- If the action is highly unsuccessful, then feedback should suggest that the learner substitute or replace the action.
- If the action is unsuccessful, then feedback should suggest that the learner modify the action.
- If the action is successful, then feedback should suggest that the learner repeat the action.

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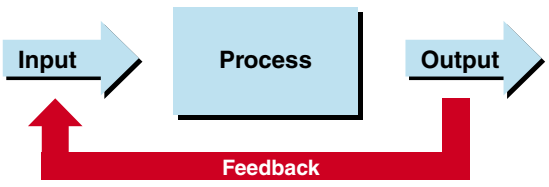


Figure 8.22: Feedback is provided following analysis of the output.

Internal (or intrinsic) and external (or extrinsic) feedback

Internal feedback occurs as a normal consequence of performing a skill. It embodies feelings, together with sensory information such as seeing the ball and hearing the sound of a ball hitting the bat.

Some feedback is experienced during execution of the skill. Called **internal feedback**, this information is received through the body's proprioceptive mechanisms (senses).

Proprioception is made possible by the neuromuscular system sending messages to the brain about how the movement is being performed. It helps us develop a kinaesthetic sense or 'feel' for a movement, and eventually to differentiate between skilful application and error.

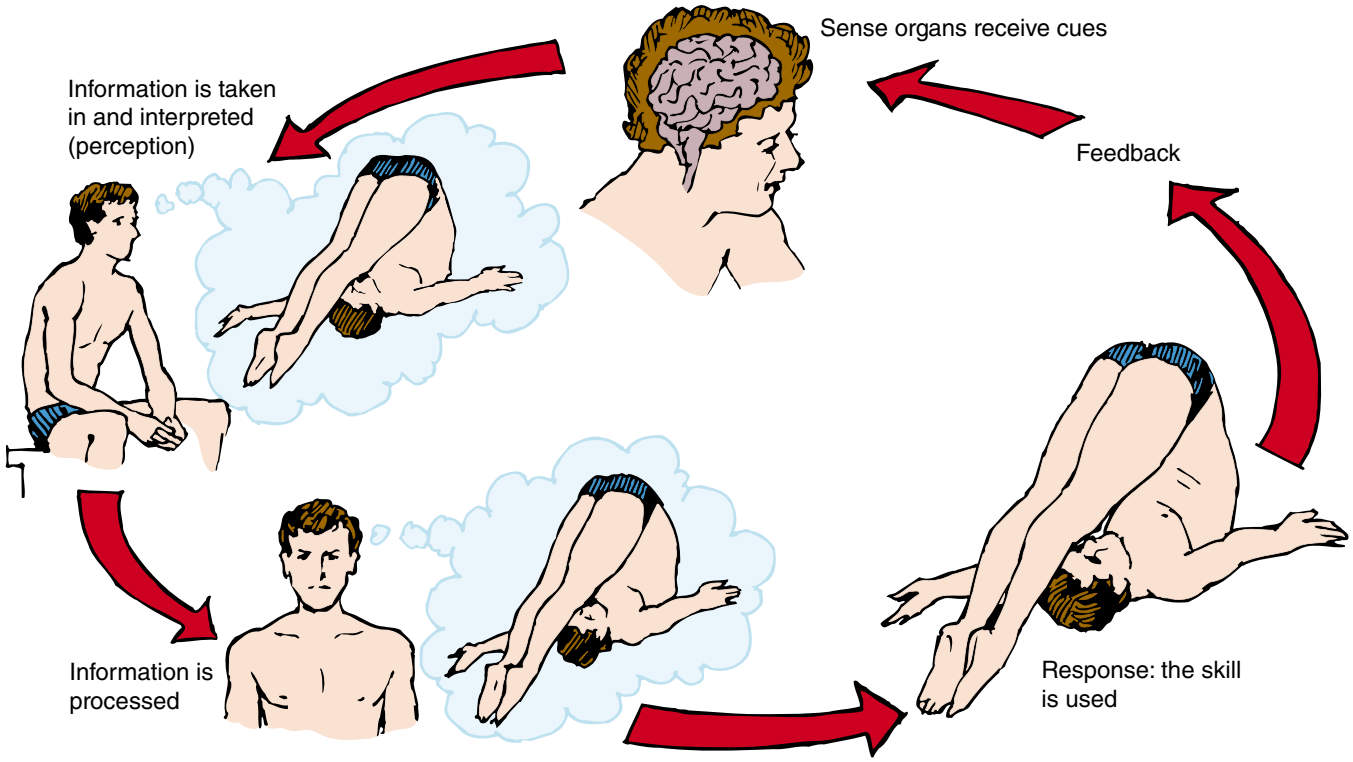


Figure 8.23: How internal feedback functions

External feedback is all feedback other than that which occurs as a normal consequence of performing a skill. It includes various forms of external information, such as suggestions from the coach, video replays, judges' scores and race results.

Some feedback is derived from outside sources during performance of a skill. Called **external feedback**, this information may take the form of a comment from the coach, applause from the crowd or the result of a game. While it may vary in nature, its origin or source is outside the body. A form of external feedback is *augmented feedback* — supplementary or additional information that is not given immediately the skill is performed, but is used later to illustrate a point. Visual aids such as video replays of performances are examples of external augmented feedback. Forms of external feedback are illustrated in figure 8.24.

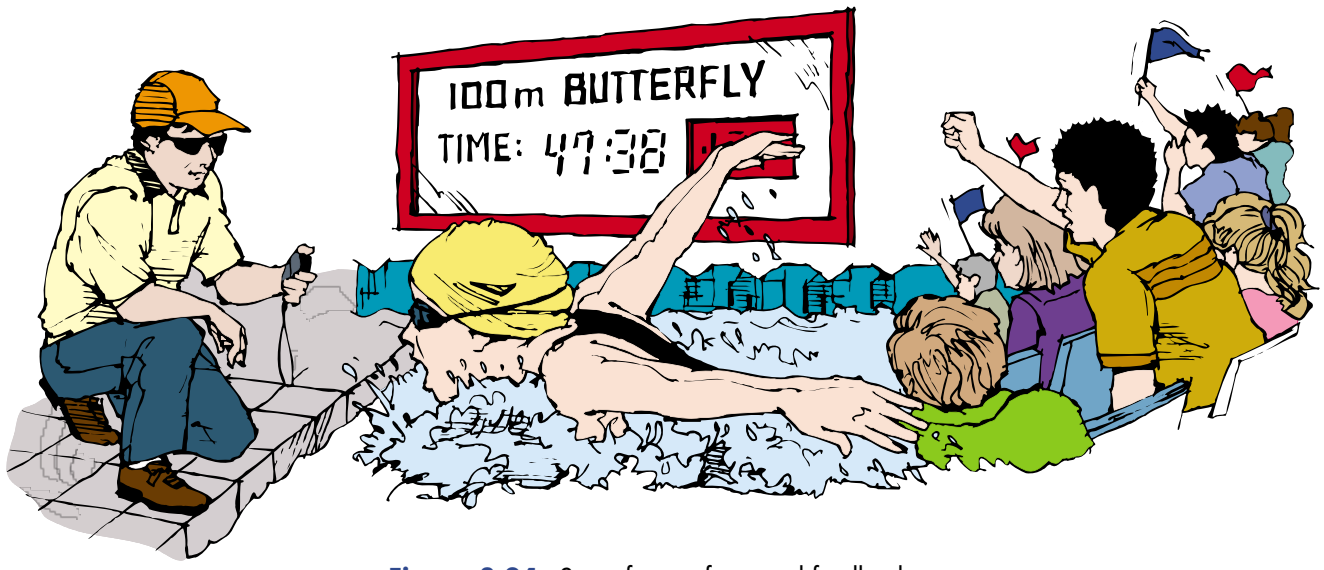


Figure 8.24: Some forms of external feedback

Concurrent (or continuous) and delayed feedback

The timing of feedback is important in skill learning. A certain amount is concurrent, yet much feedback may be delayed or withheld until the most appropriate moment.

Concurrent feedback is received during the performance of a skill.

Concurrent feedback occurs simultaneously with skill execution, and it is relayed throughout the body by the proprioceptive mechanism. An example is the feedback that a person receives while balancing in a headstand — information from the brain that enables them to maintain poise. Such a skill requires constant readjustment to the centre of gravity to maintain equilibrium, and its success relies on feedback being continuously supplied to the body.

Delayed feedback is received after the skill has been executed.

Often there is a period of time between skill execution and feedback. Feedback received at a later stage is called **delayed** (or terminal) **feedback**. An example of delayed feedback is waiting for the result of a basketball throw. The feedback (a successful or unsuccessful throw) is not received until the ball either enters or misses the basket.

Knowledge of results and knowledge of performance

Knowledge of results and knowledge of performance are two varieties of feedback.

Knowledge of results is information about the outcome of a movement.

Knowledge of results suggests how successfully the skill was performed — for example, how many goals were scored from a number of attempts, or what distance was covered in a long jump. It is always external and may come from sources such as a coach or other performer. Generated in response to a performance, knowledge of results is important because it provides information about skill execution. To obtain a different result, the performer may need to execute the skill differently, or perhaps not at all, in a specific situation.

Knowledge of performance is information about the pattern of the movement during execution.

Knowledge of performance is more specific to the way in which the skill is performed. An example is a comment from a coach about the height of the ball toss during a tennis serve, or the angle of the elbow during the pull phase of butterfly swimming. Knowledge of performance gives feedback on the quality of the execution of the skill, and it may generate from either internal or external sources.

Feedback is essential if performance is to be improved. It works best if it is immediate and positive, and if it reinforces correct skill execution. Sometimes coaches are confronted with players who successfully execute a skill even though their technique is incorrect and undesirable in the eyes of the coach. This can lead to frustration when the performer is receiving positive feedback (success) but also negative feedback (the coach's comment on poor skill execution). Athletes must realise that development of correct technique is essential for long-term success.



APPLICATION

Experiencing feedback

You will require a number of plastic buckets, tennis balls, blindfolds and recording sheets. Work in pairs.

(a) From a distance of two metres, each person makes 50 attempts at throwing a tennis ball into a bucket. Tell the thrower of their progressive score, and provide coaching to assist their technique. Record the results.

(b) Complete a second attempt of 50 throws, but this time blindfold the performer and do not tell them about the success or otherwise of each throw.



INQUIRY

How important is feedback?

1. Identify the types of feedback that were available to the thrower on each occasion in the above application.
2. Discuss why feedback is important in skill learning situations. Why is the timing of feedback critical?



INQUIRY

Teaching plan for beginners

Choose a sporting skill with which you are familiar, such as a layup in basketball, serving in tennis or batting in softball. The skill should be discrete and reasonably complex; that is, it should contain some subskills that may need to be taught.

Draw or enlarge a photocopy of the following plan in your workbook. Research the skill and use it to complete the appropriate sections.

TEACHING PLAN	Skill name: _____
Description of skill	Diagram or photograph of skill
Description of area required for teaching	Equipment required
Characteristics of your learners	How will you motivate your learners?
Drills/activities and practice methods (e.g. layup using whole/part/whole practice method)	Diagrams

Performance elements (decision making, strategic and tactical development)
How feedback to learners will be provided
How the level of mastery will be assessed
Evaluation of your lesson



APPLICATION

Implementing the teaching plan

You now need to teach your skill. Choose two or three other students in your class, students from a year 7 class, or have the teacher organise to visit a local primary school where one class could be divided into a number of groups. Keep a copy of your plan with you to be sure you implement it fully as you work through the activities.



INQUIRY

Reflection on my teaching plan and its application

Answer the following questions.

1. *Practice methods*. Did the practice methods work? Were difficulties encountered with learners? How did you address them? What could you do to improve the methods?
2. *Performance elements*. How did you integrate performance elements? What kinds of decision had to be made? Were you able to integrate the skill into a game situation? Were you able to use it in a strategy? Did you ask any questions of learners? How did you encourage creativity?
3. *Characteristics of learners*. What characteristics of learners may have contributed to productive learning? What characteristics did you consider to be negative to the skill learning situation? Were you able to use any characteristics to advantage?
4. *Feedback.* What types of feedback were used during teaching? Do you think any one type was more productive than any other? How important do you consider feedback to be in learning the skill?

After having taught skills, assessment needs to be made of the effectiveness of methods used in terms of improvement in performance. Each type of performance has a number of ways by which it can be measured. It is important to gather information about skill and performance using accurate and well-established techniques to ensure true reflection of performer achievement.

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Characteristics of skilled performers

There is a marked difference between the movements of a skilled performer and those of an unskilled performer. Even to inexperienced judges, the movements of the skilled performer have certain observable qualities: kinaesthetic sense, anticipation, consistency and technique.

Kinaesthetic sense

Kinaesthesis (or kinaesthetic sense) refers to the system of sensitivity that exists in the muscles and their attachments.

A skilled performer has well-developed **kinaesthesis** (or a kinaesthetic sense).

The performer's kinaesthetic sense allows them to 'feel' the movement as they perform it. Inexperienced performers make mistakes because their 'muscle memory' is not fully developed, but highly skilled players are especially alert to movement error and are even able to make corrections and

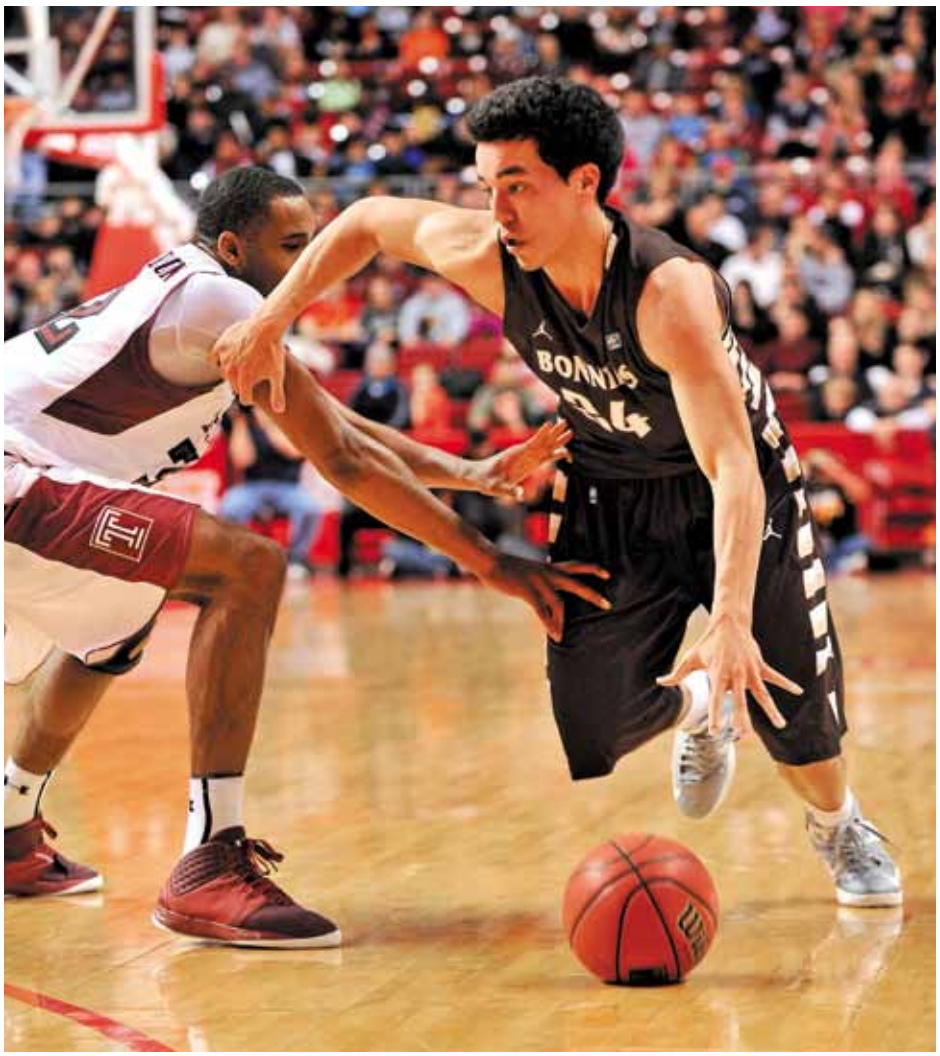


Figure 8.25: Kinaesthetic sense is related to being aware of parts of the body and objects connected to or in control of it.

modifications while executing the movement. Improved kinaesthesis is a direct result of practice. Michael Jordan, reputedly the finest basketballer ever, had remarkable kinaesthetic sense. When playing, his ability to adapt to pressure situations and modify his technique, even while airborne, making a shot, was extraordinary.

Anticipation

Skilled performers are better able to predict what may happen in specific situations. They can quickly and easily predict the possible flight path of the ball, the speed of the ball, the direction of a pass or the direction in which an opponent may move or pass. This skill allows them added time in which to respond. They can then give more attention to out-manoeuvring an opponent.

Anticipation is particularly important in externally paced activities or where fast movement and decision making are necessary, such as in cricket, baseball, tennis and squash. It leads to better timing of responses. A skilful performer can vary the pace of a movement to confuse the opponent and prevent them from anticipating the action. The ability to predict actions can also provide more opportunity to ensure the movement is performed smoothly and with coordination.

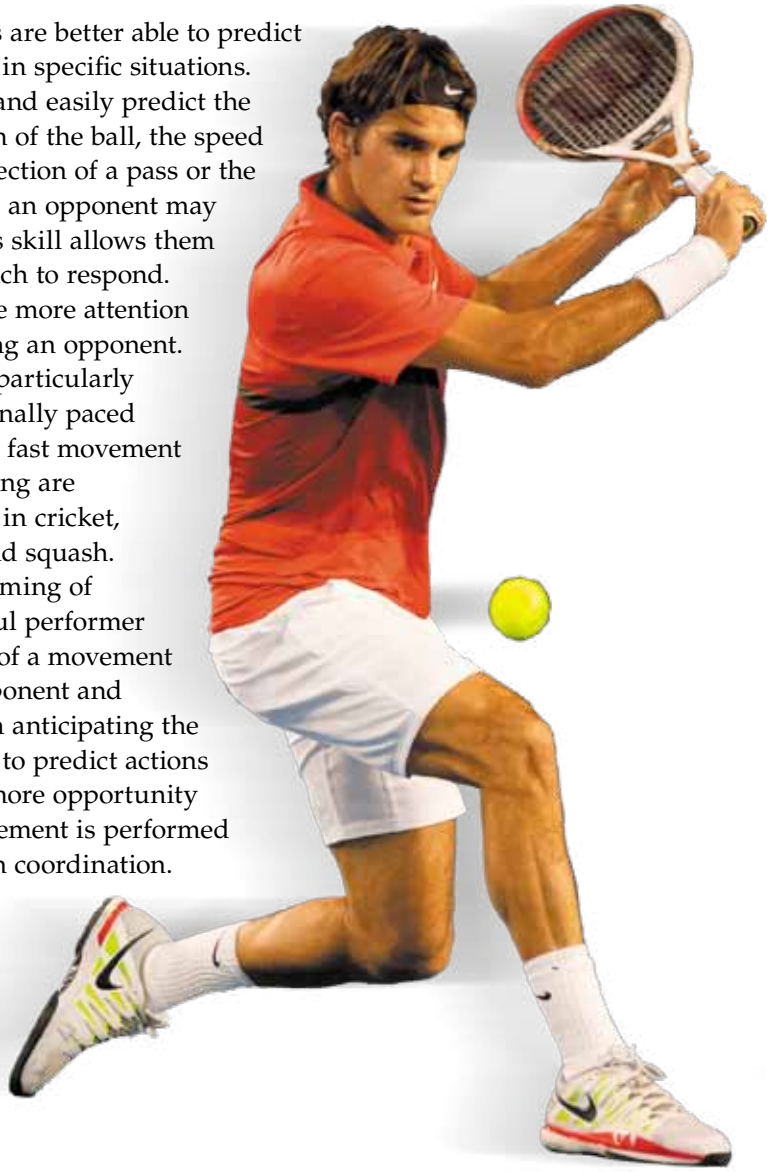


Figure 8.26: The ability to anticipate opponents' shots is important in tennis.

Consistency

Skilled performers show much more consistency than unskilled performers. In other words, the skilled performer is able to perform the desired movement repeatedly. This is easy to observe in games such as tennis, where the skilled performer is more consistent in rallies, managing to clear the net and keep the ball in court more regularly.

Technique

Technique is a procedure or practical method applied to a particular task. For example, if the task is to serve a tennis ball, good techniques have been established whereby players can learn to carry out the procedure in the most effective manner.

Development of good technique or the desired form of skill execution has a number of advantages.

- The movement is economical and will not use more energy than required.
- The movement is skilful, using only the essential muscles.
- The movement is aesthetically pleasing.
- The action has a better chance of being successful because good technique has a sound biomechanical platform.
- The action has a better chance of holding up under pressure.
- The performer has less chance of sustaining injury during execution of the movement.
- Good technique is fundamental to achieving at the higher level.

Good technique is an observable characteristic of skilled performers. It enables elite tennis players to serve at high speeds, apply bounce and topspin, and participate in rallies for extended periods of time. Good technique is fundamental to golfers, enabling them to drive big distances; basketballers to shoot successfully; and cricketers to achieve many runs. In essence, good technique is 'best practice', requiring development through drills and game-related activities.

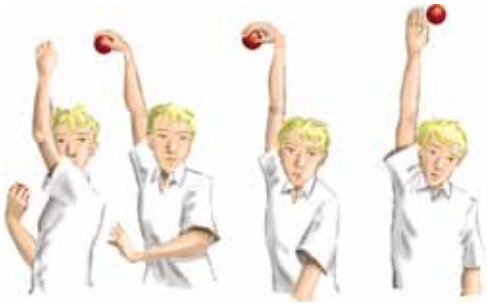


Figure 8.27: The techniques of skilful performers have developed through careful analysis and practice.

INQUIRY

Technique

eBookplus

Use the **Technique** weblink in your eBookPLUS, read the information on technique, then answer the following questions.

1. What is good technique?
2. Why is good technique important?
3. Choose 'jumping and landing', 'throwing and kicking' or 'grip and posture'. Explain how good technique is applied in your skill.

INQUIRY

Video analysis

Play a video or DVD of an elite sports performance — for example, *Michael Jordan's Playground*, World Cup soccer or a tennis or golf major. Identify and explain one instance of where you saw examples of each of the following:

- kinaesthetic sense
- anticipation
- consistency
- technique.

Discuss your observations with the class.

Objective and subjective performance measures

Measurement is the process of using numeric information to assess a particular physical ability. The information may be presented in the form of times, distances or guidelines. The greater the accuracy of measurements, the more reliable the data will be. Speed measurements using stopwatches or electronic timing, or distance measurements using tape measures, for example, provide reliable information on which to assess a performance

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Subjective observation refers to a judgement of performance quality based on feelings, impressions or opinions rather than a measurement system.

Objectivity is the extent to which a measure or test is independent of the observer.

because the devices are accurate. Where measurement is not part of the process of gathering information, assessment of the performance tends to be **subjective** and subsequently less accurate. The use of instruments such as measurement tapes and stopwatches makes data more credible by eliminating guesswork; in other words, it increases the degree of **objectivity**.

A completely objective observation occurs when judges or testers apply the same criteria to measure a performance and do not need to interpret information. Their scores should thus be consistent. In a high jump event, for example, judges use the same measuring scale to determine the height jumped by a competitor. This is a very objective measure because there is virtually no disagreement among the judges.

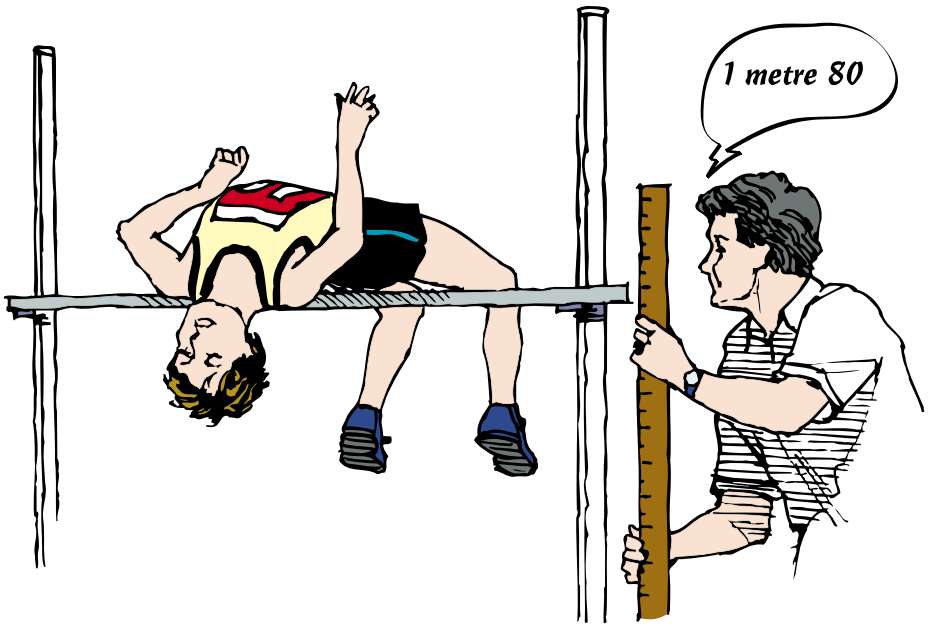


Figure 8.28: An objective observation of performance

Objectivity runs on a continuum from highly objective to slightly objective. Some performances, such as a sprint, high jump or javelin throw, are easily measured because a uniform scale of measurement (a stopwatch or tape measure, for example) is used. Appraisal here is highly objective. Other activities, such as judo and fencing, require expert interpretation of special rules. Additionally, team games need to be appraised by competent officials who are familiar with proper adjudication procedures. Appraisal of these types of activity is still objective, but not to the same extent. Two judges rating a diving performance may disagree considerably because there are variables such as the degree of diving difficulty. Thus, there is more room for subjectivity to affect the assessment.

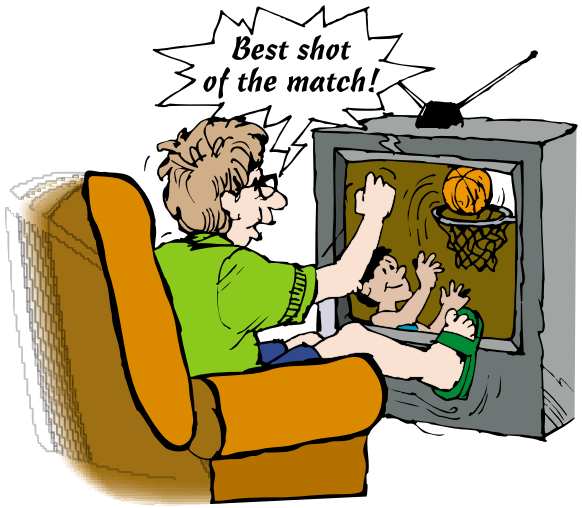


Figure 8.29: A subjective observation of a movement performance

Observations can be made more objective by using:

- *checklists* — lists that include elements such as style, technical correctness, sequencing and execution of the required skill
- *measurement systems* — instruments that accurately discriminate one set of data from another (for example, measuring tapes)
- *established criteria* — a set of procedures, rules or guidelines that indicate how an activity is to be assessed

- *rating scales* — a degree-of-difficulty sheet that awards more marks for movements that are difficult to perform.

The difference between objective and subjective appraisal is illustrated in table 8.3.

Table 8.3: Objective versus subjective appraisal

Activity	Objective assessment	Subjective assessment
Basketball	The throw for goal went through the basket.	The offence scored as a result of poor positional play by the defence.
Gymnastics	The gymnast scored 7.0 on the floor routine.	The floor routine lacked creativity.
Swimming	She completed the 50 metre race in 32.7 seconds.	Her slower time was caused by a faulty bilateral breathing technique.

Validity and reliability of tests

Validity is the honesty of a test — that is, the degree to which it measures what it is supposed to measure.

For a test to be considered credible, it needs to meet certain criteria. **Validity** is the first essential characteristic.

Is the 12-minute run test, for example, a measure of cardiorespiratory endurance or a measurement of something else? We accept that it measures fitness because a major part of the test involves running, which we know develops heart and lung capacity. This fact, together with a review of research, tells us that the relationship between this test and this performance component has been tested many times. However, what about cycle ergometry as a test of our ability to swim 50 metres? We immediately have doubts based on the knowledge that the skills (cycling and swimming) are quite different in (a) the way in which they are performed, (b) the energy systems that they used and (c) the muscle groups involved.

Establishing validity is about determining the strength of a relationship between a performance component (for example, strength) and a test designed to assess that component (the handgrip dynamometer test). Relationships already exist between components and tests that we do not question — for example, a car speedometer as a measure of the speed of the vehicle; a barometer as a measure of air pressure; and a 50 metre sprint as a test of speed. However, the strength of these relationships would have been questioned and tested some time ago, and finally proved beyond reasonable doubt. Continual scrutiny and checking provided credibility to the extent that we no longer question these relationships.

The techniques commonly used to enhance the validity of a test include:

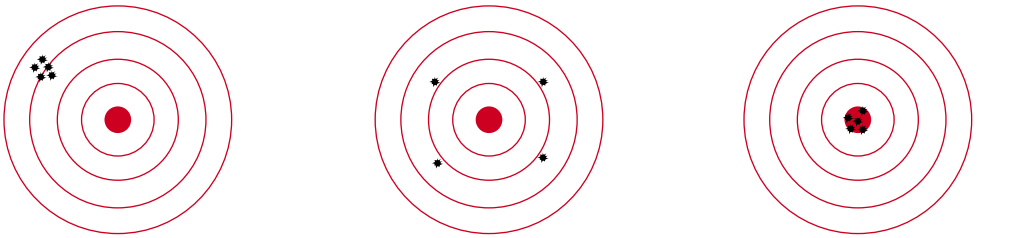
- *judgements about the test items*. We assume for a particular item — for example, the ability to jump — that known good performers score better than known poor performers. If this occurs when the test is administered, then the validity of the test is increased.
- *using already validated but similar tests as an indicator*. If the relationship between the validated test and the new test is close, then it gives strength to the validity of the new test.
- *accuracy in prediction*. The validity of a test is increased if it is a reliable indicator of future performances.
- *ensuring test items contain the component being validated*. A speed test, for example, needs to have running as a component, because simple observation tells us that running is the major part of the test.

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Use of a range of these measures strengthens a test's validity. It would suggest that a single-item test would be satisfactory for assessing the validity of a single skill — for example, the grip dynamometer as a test of strength. However, for a game such as hockey, which comprises a large number of movements, it would be more appropriate to use a battery of test items. The validity of a hockey skills test would be increased by the inclusion of a range of skills from the game. A test battery — including the measurement of agility and coordination, together with an assessment of the individual's ability to hit, dribble and trap — increases the validity of a hockey skills test. It would be called a valid test if the test items measured those skills and abilities represented in the game.

Reliability refers to the degree of consistency of a test — that is, the ability of the test and tester to produce the same results on successive occasions.

A test also needs to have **reliability**. The 50 metre sprint test, for example, is a reliable test of speed if the same tester repeats the same test on the same subject under the same conditions and consistently finds very similar results. Reliability in testing can be improved by the use of similar procedures, conditions and equipment as originally prescribed. If the speed test of the athlete is conducted on successive weeks and the conditions vary considerably (no wind on the first week and a strong headwind on the second, for example), then the degree of reliability decreases considerably.



1. Good reliability, poor validity
2. Poor reliability, better validity (on average)
3. Good reliability, good validity

Figure 8.30: Validity has more to do with accuracy, while reliability has more to do with precision.

Personal versus prescribed judging criteria

Criteria refer to the standards or qualities that are used for judging the value of a performance. There are two forms: **personal criteria** and **prescribed criteria**.

Personal criteria are the preconceived ideas or expectations that an individual brings to judge a performance.

Prescribed criteria are established by a sports organisation or body and form the basis of assessment for competitions in that sport or activity.

Personal criteria are frequently used by coaches when they select a team for the following week based on this week's performance. They may feel that some team members played well and deserve to hold their positions for the next game. Spectators use personal criteria when evaluating dance performances, movies and test matches because their assessments are based on feelings and impressions rather than assigned criteria.

Judgements based on personal criteria rely on feelings and emotions as a measurement tool. A judge's preconceived attitudes, expectations, opinions and possible bias may contribute to judgements that others may believe to be incorrect or unjustified. In some cases, judges may be unaware of the strength of their personal conviction towards particular elements of a performance and unwittingly favour certain aspects. For these reasons, total reliance on personal criteria is more suited to appreciation of performances rather than to the impartial judgement of one performance compared with another.

Appraisal is a judgement about the quality of something or somebody.

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In top level competition in sports such as gymnastics, dance and diving, **appraisal** is initially quite subjective. In other words, judges watch a skill such as a dive and form an impression based on appreciation of the movement. However, they then apply the prescribed criteria to standardise interpretations as much as possible. This adjusts their subjectivity along a continuum to an area where it is seen to be more objective. The more rigorous the criteria and the more competent the judges in applying the criteria, the more objective is the appraisal.

While it is impossible to make judgements totally objective in performances such as these, the use of prescribed criteria seeks to absorb elements of subjectivity into a more objective framework. A judge's use of prescribed criteria, such as checklists, rating scales and degree of difficulty charts, helps to more accurately convert the appraisal into meaningful measurements such as a score and something to which an audience, spectators and fellow judges can relate.

For organised competitions, judges are usually supplied with prescribed criteria well before the event. They may discuss interpretations of the criteria, of which some may need clarification. The criteria in the dance evaluation sheet in table 8.4 are prescribed — that is, the skills checklist has predetermined data for assessment and notes the areas on which to focus. During a competition, a judge matches the performance to the criteria to rate the standard of the performance.



APPLICATION

Using prescribed criteria

Use the criteria in table 8.4 to appraise a video of a dance performance. As a class, compare your scores and remarks.

Table 8.4: A dance evaluation form is an example of prescribed criteria.

Criteria		Level of achievement				
		Inadequate 1	Limited 2	Sound 3	High 4	Outstanding 5
Use of the element of composition	• Space (floor pattern, shape, focus etc.) • Rhythm elements (beat, accent, tempo, phrasing) • Relationships (variation, groups etc.) • Flow (uninterrupted) • Force (change in the dynamics) • Time					
Composition	• Musicality • Structure • Choreography					
Performance	• Technical ability • Presentation					



INQUIRY

Assessing quality of performance

1. How would the criteria be established for making an assessment such as that in the application above? How would you change the criteria?
2. How did your ranking of performance in the above application compare with that of others in the class? Does your ranking indicate a skilled performance? Why?

INQUIRY

Objective and subjective performance measures

Choose one type of performance where the method of appraisal is predominantly subjective and another performance that would be best assessed using objective measures. Use an enlarged copy of the following chart to contrast your findings. Justify the appropriateness of techniques selected.

Subjective measurement	Objective measurement
Type of performance	Type of performance
How this performance is measured	How this performance is measured
Justification of appropriateness of techniques	Justification of appropriateness of techniques

SUMMARY

- Learners progress through three recognisable stages of learning skills: the cognitive (beginning) stage, the associative (practice) stage and the autonomous (automatic) stage. Some learners may not reach the autonomous stage in the execution of specific skills.
- The learner brings many characteristics to the learning situation. Personality, heredity, confidence, prior experience and ability particularly influence the direction of the learning experience.
- The learning environment encompasses areas including the nature of the skill, performance element, practice methods and feedback.
- Open skills such as tackling in rugby occur in an environment that is unpredictable and frequently changing.
- Closed skills such as vaulting in gymnastics occur in an environment that is stable and predictable.
- Gross motor skills such as swimming require the use of large muscle groups for execution.
- Fine motor skills such as catching require the use of only small muscle groups to perform the movement.
- Discrete skills such as throwing have a distinctive beginning and end that can be identified.
- Serial skills such as bowling in cricket involve a sequence of smaller movements that are assembled to make a recognisable skill.
- Continuous skills such as swimming have no distinct beginning or end.

- Self-paced skills are movements for which the performer determines the timing and speed of execution.
- Externally paced skills are movements for which an external source controls the timing.
- Performance elements include important game components such as decision making, strategic development and tactical development.
- Strategic understanding refers to the way we play, where we should be at a particular time and what to do, such as returning the ball in tennis using backhand.
- Tactical awareness is about utilising ways of gaining an advantage over an opponent; for example, using a cut-out pass in rugby league or 'double teaming' an opponent in basketball.
- Massed practice involves a continuous practice session, with the rest intervals being shorter than the practice intervals.
- Distributed practice (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals.
- Feedback constitutes an important role in the learning process because it provides guidance and helps the performer eradicate movement error.
- The many types of feedback include internal, external, concurrent, delayed, knowledge of results and knowledge of performance.
- Assessment of skill and performance includes knowledge of characteristics of skilled performers, objective and subjective performance measures, validity and reliability tests, and personal versus prescribed judging criteria.
- Skilled performers possess observable attributes that make their performances distinctively different from those of poorly skilled performers. These features relate to mainly kinaesthetic sense, anticipation, consistency and technique.
- A large number of tests measure skill. To be credible, the tests need to be both valid and reliable.
- Judging the quality of performance requires the establishment of standards. While personal criteria may be acceptable in some situations (such as where appreciation is the focus), prescribed judging criteria are essential for important competitions.

QUESTIONS

Revision

1. Explain the main features of each of the stages of skill acquisition. (H9) (3 marks)
2. Discuss why some learners may not progress to the third stage of skill acquisition. (H9) (3 marks)
3. Justify the need for demonstrations for learners who are in the cognitive stage of skill acquisition. (H17) (5 marks)
4. Explain how the specific characteristics of a learner may have an impact on a teaching/learning situation. Use an example in your answer. (H9) (4 marks)
5. Explain the difference between each of the following:
   (a) open and closed skills
   (b) discrete and continuous skills
   (c) a self-paced and an externally paced skill. (H9) (3 marks)
6. Describe a learning situation in which distributed practice would be preferable to massed practice. Account for your choice of this method of practice. (H16) (5 marks)
7. Explain how an understanding of performance elements can improve performance. (H8) (4 marks)

8. Use the **Skill classification** weblink in your eBookPLUS. Draw a table similar to the one below. Use the text and the website information to provide two examples of each of the listed skill classifications. (H9) (5 marks)

Skill classification	Example 1	Example 2
Gross motor		
Fine motor		
Open		
Closed		
Externally paced		
Internally paced		
Discrete		
Serial		
Continuous		
Massed practice		
Distributed practice		

9. Use examples to explain the difference between massed and distributed practice. (H9) (2 marks)
10. Choose any complex skill and describe how it would be taught using the whole and the part method. (H9) (4 marks)
11. Explain how feedback improves performance. (H8) (3 marks)
12. Explain the difference between concurrent and delayed feedback. (H9) (2 marks)
13. Discuss the importance of knowledge of results and knowledge of performance to learning a tennis serve. (H10) (4 marks)
14. Use the **Kinaesthetic sense** weblink in your eBookPLUS. Read the information and use it to write a paragraph about kinaesthetic sense, describing what it is and how it can be further developed. (H9) (3 marks)
15. Choose an individual in an elite sport. Explain how the athlete's kinaesthetic sense and mental approach make their performance more skilled than that of a non-elite sportsperson. (H9) (4 marks)
16. Outline the difference between objective and subjective performance measures. (H16) (2 marks)
17. Discuss the difference between validity and reliability in the design of a fitness test. (H16) (4 marks)
18. Discuss the difference between personal and prescribed judging criteria. How may each be used in assessing the quality of performance? (H17) (5 marks)

Extension

Use a video recorder and, with permission, record a class physical education lesson or a sports club training session. Observe how skills are being taught. Report on the various forms of internal and external feedback observed, and comment on the effectiveness of each in improving skills learning. (H16) (8 marks)

Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

Options

CHAPTER 9
The health of young people



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H2**, **H5**, **H6**, **H14**, **H15**, **H16** from the PDHPE HSC syllabus.

CRITICAL QUESTION

What is good health for young people?

The nature of young people's lives

Who makes up the group in our population that we refer to as 'young people'? For the purposes of this chapter, young people are considered to be those individuals aged between 12 and 24 years. Between these ages, the individual will make the transition from child to adult, the life stage known as **adolescence**.

Adolescence is characterised by rapid physical growth and is accompanied by emotional, mental and social maturation. It is considered for some a time of turmoil, but in reality many adolescents pass through this period easily. As teenagers' bodies reach adult proportions, their ability to think and reason becomes more developed. This is often when values are clarified and, after **puberty**, when adult sexual urges begin.

Adolescence is the transition period from childhood to adulthood.

Puberty is a stage in the life cycle when rapid physical changes occur that signify that a person has reached sexual maturity.

For males
- Sperm production begins.
- Erections begin to occur.
- Ejaculation and wet dreams occur.
- Muscles develop.
- The voice box enlarges and the voice deepens.
- Hair grows on face, under the arms and in the groin area.





For females
- Menstruation begins.
- Breasts develop.
- Extra layers of fat are deposited.
- Hips widen.
- Hair grows under the arms and in the groin area.

Figure 9.1: The physical changes experienced during adolescence

Society generally regards adolescents as relatively inexperienced in life, so they are not always given the opportunity to make decisions for themselves. Adolescents' rapid mood swings, attributed mainly to changes in **hormones**, might also arise out of the frustration of feeling like adults but not being in full control of their lives.

Hormones are chemical messengers in the body. They are essential for physical growth and maintenance.

Because many adolescents yearn for independence, their natural reaction to being dominated is often to rebel. This can partly account for the high level of risk-taking behaviour and experimentation that is associated with this age group. Unnecessary risk taking, such as driving at excessive speeds or misusing drugs, accounts for many premature deaths or injuries in young people. In response to these and other similar behaviours, society enforces limits in an attempt to protect adolescents from harm. The government sets legal minimum ages for drinking alcohol, driving a car, having sex and getting married.

The difficulties encountered during adolescence do, however, have a benefit in that they give adolescents experience in dealing with problems and developing skills that improve resilience. **Resilience**, which is the ability to 'bounce back' from difficulty, is an important factor in promoting the good health of young people.

Resilience is the ability to 'bounce back' after difficult times or bad experiences.

Variations in the developmental stage for young people

Although we can group young people together under a label, they are in fact a diverse group in terms of the following characteristics and backgrounds.

study on
Concept code: PDH-076
Do more
Variations in the development of young people
Practice HSC exam questions

study on
Concept code: PDH-077
See more
Influence of family and peers
Practice HSC exam questions

- *Rate of physical development:* individuals mature at different rates, with rapid growth spurts affecting some individuals earlier than others. A young person's physical maturity may not always be matched by emotional maturity.
- *Level of motivation:* a person's level of motivation is a result of their mental attitude and their emotional maturity. These can be affected by life experiences, family values and self-esteem. Young people are often labelled 'lazy' or 'unmotivated' because the habits and values of their peers concerning leisure time conflict with those of the family.
- *Socioeconomic background:* inequality in the distribution of wealth means that many young people have limited opportunities while others seem to have the world at their feet.
- *Sociocultural background:* the multicultural nature of Australian society means that a variety of customs, beliefs and traditions influence young people's lifestyles. As young people mix socially, they absorb new experiences that promote personal growth.

Many other changes in young people's lives can be highlighted in the progression from childhood to adolescence. Children's experiences involve a great deal of play and the learning of new physical, intellectual and social skills, all under the protection of family or carers. In adolescence there is a greater emphasis on studying and acquiring the skills needed for a career, and an acknowledgement that young people are acquiring the skills that will see them through to social and financial independence.

Influence of family/peers

The influence of family can differ for young people in Australia. For example, some families place a strong emphasis on the obligations to care for elderly relatives or younger siblings, or to help in a family business. Some families impose firm rules and restrictions on adolescents through concern for their safety, while others appear to allow young people greater freedom. Communication and shared respect between parents and sons or daughters becomes more important in dealing with issues that arise during adolescence.



The influence of the peer group grows during adolescence and can influence young people's attitudes and behaviours in many ways; for example:

- in a positive way, as when peers support each other in not smoking
- in a negative way, as when they encourage each other to take risks on the road.

During adolescence, the growing influence of the peer group may become a source of conflict with parents.

Figure 9.2: The influence of the peer group increases during adolescence as young people tend to spend more time with friends.

APPLICATION

A case of peer pressure

View a Road Whys video on speeding and drink-driving. After watching the video, discuss as a group:

- the pressures being exerted on the characters
- whether the pressures are different between the sexes
- how this may affect the health of young people.

study on

Concept code: PDH-078

See more
Influence of youth cultures

Practice HSC exam questions

The influence of prevailing youth cultures

Youth for a long time has had a culture of its own. In the 1960s, a 'counter culture' was said to exist. 'Hippies' and others protested against the Vietnam War and nuclear arms, and advocated free love as a reaction to conservative society. The 1990s saw the development of rave culture, dance parties and styles such as grunge. Styles of music such as techno and rap were quickly packaged and marketed by businesses. It was the commercial world that identified the potential of a 'cashed up' youth, eager to spend big dollars to obtain the symbols that represent their particular youth culture.

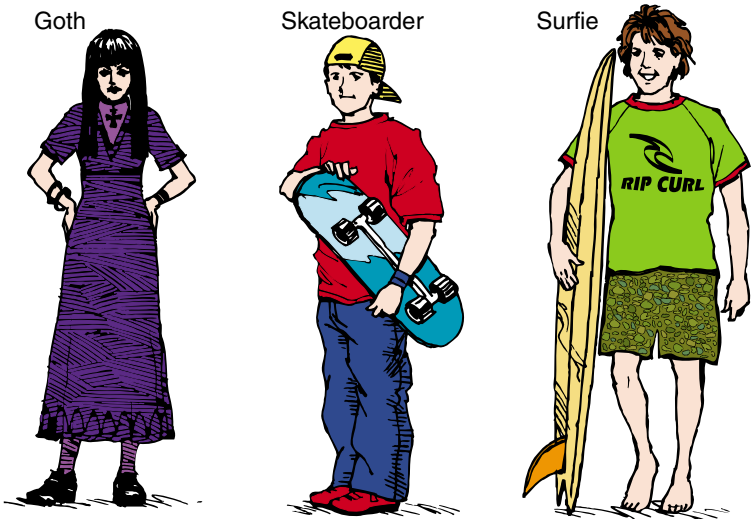


Figure 9.3: Examples of youth culture

The need for some young people to develop a certain look and be part of a youth subculture is all about trying to express their feelings about the world around them. This can be used to confirm their identity and may be important in maintaining self-esteem and self-confidence.

There are some youth cultures that provide a way for young people to resist the established order by creating their own language and lifestyle. Certain youth cultures stand out more than others, such as goths, homies, skateboarders and surfies. The members of each youth culture use symbols and clothing to identify themselves. The mass media — that is, newspapers, television and magazines — have sometimes promoted the various youth cultures throughout the world. An example was punk culture in England. Punks wore Doc Martens boots, safety pins and spiked hairstyles. This youth culture soon found many teenagers in Australia keen to identify themselves this way.

Involvement with a youth culture is not necessarily a negative influence. The support and security that is provided by being part of a youth culture can be essential for some young people to develop into well-adjusted adults.

Adults are increasingly aware of and sometimes more tolerant towards youth cultures, but there is still said to be a 'generation gap'. This gap tends to be exaggerated, as it has been found that young people's opinions often reflect those of their parents on basic issues.

INQUIRY

Youth cultures

1. Ask your parents or guardians about their youth and the cultures that existed in their era (you may hear about rockers, bodgies, sharpies, surfies and skinheads, depending on the age of your parents). Report back to the class.
2. It has been said that the predominant youth culture of a particular time is an indicator of what is happening in the rest of society; that is, life is good or bad.

Do you agree or disagree? Use a T chart to outline your points 'for' or 'against' this view.

3. Society and public opinion is swayed by the media's portrayal of the various youth cultures. Critically analyse how this bias affects young people and write a brief summary. Provide examples to strengthen your response.

study on

Concept code: PDH-079

See more
Influence of global events

Practice HSC exam questions

The influence of global events and trends

Modern communication systems have created a world in which events and news are transmitted around the world almost instantaneously. Images and reports from war-torn countries, regions gripped by floods or famine, environmental disasters or violent sports matches are flashed across television screens throughout Australia each evening. These images can affect young people and they may develop a pessimistic view of the future. While it appears bad news travels fast, it needs to be balanced with the view that much good news happens in the world but this is often less reported.



Figure 9.4: Young people — thinking globally and acting locally

Environmental pollution disasters and concerns about climate change have also prompted young people into action in their community. The success of the Streamwatch programs in some schools shows that young people can make a difference in pollution management.

Besides being involved in environmental health issues, young people are being asked to join in other forums that contribute to debates. At these forums, young people discuss issues that impact on health such as drugs and youth suicide, which affect young people in many countries. It is with the support of governments that young people are becoming more involved in making the decisions that influence their future.

International competitions, such as the Olympics, the Davis Cup, the soccer World Cup and World Series Cricket, influence young people by increasing their participation rates in the various sports. This is a definite bonus for Australia. Public commentators have noticed that Australians tend to follow overseas trends, particularly those from the United States. This can have both positive and negative consequences. An example of a positive influence is the rise in popularity of basketball. However, a negative influence might be a rise in violence in schools. The rave scene was another example of a trend to reach Australia. With its all-night dance parties, rave has contributed to the growth in the use of ecstasy and 'ice' as 'party' drugs, another alarming trend that is affecting the health of young people.

INQUIRY

The effect of globalisation on youth

The internet and the mass media have made the world a relatively small place. Young people, more than ever, are aware of global issues such as climate change, human rights issues, and racial and sexual inequalities. Young people are encouraged to take action and be part of the future. Debate the positive and negative effects of globalisation on the identity of young people.

study on
Concept code: PDH-080
Practice HSC exam questions

Influence of technology

Technology plays a large part in the lives of young people today and has been both positive and negative in its influence. The rapid advances in communications technology over the last two decades have led to wide use among young people of the internet, email, Facebook, Twitter, blogs, mobile phones, iPods and iPhones. This information and communication revolution means young people have far greater access than their parents did to information from around the world, and are able to communicate locally and internationally at any time of the day or night.

Due to the rapidly changing nature of technology, new jobs are continually being created that young people find easier to access than older people. Jobs such as software developers, programmers and web page designers are relatively new. The specific nature of these jobs means that some young people can be on high salaries because of the demand by businesses for these skills.

Through the World Wide Web young people also have virtually unlimited access to music, computer games, videos and information regardless of its classification. While adults may try to filter what influences young people's lives, young people are then only challenged to find new ways to get around this censorship and then pass it on to their friends.



Figure 9.5: Young people use technology for social interaction as well as for information and learning.

Young people use a technologically based language many adults do not understand. Abbreviations and code words are used as they communicate across extensive social networks that can extend internationally and run around the clock. The need to communicate with other young people is very strong and has in part contributed to a generation of young people with multitasking skills. It is fairly common to see a young person simultaneously typing on Facebook to friends, listening to music on their iPod and watching the latest television program from Foxtel.

However, the rapid increase in technology used by young people has created some problems. Some young people find they get caught in expensive

contracts or are unable to restrict their usage, resulting in high personal debt. Parents feel pressured to provide mobile phones at increasingly younger ages to their child so the child doesn't feel socially isolated. The theft of mobile phones is quite high and is sadly seen by most young people as not being a real crime. Young people who have had their phone stolen can become quite distressed by its loss and suffer depression because it stores so much information. The replacement costs for stolen phones can also be a drain on the family or person's budget.

Young people have unrestricted and generally uncensored access to material on the internet. Violent images seen on the computer screen may be repeated many times and shared with others, leading to a desensitising of young people towards violence. Websites such as YouTube enable the uploading and viewing of videos of young people engaged in risk-taking behaviours or stunts. When others copy such behaviours they can suffer serious injuries if stunts go wrong.

New medical conditions have emerged for some young people. Nintendo thumb and Wii shoulder injuries are a result of repetitive movements and strain on joints. Warnings now appear on some games to remind young people to take a break, or get out and exercise to help prevent these injuries and reduce the risk of the onset of hypokinetic diseases such as obesity. The number of hours a young person spends using technology is generally at the expense of being involved in physical activity and is a concern for the future.

Technology has also opened up some negative social issues for young people. Instances of cyberbullying and identity theft are increasing and cause tremendous stress and anguish for young people. The wide use of mobile phones and the internet has resulted in parties being crashed by large groups of uninvited people (see page 325).



INQUIRY

Influence of technology on young people's lives

Draw up a table to summarise your views on the influence of technology on young people's lives, using columns headed 'Positive influences' and 'Negative influences'. Share your table with other class members and discuss the general findings.



APPLICATION

The comparison of today's youth with the past

Interview a person from each of the following age groups: 20–30, 50–60 and 70+. Determine the differences and similarities between being a young person today and in the past. The people you interview could be teachers, parents, neighbours or grandparents. Design questions similar to the following and conduct an inquiry.

1. What did you do for entertainment when you were young?
2. What age did you start your working life and how did you get a job?
3. What were you expected to do at home?
4. Describe any problems you had to face as a young person.
5. Describe your experience of being a young person.
6. Were you a member of a particular group or gang? If so, why did you join?

Discuss the responses to your inquiry with the class. Then briefly outline the most significant changes that have taken place in adolescent behaviours and interests over the last half-century.

Epidemiology of the health of young people

The good news for Australia's young people is that most do enjoy good health and it is getting better. They experience the lowest rate of disability of all age groups. Youth mortality rates have halved between 1987 and 2007, largely due to declines in the injury and poisoning rate. There are, however, still some areas of concern that need priority and these are discussed later in the chapter.

Patterns of morbidity and mortality

Young people (12- to 24-year-olds) are among the healthiest people in the whole population. They require fewer health-care services, but are prone to greater risks, which ultimately affect their physical, social, emotional and mental development. In relative terms, they experience lower rates of **mortality** compared with other population groups, but a higher level of **morbidity** in specific areas of their health.

Mortality refers to the number of deaths in a given population from a particular cause and/or over a period of time.

Morbidity is the incidence or level of illness or sickness in a given population.

Mortality

Young people are more likely to die as a result of a preventable cause of death. The death rate for males remains consistently higher than females and is probably related to behavioural causes such as greater risk-taking in the workplace and in social settings. The overall picture does, however, indicate a steady decline and levelling off of mortality rates over the past decade. The major causes of death for young people are accidents, poisonings, violence, suicide and cancer.

study on

Concept code: PDH-081

Do more
Patterns of morbidity and mortality

Practice HSC exam questions

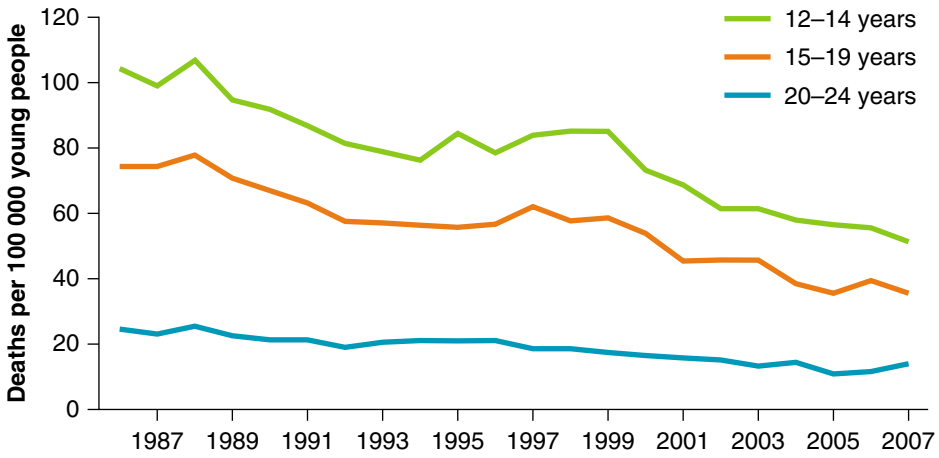


Figure 9.6: Death rates for young people aged 12–24 years, 1986–1987

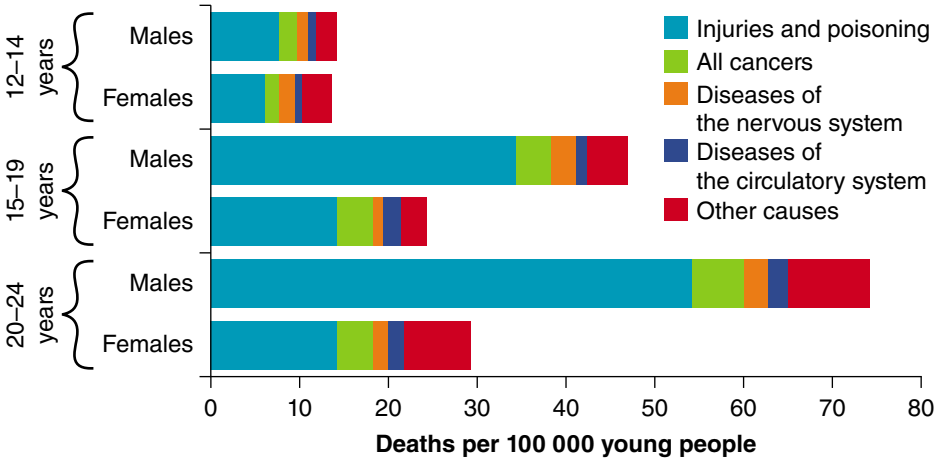


Figure 9.7: Leading causes of death among young people aged 12–24 years, 2007

INQUIRY

Mortality and young people

Write five statements that describe trends and information indicated in figures 9.6 and 9.7. Share your statements with the class.

Morbidity

For the general population, the leading causes of morbidity (illness and injury) are circulatory diseases and cancer. For young people, the patterns of morbidity are very different. The leading causes of morbidity in persons aged 12–24 years are mental disorders, injury and poisoning.

Table 9.1: Leading causes of burden of disease and injury (DALYs: disability adjusted life years) for 15–24-year-olds, by sex, 2003

Rank	Males	DALYs ('000)	Per cent of DALYs	Females	DALYs ('000)	Per cent of DALYs
1	Anxiety and depression	17 868	17.4	Anxiety and depression	29 946	31.8
2	Road traffic accidents	10 380	10.1	Asthma	6 641	7.1
3	Schizophrenia	9 795	9.6	Migraine	6 217	6.6
4	Suicide and self-inflicted injuries	7 320	7.1	Other genitourinary diseases	5 676	6.0
5	Heroin or polydrug dependence and harmful use	5 657	5.5	Schizophrenia	3 754	4.0
6	Alcohol dependence and harmful use	4 848	4.7	Road traffic accidents	3 572	3.8
7	Migraine	3 539	3.5	Personality disorders	2 622	2.8
8	Cannabis dependence and harmful use	3 520	3.4	Bulimia nervosa	2 576	2.7
9	Personality disorders	3 130	3.1	Bipolar disorder	2 450	2.6
10	Bipolar disorder	2 672	2.6	Anorexia nervosa	2 063	2.2
	All causes	**102 476**	**100.0**	**All causes**	**93 985**	**100.0**

Source: S. Begg, T. Vos, B. Barker, C. Stevenson, L. Stanley and A. Lopez, *The burden of disease and injury in Australia, 2003*, cat. no. PHE 82, AIHW, Canberra, 2007; cited in *Young Australians: their health and wellbeing*, AIHW, 2007, p. 21.

SNAPSHOT

Young people: their mortality and morbidity

The following information is adapted from the Australian Institute of Health and Welfare report, *Young Australians: their health and wellbeing*, 2011.

Mortality

- Life expectancy continues to improve. A boy born in 2008–10 can expect to live to 79.5 years, girls 84.0 years.
- Over the years there have been decreased death rates for injury. Road traffic accidents declined substantially between 1989 and 2009, from 28 per 100 000 young people to 9 per 100 000 young people. Suicide

(continued)

deaths declined between 1997 and 2007, from 19 per 100 000 young people to 10 per 100 000 young people.
- Young indigenous death rates remain above young non-indigenous death rates.

Morbidity

- In 2008, 93% of young people rated their health as 'excellent', 'very good' or 'good'.
- Asthma prevalence and hospitalisations among young people have declined.
- Notifications for hepatitis (A, B and C) among young people have substantially declined.
- Cancer survival continues to improve, with a 96% survival rate from melanoma of the skin.

Areas of concern

- Indigenous young people have poorer outcomes in many areas (for example, death rates are over twice as high).
- The incidence of insulin-dependent diabetes is increasing (41% increase since 2001).
- Notifications for sexually transmissible infections have increased four-fold, mostly due to increases in notifications for chlamydia.
- Death rates from road transport accidents and suicide are still high, particularly for males.
- Intentional self-harm among females is also of concern.

Source: AIHW, *Young Australians: their health and wellbeing*, 2011.

study on
Concept code: PDH-082
Practice HSC exam questions

Comparisons of health status with that of other age groups

As we have seen, the health of young people is generally good when compared with the health status of other age groups.

The leading causes of death among young people, categorised under 'Injury and poisoning' (see figure 9.8), include motor vehicle accidents, suicides or intentional self-harm and drug-related deaths, although the rates for all of these have dropped over the last decade. In older populations, cancer and cardiovascular disease take over as the leading causes of death, as shown in figure 9.8.

If we examine health data for other age groups in the population we see significant differences in the health status of those groups when compared with young people. Following are two examples.

Health status of infants and young children

The major factors affecting the health of young children and infants (aged from birth to 14 years) are:

- congenital malformations
- accidents and injuries
- perinatal (around the time of birth) conditions
- juvenile diabetes.
- infections and parasitic diseases

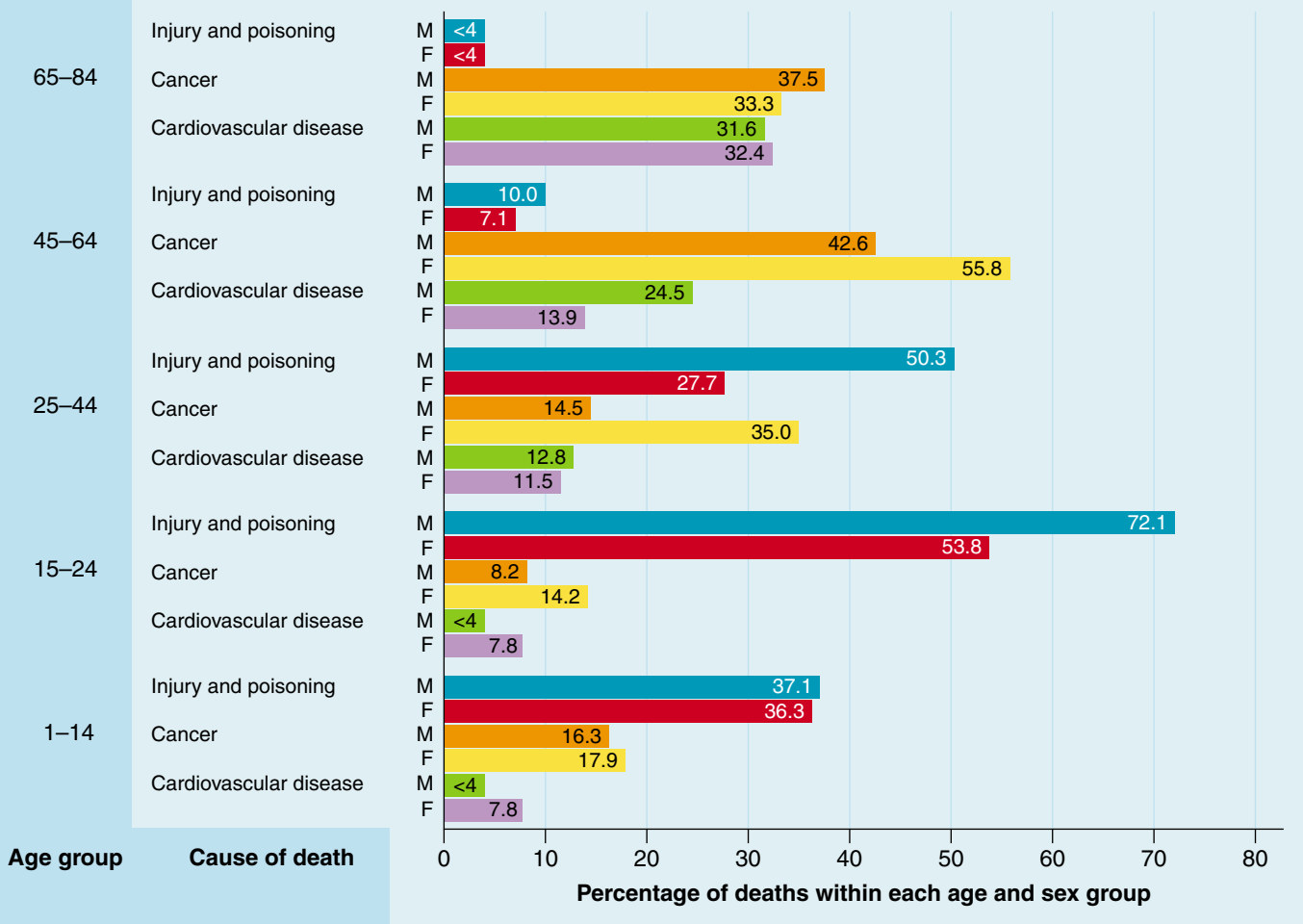


Figure 9.8: Comparison of the leading causes of death, by age and sex groups (*Source:* AIHW National Mortality Database; data for graph obtained from *Australia's health 2010*, Australian Institute of Health and Welfare, table 2.11, p. 51.)

The main conditions resulting in hospitalisations of this age group are:

- boys aged 1–4 — diseases of the ear and mastoid process, acute respiratory infections and chronic obstructive pulmonary disease (COPD)
- girls aged 1–4 — diseases of the ear and mastoid process
- boys aged 5–14 — fractures, dislocations, sprains and strains
- girls aged 5–14 — upper respiratory diseases.

Health status of people aged over 65

The leading causes of death for older people are cardiovascular disease, stroke and cancer. Older people are living longer and some health problems are associated with longevity (the longer life span). The most common general health problems experienced by the elderly are:

- arthritis
- vision and hearing problems
- hypertension
- circulatory diseases
- dementia.

The elderly population continues to have higher rates of hospitalisation than other age groups and they tend to stay in hospital for longer periods.

INQUIRY

Comparing the health status of other age groups

Using the information in figure 9.8, in the text and from your own further research, choose another age group and compare the causes of death and general health status with those of young people. You may present your comparison in a table or a short report. Also mention any differences you notice between the health status of males and females in the two groups.

Effects of the determinants of health on young people

A range of factors impact positively or negatively on the health of young people. These factors are classified as individual, sociocultural, socioeconomic or environmental.

Individual factors as determinants of health

Individual factors relate to a young person's predetermined genetic makeup and their skills, knowledge and attitudes.

study on
Concept code: PDH-083
Practice HSC exam questions

Genetics

Each young person is born with a mixture of genetic material passed on from previous generations. This genetic makeup can either protect or expose them to particular illnesses or disease. For example, young people with more melanin in their skin are at less risk of developing skin cancers in later years than fair-skinned young people. A genetic predisposition for breast cancer or heart disease can be passed on through generations. Even being born male or female can determine future life expectancy and increases your risk of developing certain diseases; for example, prostate cancer for males or cervical cancer for females.

Gender

Young females tend to be more conscious of their own health and visit doctors more frequently for medical treatment than males. They can experience problems associated with menstruation, urinary infections and reproduction. Young men, on the other hand, have more injuries, many of which are work-related strains and sprains or the result of accidents due to risk-taking behaviours. Alcohol is a contributing factor in many of these cases.

Society places expectations on girls to be attractive and to identify with specific body images presented in the media. This can lead to many girls suffering from depression and developing eating disorders, such as anorexia nervosa, bulimia nervosa or overeating, which affect growth and development. Several surveys of young females have found that many thought they were overweight when in fact they were the normal weight or actually underweight.

A preoccupation with body image has been linked to the high rates of depressive disorders in young people. Young females seem to be more affected than young males, with the incidence of hospitalisation for **parasuicide** being higher for females. Males do, however, have a higher rate of suicide than females, the ratio being nearly four to one. The growing trend for young males

Parasuicide is an attempted suicide that is not fatal and is often impulsive.



Figure 9.9: A person's own body image can be affected by media images of perceived 'ideal' body types.

to report being less satisfied with their own body image has led some of them to resort to dieting or taking muscle-enhancing drugs. There is no significant difference in the prevalence of overweight or obesity between males (37%) and females (32%).

Other alarming trends that affect young people's health are the increase in the levels of smoking by young females and, for young males, the increase in the incidence of binge alcohol consumption patterns, substance abuse disorders and injuries related to motor vehicle accidents. Young females are at greater risk of sexual harassment, violent aggression and sexual assault resulting in physical, emotional and mental injuries.

Personal skills

Personal skills such as assertiveness, decision making, problem solving, coping and goal setting can be developed and practised during a young person's life. These skills can improve health or a lack of these skills can impact negatively. For example, when young people use assertiveness skills to control their alcohol intake or encourage other young people to not drink and drive they can help reduce the risk of injury. When young people use effective decision-making models to assess risks, they can make potentially life-saving decisions. These decision-making skills are learned in health classes through examining scenarios that allow young people to make positive health choices about many issues, such as what types of contraceptive to use to prevent pregnancy and how to stop the spread of sexually transmitted infections (STIs). Young people who lack these skills may suffer emotional and financial consequences as a result of an unwanted pregnancy, or shorten their life span by contracting diseases such as HIV/AIDS or hepatitis.

Young people are also faced with many dilemmas as they move towards being more independent adults. Those who lack skills in problem solving are likely to come into conflict, either in relationships or within the community. An inability to resolve these conflicts can lead to a build-up of frustration and stress. Prolonged conflict can send a young person into deep depression and lower their self-esteem. Many young people who are continually frustrated may release this frustration in antisocial types of behaviour such as vandalism or acts of self-harm. Young people need to learn how to resolve conflict effectively, as well as ways of coping with stress. Individuals who use these skills effectively maintain good mental health.

Attitudes

The attitudes young people develop are a direct result of parental influence, society norms and past experiences. These attitudes can once again promote or deter them from achieving good health. When young people avoid taking risks such as speeding, abusing drugs or drinking and driving, they positively impact on their own health. But when young people develop attitudes

of impunity then they risk potential harm through motor vehicle accidents or binge drinking episodes because their attitude is 'it will never happen to me'.

Sexual orientation

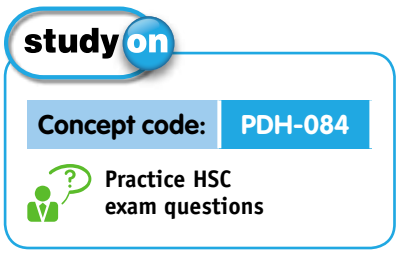
Young people's sexual development is accompanied by a growing awareness of their sexual orientation. For some young people, homosexual experimentation may be part of their adolescent sexual development; in fact eight to nine per cent of young people identify as being attracted to the same sex. By not practising safe sex, their health can be affected by the transmission of STIs or HIV, just as a heterosexual's health can be. One major health concern for young gay people is their mental health and how it affects their self-identity. The conflict between emotions, other people's expectations, and the need to disguise or control feelings can lead to stress, which can present itself as physical symptoms such as headaches and ulcers. Young gay people may sometimes feel they have let down their parents or fear they may be rejected by peers if 'found out'.

Homophobia is the irrational fear of and hostility towards homosexual people.

In schools and the community, **homophobia** contributes to behaviours such as bullying, harassment and violence, which can lead to a young person feeling isolated. In rural areas, young people may be exposed to only negative and stereotyped views of homosexual people. This may contribute to feelings of self-loathing and the denial of sexual identity. The individual's reaction to a sense of being different can also be low self-esteem and a negative body image. These thoughts can result in self-harm and substance abuse. The incidence of suicide and parasuicide is high among gay teenagers.

Sociocultural factors as determinants of health

Sociocultural factors relate to the influence of family, peers, media, religion and culture. These factors can have a positive or negative impact.



Family

The changing nature of families is having a dramatic effect on young people's health. Divorce rates are increasing and the length of marriages is decreasing. The result has been an increase in single parent and blended families. The real emotions of loss and grief are experienced at earlier ages by most young people. Young people experience having to restart their lives, make new friends, change schools and cope with living in two separate residences, which increases stress and can lead to poor mental health or possibly domestic violence. Young people's expectations of future relationships can be adversely affected.

The changing nature of families can also provide some positives for young people. They can learn to become more self-reliant and resilient as they develop coping mechanisms, and can extend their personal support networks through a larger blended family. A change of role within the family may also require additional responsibilities in the care of siblings and the household.

Peers

The influence of the peer group is very strong for most young people. The involvement with peers can be a positive influence when it encourages young people to remain drug free or engage in physical activity through a sporting team that enhances health.

Peer groups also provide important personal support networks for when young people have important decisions to make or problems to solve. Quite regularly young people turn to their peers first for advice before seeking out adults.

Young people can act as role models within their peer group, which can develop feelings of self-worth and promote positive self-esteem, which are both essential for good mental health.

However, the negative impact of peers on young people is the most often publicised. It results in dangerous risk taking behaviours involving binge drinking, substance abuse and motor vehicle accidents, all of which can account for serious injuries and the potential loss of life.

The media

Newspapers, television, movies, radio, music clips and the internet have an extensive impact on young people. The media provides information locally, regionally and internationally. Young people are in constant communication and part of the information revolution with both its benefits and pitfalls.

Young people have virtually unparalleled access to images, information and role models that can influence their lives in a positive way. Important relationship issues can be discussed in open forums on television programs. Health agencies can advertise vaccination programs or quit smoking support services to a wide audience. Programs such as *Australian Idol* promote talented and potentially successful young people who can inspire children to follow their own dreams of success. The media needs to continue to portray suitable role models from sport and the community for young people to aspire to.

However, if the media promotes stereotypes of young people who are anti-social, then it is likely to discourage them from connecting with their community. Young people can become reactionary and angry, and engage in self-harming behaviours that bring them into conflict with authorities. This puts them at a higher risk of being placed in juvenile justice systems, suffering depression or attempting suicide.

The media appears to expose young people to more graphic violence and images of poverty at seemingly younger ages which can be desensitising. Coupled with the nightly discussion of the world's environmental problems, this can be demoralising resulting in a distorted view of the future for young people.

Religion

For young people it is important to develop a sense of purpose. It becomes part of their self-identity and a way of relating to the world in which they live. Any religion can develop this spiritual aspect and help balance the four dimensions of health (physical, social, emotional/mental and spiritual). Most religions encourage young people to be important members of their communities. This has a positive effect on mental health.

In some instances religion can cause conflict and stress for young people. The rules that apply in the family home may be difficult to adhere to in general Australian society resulting in harassment or discrimination. Young people who are required to wear a head scarf or fast for religious events may suffer unnecessary pressure from their peers.

Culture

The multicultural nature of Australian society is beneficial to the health of all young people. It promotes tolerance and acceptance of cultural diversity as important values to uphold. It is essential for all interpersonal relationships that young people learn not to discriminate and accept one another for who they are. Each culture reinforces important customs that need to be passed to future generations of young people. For example, in some cultures respecting

elders and caring for younger siblings are important cultural values and survival techniques needed when health systems were not present.

Problems may arise in young people's health when there is a clash between cultures. A conflict develops between the old ways and the new ways. In the past, pre-arranged marriages may have been essential for financial prosperity and family longevity, but now young people may be less willing to follow this custom. Young people may also wish to marry outside their culture group and may then experience family displeasure or alienation and subsequent depression. In rare instances, young people who do not obey strict codes outside the family home may suffer emotional distress or in more serious cases, physical assault.

Indigenous young people who lose contact with their culture are at serious risk of poor mental health and depression.

Aboriginality

According to the Australian Bureau of Statistics, indigenous people suffer poorer health than the rest of the Australian population and this includes young indigenous people. Because indigenous people tend to have a lower socioeconomic status, this leads to poor nutrition and lifestyle habits.

For example, the increasing incidence of diabetes is reason for concern for indigenous people, as is the consumption of alcohol by some. It is important to realise that indigenous people are actually less likely to drink alcohol than non-indigenous people, but those who do drink do so at an unsafe level and create an environment of violence for young indigenous people.

The research collected indicates that only 36 per cent of indigenous people own or are purchasing their own home, compared to 71 per cent of non-indigenous people. Many young indigenous people live in dwellings that are overcrowded. This contributes to the higher rates of substantiated cases of abuse and neglect than for non-indigenous young people.

Indigenous people are over-represented in the juvenile detention system. On an average night in mid 2012, 55 per cent of young people in detention were indigenous people. Separation from family and racial intolerance in the community account for high levels of **self-harm**, substance abuse and suicidal behaviour in indigenous youth. The cultural breakdown resulting from family dislocation and the removal of many indigenous children from their families as a result of past government policies have led to a loss of cultural identity, which has affected the health status of this group.

Self-harm can include attempted suicides that did not result in death, self-mutilation, substance abuse or general risk taking.

As indigenous people make progress in achieving greater self-determination, they are encouraging their young people to re-establish cultural **connectedness** through arts programs and sporting role models. This will have positive health benefits for indigenous young people in the future, but there is much more that still needs to be done.

Connectedness is a sense of belonging and feeling valued and supported.



INQUIRY

Indigenous surgeon leads the way

Read the case study 'Indigenous surgeon leads the way'.

1. List the problems that Dr Kong overcame to achieve his goal.
2. Identify the supports given to Dr Kong during his training.
3. Discuss the importance of indigenous doctors to helping to improve indigenous health.

Indigenous surgeon leads the way

By Anne Fawcett

Ear, nose and throat specialist Dr Kelvin Kong says achieving a place in history as Australia's first indigenous surgeon is a bittersweet experience.

'On the one hand it is fantastic and I am elated,' he says. 'On the other hand it is only in 2006 [when Kong passed his final exams] that we're talking about the first Aboriginal surgeon, which is a bit of a travesty.'

When Kong, 32, began his medical degree at the University of NSW, he was the only indigenous medical student in the faculty, a fact that did not escape him or his fellow undergraduates.

'Because you're indigenous everyone thinks you're an expert on indigenous health. When we dealt with indigenous health topics at university a lot of people looked to me for guidance.'

It wasn't entirely unexpected. Kong was forewarned by his twin sisters, who experienced similar pressures at the University of Sydney, where both also studied medicine.

Kong grew up in the Worimi community in Port Stephens and admits he felt homesick at times.

'Coming from a small coastal town and being thrust into the big city can feel very isolating,' he says.

But in his third year of studies he was joined by indigenous student Tamara Mackean. 'When I started, one of the things that was lacking was a support network. When I was joined by Tamara, I had someone to talk to that I didn't have to explain things to. It made life a lot easier.'

Both were determined to improve the path through medical studies for future indigenous students.

Professor Bruce Dowton, the then dean of medicine at UNSW, supported the rural health unit to help Mackean and Kong in establishing the university's indigenous pre-medical program in 1999. The program is proving a success.

'I'm proud to say there are now over 20 indigenous medical students at UNSW,' Kong says. 'It's a testament to the university that they developed the program further. If every uni had a program like this we wouldn't be talking about these issues now.'

In association with the Australian Indigenous Doctors Association, Kong co-authored the Healthy Futures report, detailing the barriers to indigenous entry into medicine and how they might be overcome.

He says many indigenous youths lack the self-belief to even dream a medical career is possible.

'It's ingrained at an early stage that you're substandard and treated differently. On top of that a lot of indigenous families have never been to university and don't know what it is all about. The financial barriers are enormous.'

Those who do study may have to move from home, losing an extended support network in the process, 'and medicine is a tough degree', he says.

He attributes his success to the unwavering support of his extended family, particularly his mother (a nurse) and grandmother. As Kong grew up, he watched community members seek medical treatment from his mother.

'One of the common health issues was ear problems,' he says. 'She saw discharging ears, blocked ears and ear infections. My mum was playing the role of a GP or specialist, but as a teenager I wondered why people were coming to her instead of going to a hospital, and why it was only my community experiencing these health problems.'

Kong's grandmother persuaded the rugby league loving medical student to give up football in favour of his studies. He says it paid off. 'My family always said that they were proud of me no matter what.'

'Whenever I went home they were very welcoming, they wanted to make sure I was looked after so all I had to do was study. I didn't feel any pressure from them but I felt the pressure from myself. I wanted to be successful for them.'

'When I graduated I had a big mob come down from Worimi. It wasn't my graduation per se; it was everybody's graduation because we all went through it together. I had a bright future because of their vision.'

When training, Kong found inspiration in the work of ENT [ear, nose and throat] surgeons Dr Peter Carter and Professor Paul Fagan. 'I watched them at work and fell in love with it,' he says. He was accepted into advanced surgical training in otolaryngology in 2003, one of four doctors in NSW accepted in their first year of training.

'I realised that there were also opportunities offered by ENT beyond indigenous health, so it is very

(continued)

rewarding in terms of offering something to the whole community,' he says. On a given day Kong may have to perform anything from an eardrum replacement to cochlear implants to sinus surgery or treatment of head and neck cancers. He has a particular interest in pediatric otolaryngology. 'This is a subspeciality in itself,' he says. 'We deal with congenital abnormalities that may affect breathing, and operate on the airways of minuscule babies.'

Source: *Sydney Morning Herald*, 25 January 2007, 'Health and Science', p. 27.

Socioeconomic factors as determinants of young people's health

Socioeconomic factors relate to socioeconomic status, and levels of employment and education.

Socioeconomic status

Socioeconomic status is a measure of an individual's place in society and is based on their income, education, employment and other economic factors such as house or car ownership.

Australia prides itself on being the 'lucky country', but there are inequities in the distribution of wealth and incomes. A large proportion of Australians, especially young people, have a low **socioeconomic status**, which affects their level of health. People of lower socioeconomic status tend to:

- practise unhealthy behaviours, having a higher incidence of alcohol abuse and smoking
- develop poor eating habits and diets, which contribute to the development of cardiovascular disease and hypertension
- live in families with more children than the national average, leading to overcrowding and the health problems related to this
- find it difficult to save for the future or to defer gratification, so they tend not to have money saved for emergencies or for buying medicines
- use physical violence to solve problems, which contributes to the high rates of domestic violence
- have a higher rate of teenage pregnancy and children born with difficulties related to low birth weight
- develop an anti-work ethic, which may result in the development of poor mental health or depression
- be less likely to keep themselves informed of current health information, so they do not have regular breast screenings or skin cancer checkups
- move house more frequently while waiting for permanent accommodation, and so have difficulty in maintaining healthy interpersonal relationships.

study on
Concept code: PDH-085
Practice HSC exam questions

In recent decades, there has been a reduction in full-time work and a trend towards more casual and part-time work for young people. The result is a reduction in their potential income, which means that many young people now depend on the family to help support them financially, so they must consider staying at home longer. The pattern of leaving school, getting a job, leaving home and working till retirement has been broken. Young people are finding it much harder to achieve independence and change their socioeconomic status in the short term.

The relatively low socioeconomic status of young people means that those individuals who do move away from the family are likely to suffer from a lower standard of living. This can result in them developing poor nutritional habits, adopting unhealthy practices and living in environments that contribute to ill health. Furthermore, if they are also unable to buy the goods that most people take for granted, then they are considered to be living in relative poverty. To overcome this social disadvantage, some young people choose to



Figure 9.10: Young people can achieve a sense of worth, satisfaction and some financial independence through work.

live in communal-type housing so that the costs are reduced and a healthier lifestyle can be achieved. This type of arrangement does have benefits but also some disadvantages.

- Because young people tend to be on low incomes this can put their health in danger because they are forced to take risks, such as driving or being passengers of vehicles that are not roadworthy or insured.
- They often live in shared accommodation, low-cost housing or 'squats'.
- They may resort to crime to satisfy needs.
- They tend not to take out health insurance.

Employment

As a result of the trend towards permanent part-time or casual work, young people can no longer rely on guaranteed full-time work throughout their lifetime.

The national rate of unemployment for 15- to 19-year-olds is estimated at 25 per cent, with the unemployment situation in rural areas considered even worse. New jobs are also not being created as rapidly as in the past because the standard 38-hour working week has become a myth: people are required to do more unpaid overtime to retain employment and 'multiskilling' is being promoted by business.

Being employed allows young people to achieve a sense of identity and a feeling of being valued by the community. When this is not achieved, young people's self-esteem can be damaged. Society encourages a strong work ethic, but young people unable to find work for a long time may be stereotyped as 'dole bludgers'. In reaction to this type of labelling, a young person sometimes withdraws, and develops unhealthy practices such as smoking and drinking, or loses interest in participating in physical activities. These behaviours contribute to the onset of depression.

Many young people, either while they are still in full-time study or after leaving school, take on relatively unskilled jobs in fast-food outlets, service industries or as machine operators. These jobs have the potential for accidents and in some there is a risk of serious injury. Food outlets are often open late, which means the chance of fatigue-related accidents is increased.

Young people who leave school early are often paid junior rates and some find that, as their age increases and therefore their pay and entitlements must increase, the amount of work offered to them decreases. When the family must continue to support the young person financially, this can lead to increased pressure and tension.

Independence from the family does mean that young people are forced to become more resilient and to develop teamwork skills to survive. The sharing of limited resources and even the need to think creatively to find cheap entertainment should be considered positive outcomes, which improve the growth of the individual.

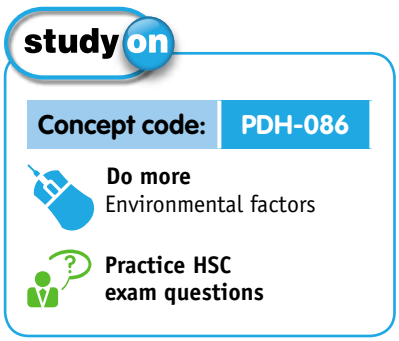
Education

The reduction in full-time employment for young people has meant that many young people now stay on longer at school or pursue higher education at TAFE or university. In 1967 in Australia, only 23 per cent of students stayed on at school to complete year 12. Four decades later, in 2011, the retention rates to year 12 had increased to 83 per cent of girls and 73 per cent of boys. Over the years, a closer relationship has developed between education and business, which has led to the introduction of vocational educational training courses at schools and the development of 'pathways', which were discussed earlier in the chapter.

Because young people are attending educational institutions for longer periods, the opportunities for reinforcing social order and good health practices have increased. For example, the Crossroads course has been introduced for senior school students in New South Wales schools. It is aimed at influencing young people's health by helping them develop appropriate decision-making processes and by making them aware of the consequences of risk-taking behaviours, such as excessive alcohol consumption, smoking and drug taking. Schools, and PDHPE classes in particular, actively promote racial tolerance and an appreciation of greater equity in society. Educational institutions are ultimately relied upon to provide environments that protect young people from abuse, neglect and exploitation.

Environmental factors as determinants of young people's health

Environmental factors relate to geographic location, access to health services and use of technology.



Geographic location

Young people in rural and remote areas often have worse health than that of young people in metropolitan areas. The reduced employment opportnities in country areas means that many young people either remain unemployed and economically disadvantaged, or are forced to travel long distances to find work. (It has also been found that the reluctance by some rural young people to wear seatbelts results in serious injuries and disability each year.) If a rural young person has to move to a large city, this may cause stress and a breakdown of the family unit. Country families may already be under considerable pressure because of the rise in rural poverty, which means that many young people have to work on family properties as well as completing studies at school.

Young people in rural or remote areas are sometimes exposed to harsher environments: extremes of temperature, drought or even floods. The nature of most rural work is potentially dangerous and forces them to work outside all day, which can expose them to a higher risk of developing skin cancers. The use of chemicals and pesticides can put rural young people at risk of developing respiratory cancers, and the operation of heavy machinery can potentially lead to them suffering injury or disability.

The belief that 'country people are a tough breed' means many young people do not seek treatment or discuss health problems as readily as young people in the cities. This is compounded by the generally poor uptake of health promotion and self-care messages, the reduced level of health-care services in country areas and long hospital waiting lists. Many young people may have to delay treatment or travel long distances to receive specialist attention.

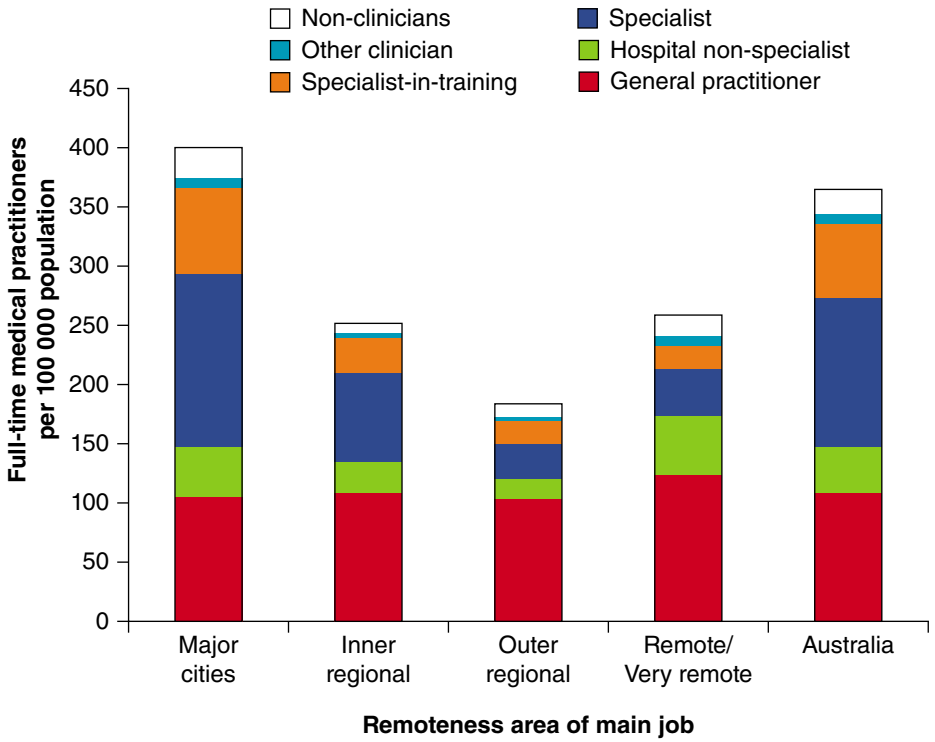


Figure 9.11: The distribution of medical practitioners in Australia

Infrastructure is the technical structures that support a society, such as roads, railways, water supply, sewerage, public transport, schools and power grids.

The reality of sparse **infrastructure** in rural areas means many young people rely on private vehicles to cover long distances in order to maintain social contact. This geographical isolation can lead to feelings of social alienation and put young people at greater risk of suicide. The relative ease of availability of firearms in rural areas means that many suicide attempts are fatal. Rural people tend to have limited access to the kinds of support services that could help reduce this cause of death.

Access to health services

Young people living in metropolitan areas have far greater direct access to health services than young people in rural and remote areas. These health services can include GPs, dentists, physiotherapists and acupuncturists, but also specialist services such as family planning clinics, sexual assault units, refuges, STI clinics, brain injury units and specific disease foundations. These all provide effective support networks and treatments for a variety of conditions affecting young people.

Young people in more remote areas may need to travel long distances for specialist care and therefore be away from the family for extended periods of time, resulting in stress. They may also need to rely more on information from websites or telephone services, or wait until the Royal Flying Doctor Service is in their region. Delays in receiving treatment can compound health issues. Therefore it is essential for young people to develop strong health literacy skills so that they can access reliable sources of information and be able to analyse the health information presented to them so that they can make important health-promoting decisions. Without adequate health literacy skills young people may not understand the dangers of drug abuse, be able to protect themselves from STIs or develop strategies that protect them from date rape or drink spiking.

Use of technology

Young people are the leaders in the use of technology in society today. Young people use technology for communication, learning, work, entertainment, games, information and for many more purposes. The health benefits of technology for young people can include high rates of social interaction in which young people can maintain large social networks that can extend around the world. These networks can provide strong personal support and opportunities to experience the world from many perspectives. Young people also have unlimited access to the latest health information, medical practitioners and drug treatments from around the globe.

As leaders in technology, young people can assure themselves a specialised place in the workforce that can provide them with a high income, flexible work hours and generous salary packages to retain their skills. Quality of life could be enhanced considerably.

The use of technology does, however, have some downsides. A reduced level of physical activity has resulted in a rise in the number of cases of obesity and a reduction in the overall fitness levels of young people in general. In addition, some young people experience an apparent addiction to texting and communicating via mediums such as Facebook at the expense of face-to-face communication or relationships. Young people may also become detached from society by spending exceptionally long hours in cyberspace, or be devoted to violent computer games or gambling sites.

Maintaining this technology also comes at a financial cost. Unwary consumers get caught on expensive plans, or young people find they are continually upgrading to the latest technology which is even more expensive but deemed necessary to maintain social contact or peer approval.

Table 9.2: Summary of the effects of the determinants of health of young people

Factors that determine the health of young people	Strategies to achieve good health for young people
Individual — includes knowledge, skills, attitudes and genetics	• Attend driver education programs such as U turn the Wheel so that you are aware of the dangers and responsibilities of road use • Limit alcohol intake to low risk levels and avoid binge drinking • Avoid illegal drug use, such as cannabis and ecstasy, especially if there is a family history of poor mental health • Reduce risk-taking behaviours; for example, speeding or poly drug use • Use appropriate contraception such as condoms to protect from unwanted pregnancy or STIs • Develop feelings of self-worth by acting as a role model for others; for example, big brother programs, church fellowship groups, scout and guide organisations • Improve health literacy by keeping informed of the relevant health issues for young people; for example, drink spiking • Develop skills related to decision making, problem solving, conflict resolution and resilience to cope with stress • Develop self-esteem by working with others; for example, refereeing or coaching junior sporting teams • Plan for regular physical activity or sport to maintain fitness and relieve stress • Eat a well-balanced diet appropriate to energy needs so that you can control weight more effectively • Avoid unhealthy dieting programs that cause rapid weight loss and do not consider lifestyle behaviours • Explore various types of recreational activities, such as meditation, Tai Chi, bushwalking, surfing and fishing that allow you to learn ways of relaxing • Establish behavioural boundaries that protect you from self-harm; for example, never engage in unprotected sex or accept drinks from strangers

Sociocultural — includes family, peers, media, religion and culture	• Develop strong support networks so that you can have help in times of illness and emotional or financial stress • Develop a mentor relationship with a trusted adult who can provide valuable advice in times of emotional need • Develop connectedness with the community by volunteering services for charities, or become involved in decision making at school or at local councils • Utilise positive peer pressure, such as encouraging friends to participate in sports or not to smoke • Promote the need for the acceptance of cultural/sexual diversity by avoiding acts of racism or discrimination • Act as a role model for peers; for example, by not drinking and driving, or accepting responsibility as the designated driver • Share family responsibilities by completing essential tasks that help you to become more self-sufficient • Develop effective communication skills that promote positive interpersonal relationships • Critically evaluate information on food packaging, in advertising and the media so that you become a more aware consumer • Support peers who make important lifestyle choices, such as to remain drug free or celibate • Establish links with your community; for example, traditional dance groups that perpetuate the passing on of cultural heritage to younger generations • Develop a sense of spirituality by exploring what different religions have to offer • Avoid becoming involved in perpetuating media stereotypes that stifle your own self-identity
Socioeconomic — includes employment, education and income	• Explore all options to remain at school to achieve the HSC by exploring alternatives such as Pathways or VET courses if required • Seek out further educational qualifications; for example, TAFE, business college or university, so that your skills are more sought after by employers • Engage in part-time or casual work to develop skills and expand your self-identity and feelings of self-worth • Seek financial planning advice from trusted adults and work towards financial independence and autonomy • Seek advice regarding matching your personal skills with occupations that increase employment success • Become involved in a variety of school and extracurricular activities to refine skills and knowledge that will enhance employment prospects in the future • Reduce the risk of injuries at workplaces by following safety procedures, such as wearing safety harnesses and correctly handling chemicals
Environmental — includes geographic location, access to health services and technology	• Limit exposure to the sun and follow sun safety rules to reduce the risk of skin cancers in future years • Drive according to road conditions; for example, slowing down in wet weather or when driving on unsealed roads • Be aware of road black spots in your local area that increase the risk of motor vehicle accidents • Be aware of health services available to young people in your local area, such as refuges, rape crisis centres, baby health clinics and hospital outpatient services • Be aware of telephone and web-based health information services; for example, Kids Help Line, Reach Out!, Quit and other government health services • Limit computer usage by setting a time limit and making scheduled breaks to engage in physical activity • When using computers understand how to protect passwords and ensure privacy so that unwanted communications or harassment is not received • Limit exposure to radiation emitted from mobile phones by keeping at a safe distance or position when not in use • Seek help from recognised self-help groups if online gambling becomes a problem for yourself or friends • Use written invitations to organise parties so that limits can be set for attendance to reduce the risk of gatecrashers • Use a drink-spiking detection kit if you suspect your drink has been tampered with

Developmental aspects that affect the health of young people

Throughout life, there are aspects of development that affect people's health and their ability to maintain good health. As lives change, individuals make adjustments to their relationships, their **self-identity**, their feelings of **self-worth** and their level of **autonomy**. These life changes need to be considered as important opportunities that will promote personal growth, and young people in particular need to be ready to respond in ways that will promote their well-being.

Self-identity is the picture you have of yourself, and it is made up of your thoughts, feelings, emotions and past experiences.

Self-worth is the value a person places on his or her own importance.

Autonomy is the freedom to determine one's own actions or behaviour.

Revising roles within relationships

The very first relationship we have is with our parents, followed by other family members and friends. This relationship has a permanent influence and may be positive and nurturing, or negative and abusive. The role an individual plays in a relationship varies according to age, gender, attitudes, expectations and type of personality. A family's cultural and religious traditions also have a bearing on this role. Depending on the circumstances, an individual may take an equal role, a dominant role or a submissive role in the relationship. If circumstances force separation within a family, a young person may feel compelled to take on an added role of father (protector) or mother (nurturer) in the family, resulting in role overload.

During adolescence, a young person continues to be a son or daughter to their parents, but the role and expectations in the family might change. Increasing age is usually met with an increasing level of responsibility. A young person might be expected to take on the role of carer for siblings or relatives, or to help maintain the household. They may appear to be ready according to age, but they may be emotionally unprepared, which can cause stress. This stress can be intensified if the division between their roles becomes blurred. This is called 'role ambiguity' and is a source of much conflict within some families.

Further role conflict arises when adolescents, as they grow older, seek greater independence and a more equal balance of power in the relationship with their parents. Parents are sometimes reluctant to accept that their children are making the transition to adulthood. This transition involves the development of a greater sexual desire for the opposite sex or possibly the same sex. Friendships become more intimate and the peer group has less importance than one-on-one relationships. If, during a relationship, a pregnancy occurs, then there can be a further change in roles as the young people adopt new roles as father, mother, single parent or wage earner.

study on

Concept code: PDH-087

See more
Revising roles within relationships

Practice HSC exam questions

Clarifying self-identity and self-worth

Your self-identity is evident in how you describe yourself to others. It cannot be given in a single description, as it is the sum of many things. For instance, a woman describing herself may have to consider that she is also possibly a mother, sister, wife and captain of a sporting team, and she may not give equal weight to all those roles. Self-identity includes an individual's sexual orientation, which may change over time. Therefore, self-identity should also be considered dynamic, because it is constantly being remodelled according to experiences, events and choices, which may be positive or negative.

The school can be an important environment where success in developing relationships or physical skills can promote a positive self-identity. On the

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See more
Clarifying self-identity and self-worth

Practice HSC exam questions

other hand, negative experiences, such as perceived failure in school work or always being the last person selected for a team, can promote a negative self-identity. When a young person's circumstances change (moving to a new school or suffering the loss of a parent, for example) this can result in an attempt to reinvent a self-identity. This may provide protection in an unfamiliar environment or may make them feel more at ease.

People use the following identity markers to make up a description of themselves:

- name
- age
- gender
- sexuality
- socioeconomic status
- job/interests
- religion
- geographical location
- past experiences
- ethnicity.



INQUIRY

Creating a self-identity

With the aid of the above markers, create a brief description of yourself — your self-identity.

Norms are the standards and behaviours accepted by society. These norms can vary between different cultures.

Socialisation is the lifelong process of learning through which we inherit the culture of our society — norms, values, gender roles and expectations.

Our self-identity is strongly influenced by society's **norms**, values and beliefs. These are reinforced during the process of **socialisation**. Society expects its members to fulfil specific roles in life, such as being a good son or daughter, and these roles influence a person's self-identity also. When society identifies people as having failed in a particular role, it may apply a label to them, such as 'delinquent', 'no-hoper' or 'loser'. These individuals may find it difficult to regain their own positive self-image. Similarly, young gay and lesbian people, who may feel compelled to hide their sexual orientation for fear of being stigmatised, may develop a negative self-identity because they don't feel accepted by society or by their peers.

The ability of society to affect a person's self-identity is evident also through the commercialisation and marketing of particular products, which are able to 'sell' an identity to young people. As young people struggle to establish themselves as individuals, businesses are keen to direct them to the symbols that help reinforce their concept of self. The correct shoes and clothes are used to reinforce a manufactured personal identity. Those young people whose choices are limited by having a low family income can be made to feel very disadvantaged.

Even as adults, self-identity can be at risk. Divorce or loss of a loved one can result in a sudden need to remodel self-identity. The so-called 'mid-life crisis' can lead some adults to want to change their career, location and lifestyle to reinvent their definition of themselves.

It is apparent that young people need to develop a strong and positive self-identity in order to achieve good health. It gives them the self-confidence to make decisions that promote health, to resist negative influences, especially from their peer group, and to maintain positive self-esteem.

It is important for a young person to establish a sense of positive self-worth, or self-esteem, because it is essential for good mental health. Self-worth can be improved by taking pride in achievements, no matter how small, and setting goals that are progressive and attainable. Individuals need to accept their limitations and build on their strengths. When they believe in their own abilities, they are able to recognise that **self-esteem** comes from

Self-esteem is the feeling or opinion (negative or positive) one has about oneself.

within and need not be affected by others. Positive self-worth can eliminate the pressure that some young people feel to accumulate possessions, to present a fashionable body image, or to behave in a way that establishes their credibility among certain peers but that damages their community (for example, carrying out graffiti).

Family and peers can provide important support for young people in establishing a sense of positive self-worth. Confidence in meeting new personal challenges comes from the security of knowing that personal support structures exist and can be called upon if needed.

Developing self-sufficiency and autonomy

Self-sufficiency is the ability to provide for oneself without help from others.

The mental health of a young person is enhanced when they are able to achieve **self-sufficiency** and autonomy. For many young people this marks their 'rite of passage' to the adult world. Achieving autonomy enhances self-confidence and self-esteem, and a young person's sense of identity becomes more complete. They become responsible for making important decisions about their work, diet and health. The frustration of not having any autonomy leads to some young people, and their families, living with high levels of stress.

study on

Concept code: PDH-089

See more
Developing self-sufficiency and autonomy

Practice HSC exam questions

Establishing education, training and employment pathways

A solid education can provide the foundation for achieving personal potential and positive self-esteem. The wide range of options now available creates flexibility in education, reduces the stress for young people, promotes greater self-confidence and enables young people to have a clearer career pathway and be more prepared for work. These options include:

- TAFE traineeships, which enable a young person to learn on the job and earn a small income
- Australian School-based Apprenticeships, which allow years 11 and 12 students to start an apprenticeship while still at school
- VET (Vocational Education and Training), which allows young people to establish links with TAFE and university courses while still at school
- TAFE HSC Pathways, which enable young people to do HSC and TAFE courses over two years and still attain a UAI
- part-time work, which allows young people to develop job skills that are transferable to other areas of employment (see figure 9.12).

study on

Concept code: PDH-090

Do more
Education, training and employment pathways

Practice HSC exam questions

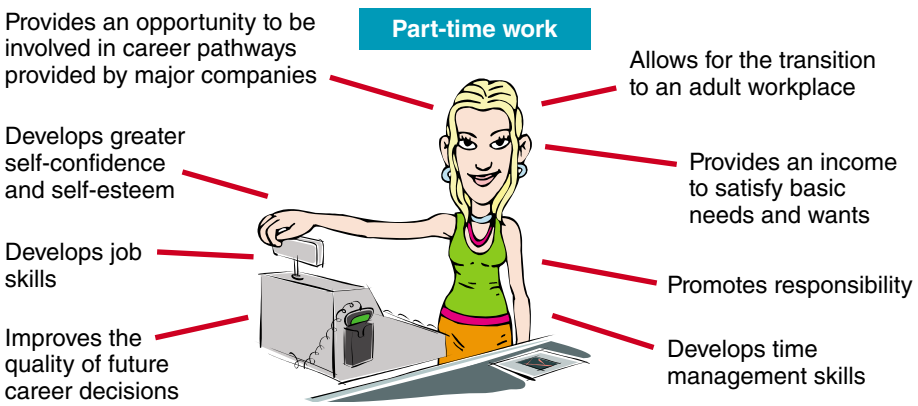


Figure 9.12: Benefits of part-time work for school students

Establishing personal support structures

Support structures are the people, places and programs that increase an individual's ability to make health-promoting choices.

Personal **support structures** give assistance in times of stress or trauma. Family and friends often provide the strongest support as they have a vested interest in the individual and the greatest insight into the person. The key to establishing a good personal support structure is two-way communication based on mutual respect, trust and shared responsibility. Families can provide personal support structures in the following ways:

- financially — setting up a flat, helping with credit card debt, being a guarantor or supporting further education costs
- emotionally — giving support when there is a breakdown in a relationship
- physically — providing food and accommodation if unemployed or still studying, or care during illness
- mentally — helping a young person cope with the stress of exams.

Personal support structures enable a person to cope with stress, allow them to have time out if needed and provide someone to turn to for advice. Adolescents who are in a rush to achieve independence risk leaving unresolved conflicts with the family, which can damage their personal support structures. Should their personal support structures fail, they need to seek alternative support through government agencies, community groups or professionals. Because of the high demand for these services, there are limits to the depth and length of support they can offer. The family has the most to gain by promoting the good health of its members.

study on
Concept code: PDH-091
See more
Establishing personal support structures
Practice HSC exam questions



INQUIRY

Identifying personal support structures

1. (a) Create a table that identifies your personal support structures.
   (b) Classify each support as financial, emotional, physical or mental, and specify when each should be used.
   (c) Comment on the adequacy of this system to give you the support required in the future.
2. Discuss the consequence of having few or no personal support structures.

study on
Concept code: PDH-092
See more
Determining behavioural boundaries
Practice HSC exam questions

Determining behavioural boundaries

Impunity is a sense of being immune from the consequences of certain actions, believing that 'it won't happen to me'.

Adolescence is a time of testing and establishing the boundaries of behaviour, and learning what is acceptable and what is not. Each family establishes its own behavioural boundaries, and these are often based on cultural and religious beliefs. Parents set boundaries, such as how late to stay out at night. They then impose consequences if the boundaries are broken. However, not all families provide clear boundaries and, if parents separate or divorce, children may find that the rules for one home don't apply in the other.

In certain circumstances, when there are no negative consequences for any action, children may also begin to believe that they are immune from punishment; that, because of their age, they can commit crimes with **impunity**. In some isolated rural communities this has led to the establishment of curfews that restrict the movements of young people at night.

Laws are designed to protect people from harm by others and from doing harm to themselves. Young people who are unwilling to accept society's boundaries, and cannot set their own boundaries, may get involved in drinking and driving, using illegal drugs or committing violence, and consequently spend time in juvenile justice institutions. Besides the potential for the physical injury from these risk-taking behaviours, these young people may

be unable to cope with confinement or the consequences of their actions, and may contemplate suicide.

In schools, behavioural boundaries are necessary to ensure all students are able to learn in a safe and supportive environment. Students who cannot accept these boundaries may suffer stress and refuse to attend, or may change schools frequently. School policies encourage students to develop their own personal boundaries so that they are able to accept responsibility for their actions and not blame others. The peer group often challenges a young person's personal behavioural boundaries, which can result in risk-taking behaviours such as engaging in unsafe sex or not wearing seatbelts. These can have long-term health consequences because they can lead to injury, disability, dysfunction or stress-related disorders. Young people who are able to set their own boundaries are likely to be more confident, independent and achieve a higher health status as a result.



INQUIRY

Indicators young people use to define good health

1. Outline what indicators a young person might use to determine their health status.
2. Categorise each of these indicators as physical, social or emotional.
3. Discuss the validity of the physical, social or emotional indicators that a young person might use to determine their health status.



APPLICATION

Identifying the values of young people

1. Conduct a survey of another senior class to identify the priorities and values of young people. Design a survey sheet with the following questions.
   (a) List five priorities in your life. Rank them from 1 to 5, with 1 being highest and 5 being lowest.
   (b) List five values you consider as the most important. Rank them from 1 to 5, with 1 being highest and 5 being lowest.
2. Analyse the information collected and write five statements about your findings. What priority did young people give health? Account for this trend.

SNAPSHOT

Careful — teenage brain on board

By Deborah Smith

A teenage brain is a work of art in progress. After a spurt in growth before puberty, children end up with more grey matter — the nerve cells that let us think — than they will ever have again. Adolescence is, then, a time of rapid pruning back, a discarding of unwanted neural connections which sees grey matter lost in a wave from the back of the brain to the front.

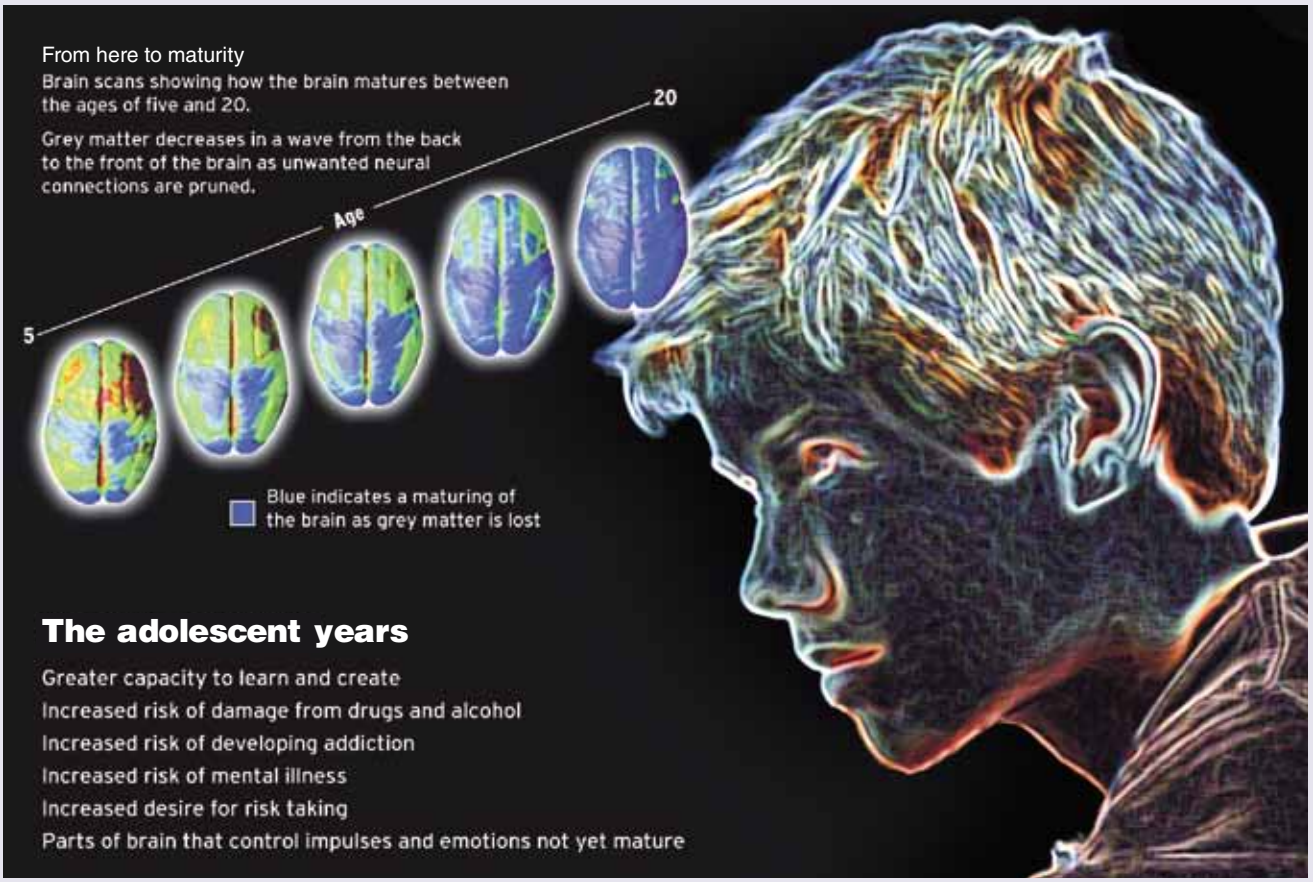
A University of Melbourne neuroscientist, Professor Stephen Wood, likens this refining of our most important organ to a sculpture being created, as unwanted bits are chipped away. 'You end up with less stone or clay, but it is a better finished work,' he says.

Recent brain-imaging studies show the honing process is not complete until young people have reached their early to mid-20s. The front parts of the brain that control judgement and caution are the last to mature, which helps explain why teenagers have a reputation for being impulsive, emotionally volatile and reckless.

Meanwhile, young people's surging hormones are driving a desire to seek out new thrills and experiences, especially for boys.

'There is a developmental mismatch, with increased drive and no brakes,' Wood says.

Some researchers are critical that findings about the teenage brain can be used to reinforce negative



stereotypes of adolescents and threaten their human rights, but the brain scans also provide insights into the special vulnerability of young people to addictive substances and mental illness.

They reinforce, too, that the teen years are not just a time of risk, but one of opportunity, creativity and learning. And with the brain still plastic, it is a period when the right kind of intervention — in particular, firm but warm care from adults with high expectations of a teenager — can have a transforming effect on them . . .

In his new book, *Teenagers: A Natural History*, Dr David Bainbridge praises the teenage brain as one of the greatest achievements of human evolution. For our brains to become huge — almost three times too big for an animal our size — the unique innovation of a teenage decade of radical change and cerebral reorganisation was needed.

The reason humans live so long is to nurture the extraordinary brains of teenagers, Bainbridge recently told the *Guardian*. 'We shouldn't be criticising teenagers, we should be celebrating them.' . . .

Wood says a surge of hormones at puberty tends to make teenagers more emotionally reactive, and relationships with peers become very important. The brain's reward centres are also more active during adolescence than in adulthood, driving teenagers to seek out new sensations. 'They become more interested in doing risky things, whether it's extreme sports or stupid behaviour like hanging onto the back of a train.'

As a species, this has been useful in as much as it spurs young people to move out of the comfort zone of the family and start to explore the wider world. 'If everyone is risk-averse and stays close to where they were born, then they quickly run out of food and resources.' But the brain can still take many years after puberty to develop the 'brakes' that allow young people to think about the consequences of their actions and be more cautious, Wood says.

As part of the drive for new experiences, trying drugs and alcohol can be very tempting, but with the brain still developing this can have serious effects. 'The younger people start drinking or using cannabis, the worse it is for their brains.'

And the earlier they start, the more likely they are to become addicted, because the substances can affect the way the brain's control mechanisms develop.

(continued)

The brain is also particularly vulnerable to going awry at this time. 'About three-quarters of all mental illnesses have their origins between the ages of 15 and 25,' Wood says, adding that the diagnosis may often come later . . .

Dr Elizabeth McAnarney, of the University of Rochester, says factors such as self-esteem, being connected to family and school, and having a set of beliefs all help protect the emotional health of adolescents, and can help put a brake on reckless behaviour until the prefrontal cortex of the brain is fully developed . . .

However, a Melbourne youth expert, Professor Judith Bessant, is concerned the notion that adolescents are 'hard-wired for risk' is being used to reinforce negative stereotypes of teenagers and to undermine their rights, in a similar way to past claims that women and black people had inferior brains.

The evidence linking brain structure and behaviour is not strong, says Bessant, of the Royal Melbourne Institute of Technology . . . Yet it is leading to a push to increase the age at which young people can drive, drink or carry out other activities, reducing the opportunities for them to learn through experience and develop intuition and insight through taking on responsibilities.

Wood, on the other hand, believes it is appropriate to use the new findings to, for example, limit the number of passengers a P-plate driver can carry. 'There is plenty of evidence that mature judgement takes time to develop. To me, that is evidence-based policymaking.' But he does caution against falling for the stereotype that all teenagers are rebellious risk-takers. 'A lot of adults forget what it was like to be an adolescent.' . . .

Adolescence is one of life's great periods, Bainbridge says. 'We've become blind to the fact that our teenage years are the most dramatic, intense and exciting of our lives. Everything is very vivid.'

Source: Sydney Morning Herald, 26 March 2009, p. 20.



INQUIRY

The teenage brain

Read the snapshot 'Careful — teenage brain on board', about the changes that take place in a teenage brain.

1. Summarise the reasons put forward in the snapshot for the changes that take place in the teenager's brain.
2. Identify other factors that may account for risk-taking behaviour by adolescents.
3. Discuss the impact of new licensing laws on adolescents trying to seek independence.
4. Debate the topic: Adolescents learn best by trial and error.



TO WHAT EXTENT DO AUSTRALIA'S YOUNG PEOPLE ENJOY GOOD HEALTH?

CRITICAL QUESTION

To what extent do Australia's young people enjoy good health?

The syllabus requires students to analyse *two* of the following major health issues that impact on young people:

- mental health problems and illnesses
- body image
- alcohol consumption
- violence
- road safety
- sexual health
- emerging health issues; for example, gambling, cyberbullying, party crashes or drink spiking.

study on

Concept code: PDH-093

Practice HSC exam questions

Students must understand the nature and extent of the major health issue, the risk factors and protective factors, the sociocultural, socioeconomic and environmental determinants, and the young people most at risk. This text discusses mental health and body image in some depth because of the increasing risk to young people's health. A summary of the other major health issues is included in this chapter (pages 313–27) as a guide for students who wish to carry out further research. Further research is also highly recommended on government and non-government agencies that use a range of strategies to target the health issues of young people.

INQUIRY

Health and well-being of young Australians

eBookplus

Use the **Health and well-being of young Australians** weblink in your eBookPLUS to access the latest report on the health of young Australians. Find the overview, summary or snapshot pages to give you an overall picture of the emerging health issues for young people. Use this information to help you begin further investigation into the two areas you have selected for analysis.

Mental health problems and illnesses

General nature

Stress is a physiological or psychological influence that produces a state of tension in a person.

Young people appear to be experiencing increasing levels of **stress**, often due to factors beyond their control. For example, the higher incidence of divorce is leading to the breaking up or merging of families, causing changes to lifestyle. The media's perpetuation of unrealistic body images erodes young people's self-esteem and high youth unemployment leads to frustration in achieving independence.

Table 9.3: The common sources of stress for young people

Type of stressor	Example
Physical	Training for a sport, having an injury or illness
Emotional	Type of personality (A or B), expectations from parents and self
Social	Changes in relationships with others, peers
Environmental	Pollution, noise, living conditions
Vocational	Unemployment or starting a new job
Life crisis	Divorce of parents or leaving home
Abuse	Physical, emotional or social

Source: Adapted from *Personal Awareness*, PDHPE Board of Studies, p. 141.

Stress is experienced throughout life, but because adolescence is characterised by rapid change it makes young people particularly vulnerable. A young person who is trying to cope with multiple stressors or with a stress that continues for a long time can develop physical illnesses such as headaches, high blood pressure or ulcers. Compounding these further is the fact that a stigma is attached to not being able to cope with stress, which means many young people do not seek help.

Since everyone is exposed to some level of stress, it is an individual's reaction that determines how well they cope. An individual's personality type (type A personality — aggressive, competitive and impatient — or type B personality — relaxed, non-competitive, patient), family attitudes, values, expectations, perceptions and mood affect how their body reacts. It is not possible to eliminate all the stressors in our lives, and there are also some stressors that

we have no control over; for example, poverty, pollution and family trauma. To tell someone to simply relax or avoid the stressor can be too simplistic at times.

Young people need to develop personal coping mechanisms (see table 9.4) and alter their perspective of the stressors that affect them. The AIHW report *Australia's young people — their health and wellbeing 2007* indicated that one in five males and one in 10 females aged 18 to 24 years were found to have a substance (alcohol/drug) use disorder. Combined with the high frequency of mental illness and youth suicide, this indicates that not all young people are coping with life.

Table 9.4: Coping mechanisms

Do	Don't
1. Develop time-management strategies to balance school, part-time work and social activities (prioritise).	1. Leave everything to the last minute.
2. Use positive self-talk in order to see things in the right perspective.	2. Make mountains out of molehills.
3. Try different relaxation techniques — muscle relaxation, breathing, meditation, visualisation, yoga or Tai Chi.	3. Forget that your mind and body need time to rest and recharge.
4. Talk to someone you trust about your problems.	4. Think you're alone in having to deal with problems.
5. Take an occasional break.	5. Try to work when you're tired.
6. Give in occasionally.	6. Think you always have to be right.
7. Do something good for another person.	7. Be self-absorbed.
8. Accept that everyone makes mistakes and it is a part of learning.	8. Feel you have to be a perfectionist always.
9. Accept others as they are.	9. Be critical of others.
10. Keep the value of competitiveness in perspective.	10. Believe in winning at all costs.
11. Make the first move to be friendly to someone.	11. Socially isolate yourself.
12. Have some fun — play a sport or have an interest as an outlet for emotions.	12. Keep your emotions bottled up. They may come out in inappropriate ways.

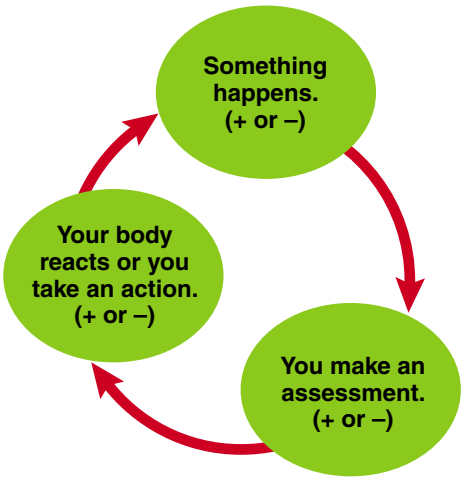


Figure 9.13: Cycle of perspectives

Negative perceptions of events and related emotions

An individual's perspective is built up over time and is based on experiences, family values and cultural beliefs. It has a great deal to do with how that person copes with stress. For instance, when you look at half a glass of water, do you see it as half full or half empty? If a person has an uncompromising viewpoint, it can prevent them from seeing alternatives or render them unable to see the flaws in their own perspective, which contributes to a high level of stress. Furthermore, individuals often anticipate a situation, develop a high level of anxiety, but find that all the worry was unnecessary. The way we see ourselves — intelligent, happy or worthwhile (positive) or boring, dumb or depressed (negative) — also affects how we view the world. A positive or negative cycle develops (see figure 9.13). Because we are able to examine how we think and behave, it is possible to break the negative cycle by changing a negative perspective to a more positive one.

Life is generally full of potentially traumatic events that must be accepted as part of life. If individuals selectively focus on the positives, then they can defuse their emotional reactions such as fear, anxiety and depression, and this will reduce the body's **flight or fight response**. Life experiences can then be seen as challenges or opportunities to develop as a person through improved self-confidence, self-esteem and personal identity. It is said that without the bad times, we would never really appreciate the good times.

Flight or fight response is the body's physical and psychological reaction to a dangerous or threatening situation; human instinct is to run away or stay and fight.

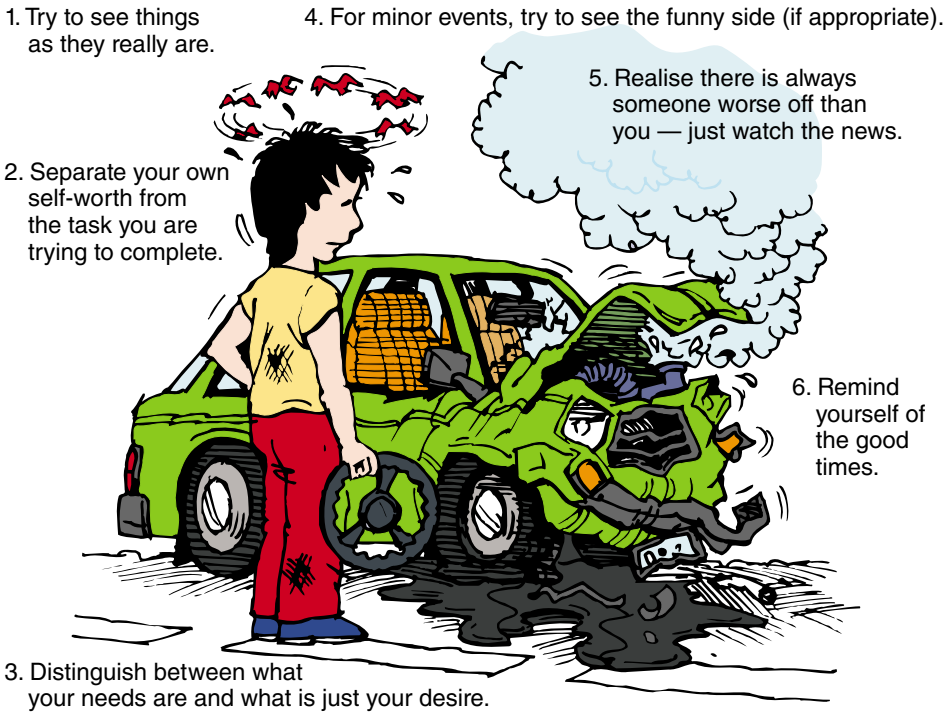


Figure 9.14: Tips for improving perspective of negative events

APPLICATION

Improving your perspective

Apply the strategy in figure 9.14 to a problem you have faced or will face shortly.

1. Discuss the difficulties in applying this strategy.
2. Explain the benefits of using this strategy.

Depression

All people may feel depressed at some stage in their lives or even during a typical week. Depression becomes a serious health concern for young people when it extends for several weeks at a time and they feel 'down', worthless, angry, tired and irritable. They may have difficulty sleeping and concentrating, and no longer gain satisfaction from daily activities. Extreme mood swings and displays of anti-social behaviour are also possible. To cope, some young people may resort to drugs or smoking, or develop an eating disorder. It has been found that depression is linked to the increased risk of suicide and self-harm behaviours.

According to information from Mental Illness Education Australia, women experience a higher rate of depression and anxiety than men. This results in a greater incidence of self-harm, eating disorders and attempted suicides. Furthermore, of the total youth population, one to three per cent of young people will be affected by a major depressive disorder and 15 to 40 per cent of young people will report having symptoms of a depressed mood disorder. It is believed that by the age of 18, approximately 24 per cent of young people will have suffered from a major episode of depression.

Experiences of loss

Young people can experience a sense of loss for a number of reasons. The trauma associated with the separation of parents, moving away from friends

or familiar surroundings, the loss of a family member, friend or even a pet can leave a young person feeling vulnerable and insecure. Some young people become stressed because they blame themselves for their parents' separation and feel responsible for bringing the parents back together. The pain and suffering a young person feels may be masked temporarily until an incident provokes a state of **distress**. A young person experiencing loss can possibly react with anger, which may appear as aggressive behaviour towards others, nightmares, irritability or a tendency to overachieve to compensate. They may even develop a need to blame the surviving family members.

Distress is the pain, anxiety, sorrow or suffering that a person experiences in reaction to a stressful situation.

Following the loss, a young person may suffer a condition known as post-traumatic stress, which is characterised by unexplained swings of mood, stomach pains, headaches, irritability and argumentative behaviour. It can lead to substance abuse and an increased risk of suicide.

While no accurate statistics are available, the current trends relating to the rate of family breakdowns indicate that experiences of loss affect a large cross-section of the community. The Australian Bureau of Statistics estimates that approximately 40 per cent of all marriages are likely to end in divorce, and the median length of marriages that end in divorce is 12.5 years. This, and the fact that young people have high rates of suicide and suffer injuries and deaths associated with accidents, particularly motor vehicles, means that they are likely to experience loss directly, or indirectly, through a friend, at a much earlier age than previous generations.

Schizophrenia

Schizophrenia affects the way a person behaves, feels and views the world. It is not just a single disorder, but a group of disorders with variable causes and outcomes. A common misconception is that it is the development of a split personality or multiple personalities. A person suffering from this illness may experience hallucinations, delusions, diminished emotional responsibility and disjointed thought patterns, and may seek to withdraw from society. It can affect anyone, regardless of age, gender, race or intelligence. Sufferers may experience one or a few episodes and can return to normal living in between episodes; for others, it can be a daily struggle.

According to the New South Wales Department of Health, most new cases of schizophrenia are diagnosed in adolescents or young adults. One in three schizophrenics will have only one to two episodes in their lives.

Self-harm

Self-harm encompasses a wide range of behaviours that are not necessarily suicide attempts or an indication that the person wants to die.

One of the behaviours attributed to deliberate self-harm is self-mutilation, which involves the person inflicting pain or punishment on themselves, usually in secret. This can be their way of trying to cope with stress or painful emotions, or might be a means of regaining power that has somehow been lost or taken away by others. Young people who are victims of sexual assault often exhibit this type of behaviour. It can be a cry for help and attention.

Suicide

Suicide is an intended self-inflicted injury that is fatal.

Studies conducted in Australia estimate that five to 10 per cent of young people will attempt **suicide** and one in two will have suicidal thoughts at some time during their life. Females tend to use drug overdoses and are less successful in taking their own lives, whereas some males use more violent methods such as

firearms and hanging. Suicidal tendencies are most prevalent in the mid-teens and many of the people who commit suicide have previously shown evidence of poor mental health.

According to the Australian Institute of Health and Welfare, in 2004, of the 15–24 years age group, males suicided at a rate of 13 deaths per 100 000 people and females suicided at a rate of six deaths per 100 000 people (see figure 9.15). However, there is a growing trend towards an increase in female suicides. Females generally make more unsuccessful attempts, largely due to the different methods used between males and females. The Australian suicide rate is the fourth highest among Western countries, with New Zealand having the highest rate of all countries.

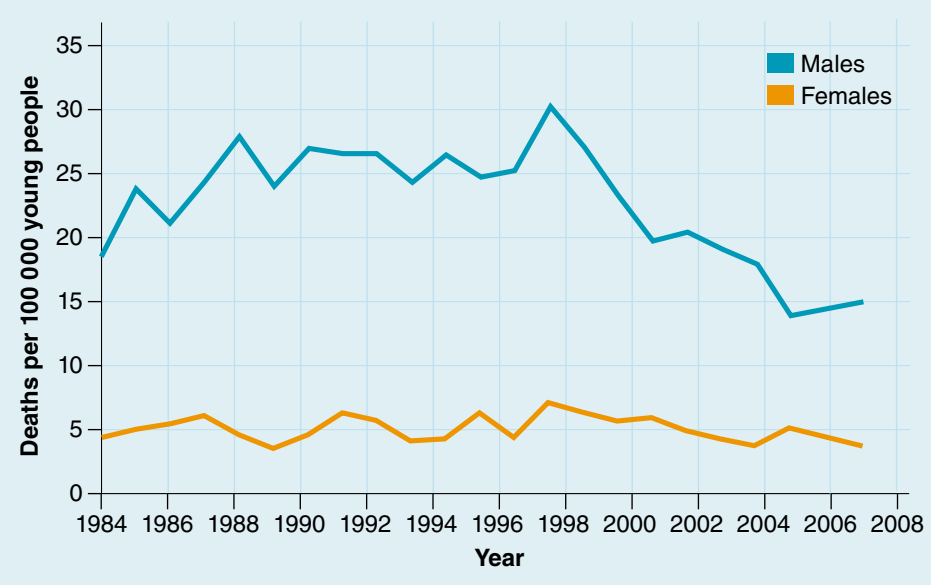


Figure 9.15: Deaths from suicide among young people, 15–24 years *(Source: Australia's health 2006 and Young Australians: their health and wellbeing 2011*, AIHW.)



eBookplus

The health of young people

Use the **Reach Out** weblink in your eBookPLUS for this application. Working in small groups, choose a fact sheet then use the information to create and perform a scenario or role play in which a group of young people help a friend to overcome a difficult time.

Risk factors and protective factors for mental health problems

Risk factors are the individual attitudes and or behaviours that make the occurrence of a disease more likely. These can be modifiable or non-modifiable.

Protective factors are the networks, personal skills, laws/policies, health services and environmental factors that protect children and young people from difficult or harmful events.

Table 9.5 summarises the risk factors and protective factors for mental health problems in young people.

Table 9.5: Risk factors and protective factors for mental health problems in young people

Risk factors	Protective factors
Modifiable • Unemployment • Low level of education • Geographic location — rural/metro • Difficulty with issues of sexuality • Low self-esteem • Social alienation • Access to firearms — rural males • Incarceration • Family breakdown • Substance abuse • Sexually abused as a child • Low socioeconomic status *Non-modifiable* • Migrant background • Aboriginal and Torres Strait Islander (ABTSI) background • Gender • Family history of mental illness	• Strong personal support networks that function in good times and bad • Personal skills based around assertiveness, resilience, coping, decision making, problem solving and conflict resolution • Laws regarding age limits; for example, work, minimum years of schooling, marriage, sexual consent, driving, alcohol consumption and anti-discrimination laws • Access to health services and the development of health literacy skills by schools, such as Kids Help Line, school counsellors, health pamphlets and government health internet sites • Education of the community and professionals who deal with young people • Societal and cultural norms that aim to protect young people from self-harm; for example, censorship and classification restrictions • Participation of young people in community decision making to enhance feelings of connectedness; for example, student representative council • Adequate nutrition to allow for full physical and mental development • Positive school environments where students feel they can achieve and are free of bullying • Economic security that fosters optimism for the future • Completion of year 12 or other educational qualification • Government paid youth allowance

Table 9.6: Mental health determinants

Sociocultural	Socioeconomic	Environmental
• Family disharmony or changes in family values • Redefining of the typical family structure • Peer expectations that are positive or negative • Media stereotypes • Cultural and religious expectations/beliefs that conflict with society norms • Racist and discriminatory attitudes by some groups in society, such as homophobia	• Higher rates of unemployment especially in rural areas • Low level of education • Slow economic growth • Low socioeconomic status • Workplace contracts • Move towards economic globalisation • Move towards more part-time and casual work rather than full-time work • National benchmarks for literacy and numeracy	• Geographical location — rural versus metropolitan areas • Remoteness leading to social isolation • Access to health services • Access to the latest technology • Adequate supply of nutritious food and water • Pollution; for example, noise, air, water • Overcrowding or inadequate housing in rented premises • Lack of adequate infrastructure

Young people most at risk of mental health problems and illnesses are:

- the unemployed or economically disadvantaged
- students who leave school prematurely
- individuals with Aboriginal or Torres Strait Islander backgrounds
- rural males
- females
- gay youth
- individuals who experience incarceration or the juvenile justice system
- long-term drug users
- individuals who experience habitual bullying or harassment
- individuals who act as a carer for parents or siblings with disabilities.

Body image

Body image is the attitude or feelings we have about our body and the way we look or the way we think others see us. A person's body image can be positive or negative.

The terms **body image** and body concept can be considered as having the same meaning. Body image is dynamic and refers to the mental picture we create of ourselves. It is linked to the feelings we have about our bodies and it can be positive or negative. These feelings can either promote greater self-confidence and self-esteem or erode it.

Factors that influence body image

The media and society in general must accept responsibility for bombarding young people with unrealistic body images that encourage them to conform. The perception of each gender has become narrowed to an 'ideal' body type and it can become a source of depression for those unable to change what has been genetically predetermined. It is thought to contribute to the development of eating disorders and a distorted body image.

The factors that influence the development of body image (whether negative or positive) are:

1. stereotypes created by society, such as the bronzed Aussie male
2. acceptance or rejection by the family or siblings
3. cultural heritage — obesity can be a sign of wealth in some cultures, for example
4. stereotypes created by the media
5. school and peers
6. an individual's level of fitness.

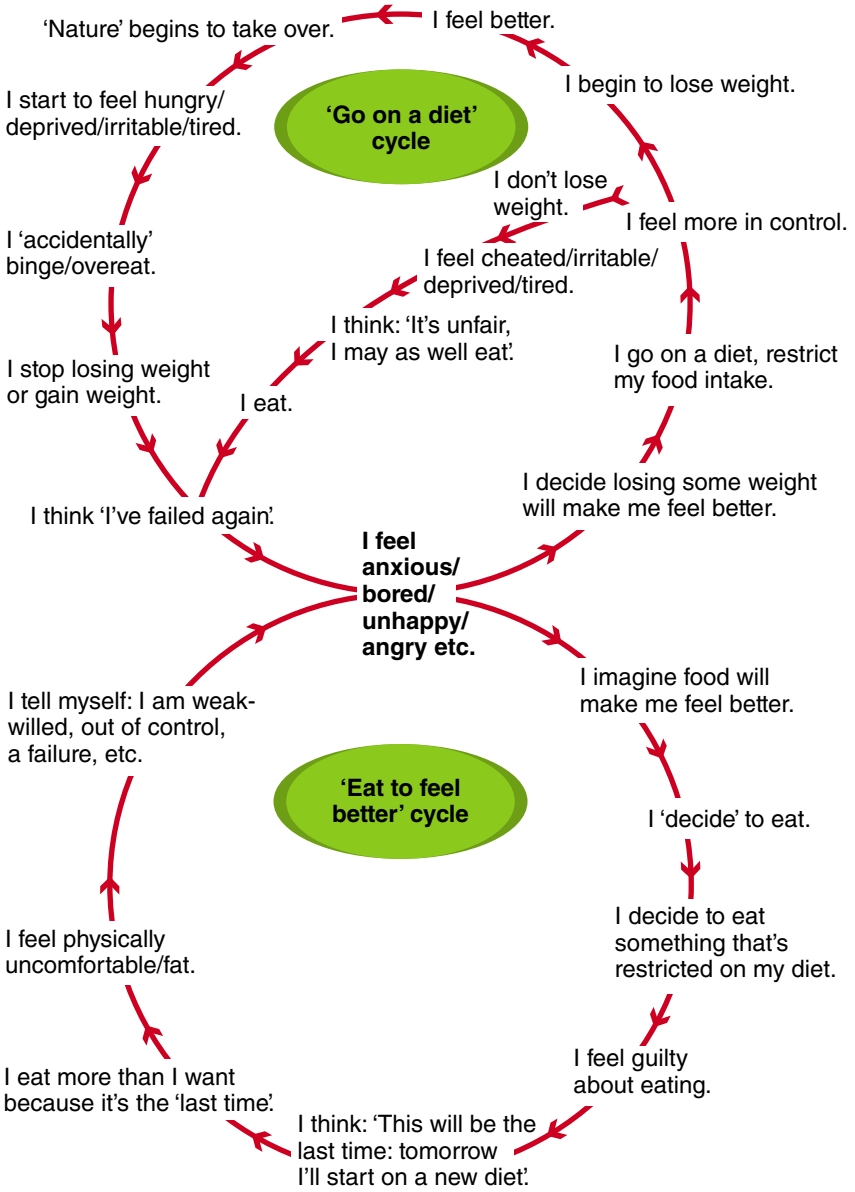


Figure 9.16: The development of disordered eating patterns (*Source:* K Healey, *Body Image*, Spinney Press, Sydney, 1999, p. 14.)

Disordered eating patterns and eating disorders

Society creates an idealised body image or shape and the media perpetuate phobias about weight. Many people responding to surveys consider themselves overweight, when in fact they are in the normal weight range. Young people aged 19 to 24 who lead busy lifestyles are more prone to missing breakfast, skipping lunches, eating too little or not eating a balanced diet. These irregular eating patterns lack satisfactory nutrition and result in unhealthy habits, which may become lifelong.

The Eating Disorders Foundation of New South Wales states that, although dieting does not cause an eating disorder, it is 'one of the most significant risk factors for the development of an eating disorder . . . [as] it may be an indication of an unhealthy concern about body weight or shape . . . If a person bases much of their self-esteem on their ability to lose weight and reorganises much of their social life around conforming to the "rules" of their diet, their simple dieting may be becoming something more dangerous.'

Several different types of eating disorders exist, including anorexia nervosa, bulimia nervosa and compulsive overeating or binge eating.

Anorexia nervosa is an eating disorder accompanied by a progressive loss of appetite and consequent weight reduction beyond acceptable health levels (15 per cent less than normal for age and height). It is accompanied by an intense fear of gaining weight.



Figure 9.17: This 18-year-old anorexia sufferer weighs only 26 kilograms.

Bulimia nervosa is an eating disorder where large quantities of food are ingested at one time (bingeing) and then purged from the body by self-induced vomiting.

Anorexia nervosa

Anorexia nervosa is an emotional disorder characterised by severe weight loss (or failure to gain weight for some young people). Anorexics may resort to severe calorie reduction, compulsive exercising, over-the-counter or prescription dieting aids, diuretics or laxatives, or abstain from eating to lose weight. This self-induced starvation eventually leads to the anorexic individual having no desire to eat at all and the body virtually shutting down. It has psychological origins, as anorexics develop a distorted body image and have a morbid fear of becoming fat. Some anorexics believe that control over their eating habits can give them control over their own destiny, if that is something that has been taken away from them. Other individuals become anorexic out of fear of reaching maturity or as a result of low self-esteem. The long-term effects of this illness include amenorrhoea, sterility, osteoporosis, heart disease and, if not treated, death.

According to Professor Pierre Beaumont of the Department of Psychological Medicine, University of Sydney, 'anorexia nervosa is the most common serious disease of adolescent girls and young women . . . After obesity and asthma, it is the most common disease in this population group and it is a much more deadly condition than either of the others'.

Anorexia nervosa is most common in females (90 per cent of anorexics being female) and the middle to upper classes aged between 12 and 30 years. In the 15–19 years age group, one in 200 girls suffers from anorexia nervosa. In New South Wales, about 5000 people suffer from the disease and 400 new cases are reported every year. The mortality rate is between 10 per cent and 20 per cent.

Bulimia nervosa

Bulimia nervosa is characterised by episodes of overeating or binge eating at least twice a week for three months or more, followed by behaviour such as self-induced vomiting, fasting or excessive use of laxatives to control weight. Bulimics can be of normal weight, so it can be harder to identify them and provide help.

Bulimics have an extreme concern about body shape. This can be accompanied by other symptoms, such as depressed moods and negative self-talk or thoughts, and impulsive behaviours, such as shoplifting and substance abuse.

The behaviour becomes an outlet for frustration, disappointment, anger, loneliness or boredom. Prolonged bulimia contributes to the development of long-term health problems such as poor metabolism, ulcers and a damaged oesophagus.

It is believed that 20–30 per cent of women aged 18 to 26 are bulimic and one in six tertiary students has bulimia.

Compulsive overeating or binge eating

People who develop a binge-eating disorder experience episodes of uncontrolled eating of large quantities of food but without the purging that characterises bulimia nervosa. After binge eating, they suffer feelings of guilt, embarrassment and self-loathing.

Individuals most at risk of developing a binge-eating disorder have low self-esteem, are unhappy with their body size, feel anxious or do not easily express their needs and feelings.

Obesity

Generally, if an individual has a BMI (body mass index) above 30, he or she is considered to be obese. A person's BMI can be calculated using the following formula:

$$\text{BMI} = \frac{\text{Weight (kg)}}{\text{Height (m)}^2}$$

(Note that caution must be used if this is the only method used to determine obesity.)

A person with a BMI of 25–30 is considered to be overweight. Obese individuals are more likely to suffer emotional disorders, which can coexist with psychological illnesses such as self-harm, depression, substance abuse and compulsive disorders. The development of low self-esteem, a need to be accepted or an inability to cope with emotions and personal issues can lead to this chronic overeating problem. During childhood, overeating can become a refuge from loneliness, insecurity and social alienation, or it can be a reaction to a traumatic life experience or relationship breakdown.

The AIHW report *Australia's health 2008* states that, in 2004–05, 22 per cent of young Australians aged 18–24 were overweight but not obese, and seven per cent were classified as obese. Obesity is higher among indigenous young people at 12 per cent.

Muscle enhancement techniques

Young males are becoming increasingly conscious of body image. Boys as young as 11 have been reported to be on self-imposed restrictive diets to alter body composition. Sports magazines and some women's magazines (particularly those that feature 'hunk of the month' and similar images) perpetuate stereotypes that put pressure on young males to diet and to work out at gyms to achieve 'washboard abs' and muscular definition. There are problems associated with excessive weight training alone, which can damage growth plates in bones. Added to this, some young males not satisfied by what has been genetically predetermined are resorting to illegal substances to achieve greater muscular **hypertrophy**.

Hypertrophy is the enlargement of muscle fibres in response to exercise.

In a Sydney University study, it was found that 11.6 per cent of boys surveyed considered themselves too thin and 30.5 per cent of boys wanted to be a little or a lot heavier. The National Drug Research Institute estimated that 50 000 Australians aged between 15 and 30 were abusing steroids. The actual use has most likely been underestimated, as many individuals would not admit to the use of illegally obtained anabolic steroids. In Australia, the

possession and use of anabolic steroids is illegal unless prescribed by a doctor for medical reasons. Their use by competitors in most sports is banned. The side effects of steroid use in young people can include the stunting of growth, liver problems, hair loss, headaches, acne, sleeplessness, heart conditions, mood swings and depression. There are also serious risks of HIV infection if a steroid user shares needles to inject the drug.



APPLICATION

Research a health promotion initiative

Examine a health promotion initiative such as the CD-ROM *Totally Gorgeous* and investigate how it deals with the issues of body image. Begin your search with the school library or area health service.

1. Outline the message that is the main focus.
2. Personally reflect on its effectiveness in dealing with the issue of body image. Report back to the class.

Risk factors and protective factors for issues of body image

Table 9.7 summarises the risk factors and protective factors for body image issues.

Table 9.7: Risk factors and protective factors for body image issues

Risk factors	Protective factors
Modifiable • Low self-esteem • Profession; for example, jockey • Specific sports such as gymnastics, dance, diving and events with weight classes • Sexually abused • Personality type — highly competitive or compulsive • Social alienation • Development of social construct and sex stereotyping by society; for example, masculinity and femininity • Personal history of substance abuse • Physical inactivity • Cultural background • Availability of fast food • Dissatisfaction with own body image *Non-modifiable* • Age • Gender • Family history of mental illness	• Nutritionally sound diet and exercise patterns • Access to accurate information for making food choices; for example, glycaemic index • Strong personal support networks that help individuals to cope • Personal skills based around assertiveness, resilience, coping, decision making, problem solving and conflict resolution • Laws regarding sexual consent, food labelling and steroid use • Access to health services such as Kids Help Line, school counsellors, government health internet sites • Education of the community, GPs, coaches and other professionals who deal with young people • Society and cultural norms that aim to protect young people from self-harm • The media's general willingness to break down stereotypes in young people's magazines and promote real images • School curricula that promote the importance of healthy diets, proper food preparation skills and physical activity • Healthy canteen policy at school • Increased awareness raised in the media of this issue for young people

Table 9.8: Determinants for body image issues

Sociocultural	Socioeconomic	Environmental
• Family eating and exercise patterns • Family disharmony • Peer acceptance/rejection • Genetic factors • Media stereotypes such as sporting and fashion • Dieting fads • Religious beliefs towards exercise/participation in sports that can be either positive or negative • Cultural attitudes towards food intake	• Low level of health literacy/ education • Expectations of profession or sport • School environment; for example, positive or negative • Disposable income that allows for the purchase of steroids	• Geographic location — rural versus metropolitan areas • Access to health services • Availability of the latest medical treatments

Young people who are most at risk of body image problems are:

- individuals who feel they have no control or have lost control of their lives
- professional dancers, ballerinas and gymnasts
- sexually abused individuals or people who have experienced major trauma
- girls aged 15 to 19, but also those as young as eight
- individuals who are having difficulty dealing with puberty
- individuals with low self-esteem
- highly competitive types
- individuals of Aboriginal, Torres Strait and Pacific Islander descent
- individuals dissatisfied with their body image
- victims of sustained bullying.

Alcohol consumption

In many countries it is common for alcohol to be consumed as part of social gatherings, religious festivals, celebrations and during periods of grief (funerals).

study on
Concept code: PDH-094
Practice HSC exam questions

Nature of the issue

Alcohol is widely consumed by many Australians and has a number of potential benefits. However, the harmful use of alcohol continues to take a huge toll on the health and well-being of Australian communities, families and especially young people.

Alcohol consumption includes drinking in low risk, risky, high risk and binge-drinking quantities (see table 9.9).

Table 9.9: Risks involved in alcohol consumption

Risk	Alcohol consumption for males	Alcohol consumption for females
Low risk	• An average of no more than four standard drinks a day and no more than 28 standard drinks over a week • Not more than six standard drinks during any one occasional heavy drinking day • One or two alcohol-free days per week	• An average of no more than two standard drinks a day and no more than 14 standard drinks over a week • Not more than four standard drinks during any one occasional heavy drinking day • One or two alcohol-free days per week
Risky	• Seven to 10 standard drinks on any one day — short-term harm • Five to six standard drinks per day — long-term harm	• Five to six standard drinks on any one day — short-term harm • Three to four standard drinks per day — long-term harm
High risk	• Eleven or more standard drinks on any one day — short-term harm • Seven or more standard drinks per day is considered high risk — long-term harm	• Seven or more standard drinks per day — short-term harm • Five or more standard drinks per day — long-term harm

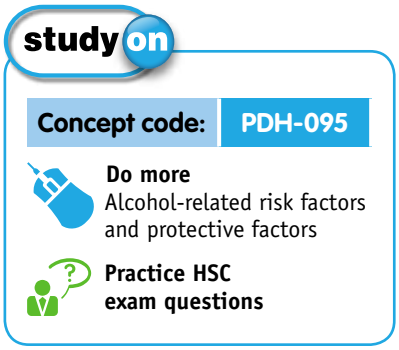
Binge drinking occurs when alcohol is consumed at a high level over a short period of time, or drinking continues over a number of days or weeks. It results in immediate and severe intoxication, with young people taking greater risks or becoming more vulnerable in dangerous situations. Common side effects include hangovers, headaches, nausea and vomiting.

The 2008 *Australian School Students Alcohol and Drug Survey* reported that 23.6 per cent of 12- to 17-year-olds males and 21.6 per cent of 12- to 17-year-old females consumed alcohol in the week prior to the survey. Among these students, 25.6 per cent of the males had consumed seven or more drinks on one occasion and 30.9 per cent of females had consumed five or more drinks on one occasion.

Extent of the issue

Despite the fact per capita alcohol consumption in Australia has decreased over the past 20 years, current research indicates more young people are consuming alcohol, drinking at an earlier age and engaging in binge drinking episodes more frequently.

Research from the *2010 National Household Drug Survey* indicated that 5.1 per cent of 12- to 17-year-olds consumed alcohol on a weekly basis, rising to 38.6 per cent of 18- to 19-year-olds. It also reported that people aged 18–29 were more likely than any other age group to drink alcohol that put them at a risk of alcohol-related harm during their lifetime.

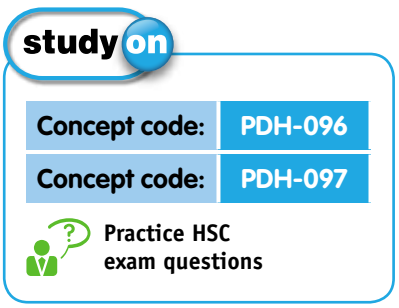


Risk factors and protective factors for alcohol consumption

Table 9.10 summaries the risk factors and protective factors for alcohol consumption.

Table 9.10: Risk factors and protective factors for alcohol consumption

Risk factors	Protective factors
Modifiable • Early exposure at home or work • Easy access or availability • Older siblings who use or supply • Poor mental health • Limited recreational and entertainment opportunities in some areas • Cultural expectations • Unemployment • Low level of education • Geographic location — rural/metro • Difficulty with sexuality issues • Low self-esteem • Social alienation • Family breakdown or disharmony • Poly drug use; for example, tobacco, cannabis • Sexually abused • Low socioeconomic status • Low academic achievement • Victim of bullying • Family mobility *Non-modifiable* • Migrant background • Aboriginal and Torres Strait Islander background • Gender • Family history of poor mental health • Parent/sibling with a disability or a mental health issue	• Strong personal support networks • Personal skills based around assertiveness, resilience, coping, decision making, problem solving and conflict resolution • Laws regarding age limits such as work, minimum years of schooling, sexual consent, driver licensing, supply of alcohol to minors, alcohol consumption and anti-discrimination laws • Access to health services, information and the development of health literacy skills by schools; for example, Kids Help Line, school counsellors, health pamphlets and government health internet sites • Education of the community and professionals who deal with young people such as the responsible service of alcohol by pub and club staff • Society and cultural norms that aim to protect young people from self-harm; for example, finding alternate sponsorship for sporting events, curfews in some rural towns, and alcohol-free areas and events for young people • Government health initiatives that raise awareness by young people such as 'Don't turn a night out into a nightmare' • Crossroads programs run at schools to educate senior students of the dangers of alcohol and road use



Groups of young people most at risk of health problems due to alcohol consumption are:

- the unemployed or underemployed
- the socioeconomically disadvantaged
- individuals with a high disposable income
- individuals suffering stress or depression
- individuals with easy access to alcohol
- individuals who use other drugs such as tobacco or cannabis
- victims of sexual abuse or major trauma
- males in rural and remote areas.

Table 9.11: Determinants for alcohol consumption

Sociocultural	Socioeconomic	Environmental
• Socially acceptable drug • Family attitudes and parental consumption levels • Access to alcohol in the family home • Peer acceptance • Religious beliefs that prohibit or include alcohol • Cultural attitudes; for example, a rite of passage or associated with most celebrations, birthdays, weddings, anniversaries or winning • Popular youth cultures that encourage consumption at harmful levels • Media stereotypes • Strong association between alcohol and sporting events	• Disposable income • Unemployment or underemployment • Alcohol-sponsored sporting or social events such as cricket • Wide availability of alcopops, which make it easier to disguise the taste of the alcohol	• Geographical location; for example, remote, rural and city areas • Limited exposure to health messages in remote areas • Access to support services such as Alcoholics Anonymous • Limited recreational opportunities in some areas • Association with gambling; for example, racing or poker machines • Longer opening hours for pubs and clubs • Cheaper drinks for females to fill venues • Larger venues for clubs and pubs



INQUIRY

Researching an area of concern

eBookplus

Use the **Australia's health 2012 and the National drug strategy household survey** weblinks in your eBookPLUS to access more information and data on alcohol consumption. Present the data in table or graph form.



APPLICATION

Analysing a health promotion program

Research a current or recent health promotion program aimed at reducing alcohol consumption by young people. List the organisation responsible for running the program, its approach to the problem, its methods of advertising, and the resources provided for individuals and their family and friends. Present your findings as a PowerPoint for the class.

Violence

Violence can take many forms and includes physical bullying, sexual assault, sexual harassment, homophobic vilification and domestic abuse. It can occur because of an imbalance of power due to physical size, age or group numbers, or due to differences in emotional maturity.

General nature

Increasing levels of violence are depicted in the media and computer games, which can to some extent desensitise people to the seriousness and the effects of violence.

- Bullying can be physical, emotional or verbal. Males tend to use physical bullying — that is, punching or kicking. Females tend to use psychological bullying, such as name calling and exclusion. Bullying can be experienced anywhere — at school, in the workplace or in the home.
- Sexual assault is against the law. The term includes non-consensual intercourse, rape and gang rape. Perpetrators of sexual assault aim to inflict harm or assert power over the victim. Short-term effects for the victim might include physical injuries, contraction of an STI, feelings of guilt, loss of self-esteem or pregnancy. Long-term effects can include difficulties in maintaining normal

sexual relationships, self-harm behaviours or depression. Laws are in place to protect victims and to punish the perpetrators of sexual assault.

- Sexual harassment is also punishable by law. It might result from an imbalance of power and includes unwanted verbal comments or suggestions, physical gestures of a sexual nature, name calling, displaying of sexually explicit images or text messages, and obscene phone calls or emails. It can occur at school, work, in pubs, clubs and in sporting areas.
- Homophobic vilification results from an irrational fear or lack of tolerance towards individuals who are same-sex attracted. It can be expressed verbally or physically. Victims can suffer physical injuries and psychological damage, which can lead to depression or feelings of isolation or insecurity. This may, in turn, lead to self-harm or even suicide if no support is given or no action is taken against the discrimination.
- Domestic abuse is violence associated within the family or home environment. The factors involved can be sociological (gender stereotypes), cultural (clash between old and new ways), environmental (overcrowding in the home) or physiological factors (differences in ages of siblings). Domestic abuse can be physical, social, sexual or psychological. It can also be perpetuated through different generations of families.

Extent of the impact

Generally there has been an increase in violence against young people. One in six school students suffer a form of bullying each week. Most sexual assaults are committed by males against a known victim and go unreported. Most physical attacks on homosexuals are by male offenders aged between 16 and 20.

Risk factors and protective factors for violence

Table 9.12 summarises the risk factors and protective factors for violence in young people.

Table 9.12: Risk factors and protective factors for violence

Risk factors	Protective factors
Modifiable • Geographic location — remote/rural/metro • Low self-esteem or poor social skills • Social alienation or isolation • Incarceration • Family breakdown or disharmony • Substance abuse • Low socioeconomic status • Overcrowded housing conditions • Poor infrastructure; for example, transport • Societal and cultural attitudes that are more accepting of violence *Non-modifiable* • Migrant background • Aboriginal and Torres Strait Islander background • Gender • Homosexuality • Family history of mental illness or domestic violence	• Strong personal support networks • Personal skills based around assertiveness, resilience, coping, decision making, problem solving and conflict resolution • Laws regarding sexual consent, alcohol consumption and racism/discrimination • Access to health services and the development of health literacy skills by schools; such as Kids Help Line, school counsellors, health pamphlets and government health internet sites, refuges and safe houses, rape crisis centres • Education of the community and professionals who deal with young people • Society and cultural norms that aim to protect young people from self-harm; for example, censorship and classification restrictions of computer games • Community based programs such as Youth off the Streets, blue light discos or curfews • Training in basic self-defence, especially for females • Adequate late night transport services with safe waiting areas

Groups of young people most at risk in relation to violence are:

- males, especially those who consume alcohol at harmful levels
- females
- homosexuals

- individuals in rural and remote areas
- individuals of Aboriginal and Torres Strait Islander background living in remote areas
- individuals of low socioeconomic status
- individuals with low self-esteem
- individuals exposed to the juvenile justice system or incarceration
- individuals who have experienced a history of domestic violence or family history of mental illness.

Table 9.13: Determinants for violence

Sociocultural	Socioeconomic	Environmental
• Early exposure to domestic violence • Family disharmony • Desensitising of society to violence • Media stereotypes that perpetuate violence in movies and sport • Peer acceptance • Cultural acceptance • Social constructs of masculinity • Exposure to periods of juvenile incarceration • Aggression accepted as part of some sports • Drug use	• Low socioeconomic status • Unemployment • Low level of education	• Glorification of violence in computer games • Higher incidences in metropolitan and remote areas • Availability of safe areas on public transport • Wide variety of violent computer games • Housing commission areas that concentrate disadvantaged populations • Overcrowding



INQUIRY

Researching an area of concern

eBookplus

Use the **SBS** weblink in your eBookPLUS to find out more about the incidence of youth violence in the Australian community. Create a summary of your findings.



APPLICATION

Analysing a health promotion program

Research a current or recent health promotion program aimed at reducing violence among young people. List the organisation responsible for running the program, its approach to the problem, the methods of advertising, and the resources provided for individuals and their family and friends. Present your findings as a PowerPoint presentation for the class.

Road safety

Risk taking can occur at a conscious or subconscious level. It can also be positive or negative. An example of positive risk taking is being involved in sporting activities that develop fitness and social skills, but have the potential for some injury. Negative risk taking is when the result of thrill seeking, copycat stunts or antisocial behaviour may be long-term disability, injury or death. A sense that 'it won't happen to me' is often the cause of most risk-taking behaviours.

Motor vehicle accidents and young people

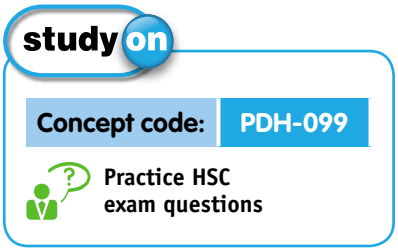
The most common causes of motor vehicle accidents involving young people relate to poor perception of risks, driver fatigue, thrill seeking, inexperience and environmental hazards. Young people are often injured as passengers because they tend to drive with friends as a social activity. As a group, young people

study on

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Road accidents: nature and extent

Practice HSC exam questions

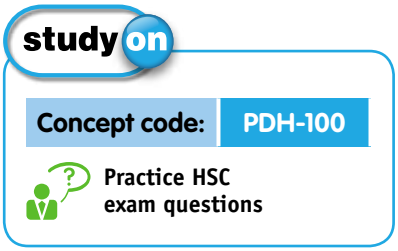


also tend to be more mobile and independent, which puts them at greater risk of injury as pedestrians, especially if alcohol or other drugs have been consumed.

Young drivers take risks in motor vehicles by not wearing seatbelts, running red lights, allowing too many passengers in the car, driving at high speeds or driving under the influence of a drug.

Extent of impact

Motor vehicle accidents represent the greatest cause of unintentional death and injury in young people. Male death rates are higher than female death rates. Hospital admission rates for males are three times that of females. Indigenous young people and young people in rural areas are more likely to be involved in motor vehicle accidents than non-indigenous young people and those in urban areas. The higher rates relate to differences in road conditions, higher speed limits and distances travelled in rural and remote areas.

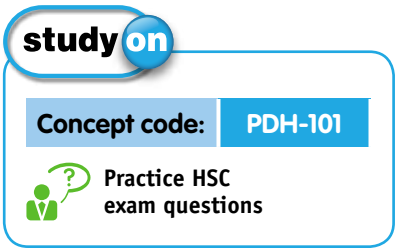


Risk factors and protective factors for road safety

Table 9.14 summarises risk factors and protective factors for road safety.

Table 9.14: Risk factors and protective factors for road injuries

Risk factors	Protective factors
Modifiable • Alcohol consumption, particularly for drivers of motor vehicles and pedestrians • Lack of driver experience • Driver fatigue, especially for young people with part-time jobs • Poor road design; for example, no roundabouts or traffic lights at busy intersections • Geographic location — rural areas have higher speed limits and more dirt roads in comparison with metropolitan areas • Risk-taking behaviours such as not wearing a seatbelt or driving at high speeds • High performance vehicles • Poor infrastructure — a lack of adequate alternative transport forces young people to use cars more often, especially in isolated areas • Poly drug use; for example, cannabis, tobacco, alcohol • Low socioeconomic status means drivers are unable to purchase cars with safety features such as air bags or carry out proper maintenance • Mobility — desire to move from one party to the next • Not obeying road rules such as driving with an overcrowded motor vehicle *Non-modifiable* • Gender — males tend to drive more irresponsibly and this is reflected in higher insurance premiums	• Personal skills based around assertiveness, decision making and problem solving • Laws regarding driver licensing, speed limits, breath testing and alcohol consumption; for example, 0 BAC for P plate drivers, three year P plates • Access to driver education programs such as U turn the Wheel, and the increase in the number of hours and experiences required on L plates • Community-based initiatives; for example, Driver Reviver stops, courtesy buses and free soft drinks for designated drivers • Improvements to roads; for example, dual carriageways, roundabouts, speed cameras and the identification of road black spots • Society and cultural norms that aim to protect young people from self-harm such as curfews in some rural towns and alcohol free communities/areas and events for young people • Improvements in the safety features of motor vehicles; for example, air bags, ABS brakes, side intrusion bars • Increased media attention • Lobbying by groups to make changes to improve driver education and licensing conditions for young people • Government initiatives such as double demerits for holiday periods



Groups of young people most at risk of road injuries are:

- males, especially in rural areas
- individuals with limited driving experience
- drivers of high performance vehicles
- individuals affected by alcohol or cannabis
- individuals who work late at night or are affected by fatigue
- individuals from low socioeconomic backgrounds who cannot afford to maintain their vehicle properly
- females, generally as passengers.

Table 9.15: Determinants for road safety

Sociocultural	Socioeconomic	Environmental
• Peer influence • Drug usage • Media stereotypes such as *The Fast and Furious* • Popular youth cultures that encourage risk taking; for example, burn outs, street racing by 'hoons' • The need for mobility and independence • High levels of social networking by younger generations	• Car ownership is more affordable; for example, easy finance • Government funding for road improvements can depend on the economic climate and must be prioritised • Low levels of participation in driver education programs • Many jobs require young people to be on the road more frequently and at all times of the day and night • Rates of car ownership are much higher in recent years	• Car design and technology such as air bags • Geographic location — rural versus metropolitan • Distance between entertainment venues • Differences in weather conditions • Use of technology such as speed cameras • Improvements in road surfaces and design; for example, roundabouts, dual carriageways, overhead walkways



Researching an area of concern

eBookplus

Use the **AIHW 2012** weblink in your eBookPLUS to find out more information and data on risk taking and road-related injuries. Present the data in table or graph form.



Analysing a health promotion program

Research a current or recent health promotion program aimed at road-related injuries. List the organisation responsible for running the program, its approach to the problem, its methods of advertising, and the resources provided for individuals and their family and friends. Present your findings as a PowerPoint presentation for the class.

Sexual health

Sexual health includes illnesses and conditions relating to sexual orientation, sexual exploration, sexual behaviour, pregnancy, abortion and sexually transmitted infections (STIs).

General nature

- A person's *sexual orientation* can be heterosexual, homosexual, bisexual or transsexual. Some young people are uncertain of their sexual orientation and may go through a distressing and confusing time if they lack support or are discriminated against. Some young people arrive at a better understanding of their sexual orientation only after a period of sexual exploration. A homosexual experience as a young person may not necessarily mean this is the person's sexual orientation for the rest of his or her life.
- *Sexual exploration* can involve brief relationships with the same or the opposite sex and can include kissing, petting, fantasising, masturbation, oral sex and sexual intercourse. Exploration allows young people to understand their sexual identity and how the body works.
- *Sexual behaviour* is influenced by family attitudes, cultural beliefs, society's expectations and role models. Sexual activity may begin early in adolescence or be delayed if a person chooses to remain celibate.

- *Pregnancy and parenting* in young people is often the result of sexual inexperience or a lack of knowledge of contraception and the menstrual cycle. Some young people choose pregnancy to satisfy the need to feel loved and be secure. A few might seek the short-term financial gain of the baby bonus or the government's parenting payments for single mothers. Pregnancy can result in the discontinuing of education or employment, and young people find themselves forced to consider issues of future parenting, adoption or termination of the pregnancy. Young people dealing with a pregnancy require strong support networks while they cope with their own maturation.
- *Abortion* is the removal of the foetus from the uterus through medical interventions (drugs or surgical procedures). This can be a traumatic decision with significant health risks. The decision to terminate a pregnancy may be linked to the mother's and the family's values and attitudes, the circumstances of conception (consensual or due to rape), the father's commitment, financial implications, society's acceptance, and cultural and religious beliefs.
- *Human immunodeficiency virus (HIV)* causes an infection that can lead to *acquired immune deficiency syndrome (AIDS).* This breaks down the body's immune system, which then cannot fight infections such as pneumonia or various types of cancers. This disease is life-threatening. Unprotected sexual activity, such as the failure to use condoms, and the sharing of needles by intravenous drug users are the primary methods of transmitting HIV.
- The *blood-borne virus* hepatitis B is transmitted by infected blood or body fluids and affects the liver. Symptoms include jaundice, fatigue and nausea. Infected people become carriers of the virus. Vaccinations against the virus are available. Hepatitis C can be transmitted through the sharing of needles, tattooing, body piercing or having many sexual partners. Infected individuals may show no symptoms initially.
- *Sexually transmitted infections (STIs)* can cause serious illnesses, infertility and possibly death if untreated. Examples include HIV/AIDS, chlamydia, genital warts, genital herpes, pelvic inflammatory disease, gonococcal infection, syphilis, pubic lice and scabies. The risk of catching an STI is greatly reduced when a condom is used during intercourse.

Extent of the impact

Among young women as a group, the most common age for giving birth is 18–19 years, and the number of births to girls under 16 years of age is decreasing. The AIHW estimates that 16 per cent of induced abortions occur in the 15–19 years age group. Young women from lower socioeconomic backgrounds have a higher incidence of pregnancy and are more likely to continue with the pregnancy to full term. In 2008, the birth rate for indigenous females aged 15–19 was 78 births per 1000, five times the birth rate for non-indigenous females in that age group (14 births per 1000).

Among young people, the incidence of HIV/AIDS is decreasing, but the incidence of blood-borne diseases is increasing. According to the report *Young Australians: their health and wellbeing 2011*, of the common sexually transmitted infections, chlamydia was most frequently reported (36 683 cases in 2008 in the 12–24 years age group.

Risk factors and protective factors for sexual health

Table 9.16 summarises the risk factors and protective factors for sexual health.

Groups of young people most at risk of sexual health problems are:

- individuals who are sexually active
- individuals who engage in sex at an early age

- females
- unemployed females
- females of low socioeconomic status
- homosexual males
- individuals who engage in unprotected sex
- individuals who consume alcohol at risky levels
- individuals who binge drink
- individuals who abuse other drugs such as cannabis
- individuals with many sexual partners
- individuals who have been sexually abused
- females with low self-esteem
- females in rural and remote areas
- females in dysfunctional family situations.

Table 9.16: Risk factors and protective factors for sexual health

Risk factors	Protective factors
Modifiable • Unemployment • Low level of education/knowledge of contraceptive methods or STIs • Geographic location — limited access to support services such as Family Planning Association in rural areas • Experiencing difficulties with issues of sexuality • Low self-esteem • Family breakdown • Substance abuse; for example, cannabis • Sexual abuse — rape • Low socioeconomic status • Cultural/religious beliefs that encourage or discourage the use of contraception • Cultural/religious beliefs that encourage or discourage the concept of sex before marriage such as celibacy • Alcohol consumption • Engaging in unprotected sex • Having many sexual partners • Being a homosexual male *Non-modifiable* • Gender	• Strong personal support networks • Personal skills based around assertiveness, resilience, coping, decision making and problem solving • Laws regarding minimum years of schooling, marriage, sexual consent and discrimination • Access to health services such as the Family Planning Association, health pamphlets and government health internet sites • The development of health literacy skills by schools; for example, information from health lessons on contraception/STIs and support from school counsellors and year advisers • Training for community workers and professionals who deal with young people who can then refer them to other services • Society and cultural norms that aim to protect young people from self-harm; for example, abstinence or celibacy • Teenage mothers in school programs that allow young mothers to continue their education • Collecting statistics that allow health authorities to measure the incidence and prevalence of HIV/AIDS and STIs so that health promotions can be targeted • Immunisation programs that protect females from contracting the human papilloma virus (HPV) • Advances in the treatment of HIV/AIDS and STIs

Table 9.17: Determinants for sexual health

Sociocultural	Socioeconomic	Environmental
• Peer pressure • Early age of sexual experience • Media stereotyping • Religious beliefs that accept or reject contraception • Cultural expectations about sex and marriage • Family values • Popular youth orientated magazines for girls	• Low socioeconomic status • Unemployment • Knowledge of safe sex practices and contraception • Sex education taught in schools under tight restrictions and acceptance of cultural diversity	• Access to family planning services • Immunisation programs such as for the human papilloma virus • Improved access to condoms; for example, vending machines • Improved medical treatment • GPs more willing to prescribe the morning after pill



Researching an area of concern

eBookplus

Use the **The Kirby Institute** weblink in your eBookPLUS to find out more information and data on issues related to sexual health. Present the data in table or graph form.



APPLICATION

Analysing a health promotion program

Research a current or recent health promotion program related to sexual health, such as contraception, seeking help for STIs or preventing the spread of viruses such as HIV. List the organisation responsible for running the program, its approach to the problem, the methods of advertising, and the resources provided for individuals and their family and friends. Present your findings as a PowerPoint presentation for the class.

Other relevant and emerging health issues

Some factors that can impact on young people's health do not fit easily into the categories we discussed in the previous sections, but have growing relevance in contemporary Australian society. Examples we will consider are gambling, cyberbullying, party crashes and drink spiking.

Gambling

Gambling becomes a health issue for young people when it is a significant part of their lives, leads them into heavy debt, and affects their mental and physical health and relationships. The initial thrill of gambling on a machine, a race or a card game can quickly be replaced by anxiety when the practice becomes an addiction. The opportunities for young people to engage in gambling have increased over the last decade with the wide availability of gaming machines and sports gambling outlets in clubs and hotels, the popularity of poker and the rise of internet gambling sites.

Nature

Gambling is one of the oldest traditions of many societies. Individuals bet on the outcomes of games, events or sporting contests. In modern times gambling has been extended to include all types of technology, such as poker machines and internet gaming. People can bet infrequently, such as on the Melbourne Cup, or become addicted to gambling and suffer financial hardship or destroy personal relationships.

Extent

Gambling statistics for young people are not widely researched. However a 2007 study on adolescent gambling in South Australia, which surveyed students aged 13–17, revealed that 6 per cent of respondents participated in gambling on a regular or weekly basis.

Of the young people surveyed, most experienced no problems with gambling, with only 2.4 per cent of those who did gamble being classified as problem gamblers. The most popular forms of gambling for young people were:

- instant scratch tickets (39.6%)
- private card games (26.7%)
- betting on racing (18.8%)
- betting on sports events (14.9%)
- bingo (13.7%)
- Keno (9.6%)
- Crosslotto (8.6%)
- internet gambling (4.0%).

Risk factors and protective factors for gambling

Table 9.18 summarises the risk factors and protective factors for gambling.

Table 9.18: Risk factors and protective factors for gambling

Risk factors	Protective factors
Modifiable • Unemployment • Low level of education • Geographic location — rural/metro • High disposable income • Low self-esteem • Substance abuse • Low socioeconomic status • Early exposure • Family history of problem gambling • Personality type; for example, compulsive • Sudden change in economic circumstance • Cultural acceptance; for example, gambling is strong in many Asian cultures • General acceptance by society, such as betting on the Melbourne Cup • Easy access to gambling at home on the internet • Association of sport and gambling; for example, betfair.com and the cricket, Centrebet and football games *Non-modifiable* • Migrant background • Family history of poor mental health • Gender — males gamble more frequently • Age	• Personal skills based around assertiveness, resilience, coping, decision making and problem solving • Laws regarding poker machine limits, age limits when entering licensed premises, gambling warnings on machines and alcohol consumption limits • Access to government and privately run health services such as Alcoholics Anonymous • Education of the community and professionals who deal with young people at risk • Health promotion initiatives that warn of the dangers of gambling • Economic security • Full employment • Involvement in community projects or sporting/social groups that limit time available to gamble

Table 9.19: Determinants for gambling

Sociocultural	Socioeconomic	Environmental
• Peer influence • Family acceptance • Family history of problem gambling • Media advertising that encourages having a bet • Cultural attitudes • Link between sport and gambling	• Disposable income • Unemployment or underemployment • Low socioeconomic status • Fluctuation in income • Economic security • Low level of education	• Access to gambling venues is higher in metropolitan areas • Emergence of larger pubs and clubs with indoor and outdoor gambling areas for smokers • Internet gambling • Increase in the number of casinos; for example, one in each state and territory • Poker machines now becoming like computer games to attract young people • Linking of machines for jackpots • Greater variety of machines and games for gambling

Groups of young people most at risk of gambling are:

- the unemployed
- individuals of a low socioeconomic background
- individuals with a disposable income
- those recently retrenched or experiencing sudden financial difficulty
- 18 to 24-year-old males
- individuals with compulsive personalities
- smokers and individuals who consume alcohol
- individuals whose culture accepts gambling
- socially alienated — internet gambling
- individuals with a family background of problem gambling.

Cyberbullying

The dangerous aspects of evolving technologies and social networking websites have gained extensive media attention in recent years. The ease with

which false, abusive or incriminating information about a person can be spread through a social group, a community or across the world has led to new forms of cyber crime that are difficult for authorities to tackle.

Nature

Bullying is the deliberate psychological, emotional and/or physical harassment of one person by another person, or a group. A new form of bullying has emerged called **cyberbullying**. Cyberbullying includes the use of technology such as mobile phones, emails, text/video messaging, chat rooms and school or community websites.

Cyberbullying is deliberate harassment of a person using communications technology, such as texting on mobile phones, by email, on MySpace, Facebook or other chat room sites and websites.

Extent

Cyberbullying is a relatively new phenomenon, so direct statistics are not available and it may be under-reported. However, the following is evident about bullying in general.

However, research has indicated the following about bullying in general.

- In a recent study, 20 per cent of teenagers surveyed said that they have been cyberbullied at some point.
- Bullying was the second most common reason for young people to seek help from Kids Help Line.
- In 2009, the Kids Help Line received 2498 calls regarding bullying. This included 200 reports of cyberbullying.
- New South Wales accounted for 33 per cent of these cyberbullying contacts in 2009. The majority (51%) occurred in the 10–14 years age group.
- Females accounted for 78 per cent of these cyberbullying contact in 2009.
- It is highly likely that cyberbullying would be a preferred method of bullying by girls as it can be done more anonymously.

Risk factors and protective factors for cyberbullying

Table 9.20 summarises the risk factors and protective factors for cyberbullying.

Groups of young people most at risk of cyberbullying are:

- individuals of low socioeconomic status
- individuals perceived as different or new
- individuals with high or low academic achievement
- individuals with some type of physical disability
- gay youth
- individuals with culturally diverse backgrounds.

Table 9.20: Risk factors and protective factors for cyberbullying

Risk factors	Protective factors
Modifiable • Low socioeconomic status • Low self-esteem • Being perceived as different/new or alternative in your ways of thinking • High achievement • Family mobility *Non-modifiable* • Age • Gender • Having a disability • Homosexual • Cultural background • Aboriginal and Torres Strait Islander background • Previous history of being bullied	• Strong personal and community support networks • Developing personal skills based around assertiveness, resilience, coping, conflict resolution and protection of private details • Laws regarding anti-discrimination, racism and menacing phone calls • School policies regarding bullying • Access to health services such as Kids Help Line and Reach Out • Knowledge of rights; police and school responsibilities related to bullying • Education of the family, community and professionals who deal with young people such as police visits to schools • Education about all the functions and services available from your internet provider, such as blocking particular people • Limiting the number of friends you keep in contact with on sites such as Facebook • Maintaining security of passwords • Access to Cybersmart, the government's online cybersafety program

Table 9.21: Determinants for cyberbullying

Sociocultural	Socioeconomic	Environmental
• Society's acceptance • Peer influence • Media stereotypes • Cultural background • Religious beliefs • Family mobility • Society's expectations of masculinity and femininity	• Low socioeconomic status • Low level of education • Parental employment	• Access to technology such as the internet and mobile phones • Geographical location; for example, affluence of areas • Access to health services that help deal with the problem, such as Kidscape

Party crashes

When a party is 'crashed', what some people perceive as a harmless prank or entertainment can quickly escalate into a violent confrontation, with consequences for individuals, neighbours and communities.

Nature

Party crashes or 'gatecrashers' are unwanted and uninvited individuals or groups at a social gathering.

Party crashing occurs when individuals known as gatecrashers attend a social gathering to which they have not been invited and refuse to leave when asked. The information regarding parties is distributed via text message or the internet.

Extent

Few reliable statistics are available other than what is reported in the media and the response of the police in developing new strategies to combat the problem.

Risk factors and protective factors for party crashes

Table 9.22 summarises the risk factors and protective factors for party crashes.

Groups of young people most at risk of party crashing are individuals:

- looking for peer acceptance
- inexperienced in the organisation of large social events.

Table 9.22: Risk factors and protective factors for party crashes

Risk factors	Protective factors
Modifiable • Poor planning — written invitations not issued to restrict numbers who can attend • Venue is easy to access by outsiders and difficult to supervise by adults • Wide use of technology by young people; for example, mobile phones and internet • Gang rivalry • A limited number of entertainment options for young people in a particular area • Cultural disharmony in a community *Non-modifiable* • Age	• Strong personal support networks; for example, inviting trusted adults to monitor the party or hire professional security guards • Personal skills based around planning, conflict resolution, assertiveness, decision making and problem solving • Laws regarding noise, trespass, supply of alcohol to minors and alcohol consumption • Access to police services and internet information; for example, how to register a party with the police and how to plan a safe party • Government health initiatives that raise awareness in young people of alcohol-related issues, such as 'Don't turn a night out into a nightmare'

Table 9.23: Determinants for party crashes

Sociocultural	Socioeconomic	Environmental
• Media influence • Peer influence • Low level of parental supervision • Popular youth cultures that encourage gaining notoriety such as YouTube or Facebook • Desire to be accepted by others	• Occurs regardless of level of employment, education or income	• Metropolitan areas because of population numbers • Areas that have limited access to entertainment venues for young people under 18 • Ready access to communication technology • Alcohol-free zones in parks force young people to find other areas

Drink spiking

The deliberate spiking of a person's drink can have serious consequences for the perpetrator, including a criminal conviction, and serious safety and health consequences for the victim.

Nature

Drink spiking is the intentional addition of alcohol or another drug to a person's drink without their knowledge or consent.

Drink spiking occurs when alcohol or any drug such as a depressant, hallucinogen or stimulant is added to an individual's drink without their knowledge or consent. Depending on the drug used, the individual may suffer any of the following within 15 to 30 minutes of swallowing the drug: memory loss, nausea, intoxication, vomiting, passing out, dizziness, paralysis, lethargy, hallucinations, blurred vision or seizures. Many cases of drink spiking are pranks, but more serious cases include sexual assault and intent to rob or physically assault a victim.

Extent

The statistics are difficult to collect and can sometimes merely reflect greater awareness and reporting. While many cases of drink spiking go unreported, the Australian Institute of Criminology (AIC) found in 2002–03 there were approximately 178 reported cases in New South Wales, 82 cases in South Australia, 70 cases in the ACT, 51 cases in Victoria, 210 cases in Western Australia, 31 cases in the Northern Territory, 30 cases in Queensland and eight cases in Tasmania. The AIC also reports the following statistics regarding drink spiking:

- 4 out of 5 victims were female
- half of drink spiking victims were under 24
- approximately one-third of drink spiking incidents reported to police involved sexual assault
- 83 per cent involved no associated crime
- 66 per cent of incidents occurred at a nightclub, bar or park
- 13 per cent of incidents occurred in the victim's or offender's house
- 10 per cent of perpetrators were apprehended by police.

Table 9.24: Estimated number of drink spiking incidents reported to police between 1 July 2002 and 30 June 2003

Age	Drink spiking incidents (%)
Under 16 years	3
16–24 years	48
25–34 years	33
35–44 years	12
Over 45 years	4

Source: Australian Institute of Criminology, 'National project on drink spiking: investigating the nature and extent of drink spiking in Australia', November 2004.

Risk factors and protective factors for drink spiking

Table 9.25 summarises risk factors and protective factors for drink spiking.

Table 9.25: Risk factors and protective factors for drink spiking

Risk factors	Protective factors
Modifiable • Anyone who drinks • Accepting drinks from strangers • Leaving drinks unattended • Leaving venues with strangers • Not knowing what you are drinking • Drinking at risky levels and above • Geographic location — more reports of drink spiking in metropolitan areas • Poly drug use *Non-modifiable* • Age — 16- to 24-year-olds report most incidents • Gender — females are targeted most frequently, but males are also victims at times	• Strong personal support networks that encourage young people to look out for each other • Personal skills based around assertiveness, decision making and problem solving • Laws regarding responsible service, consent, supply of alcohol to minors and alcohol consumption • Access to health services and information such as Kids Help Line, school counsellors, health pamphlets and government health internet sites • Education of the community and professionals who deal with young people; for example, the responsible service of alcohol by staff at pubs and clubs • Government health initiatives that raise awareness by young people, such as 'Don't turn a night out into a nightmare' • Drink testing kits

Table 9.26: Determinants for drink spiking

Sociocultural	Socioeconomic	Environmental
• Media stereotypes that desensitise individuals to the harmful effects of alcohol • Peer acceptance; for example, playful pranks • Acceptance as a part of popular youth culture; for example, binge drinking • Religious beliefs that prohibit the consumption of alcohol — limits risk • 'It won't happen to me' attitude by most young people	• Occurs regardless of level of employment, education or income	• Access to prescription medications through drug dealers • Geographic location — occurs more in metropolitan areas • Backyard labs that can manufacture drugs • Large groupings of young people such as at Schoolies • Poorly lit venues

Groups of young people most at risk of drink spiking are:

- individuals who consume alcohol
- poly drug users
- females
- individuals aged 16 to 24 years
- individuals living in metropolitan areas.



WHAT SKILLS AND ACTIONS ENABLE YOUNG PEOPLE TO ATTAIN BETTER HEALTH?

CRITICAL QUESTION

What skills and actions enable young people to attain better health?

Building positive self-concepts

The syllabus requires students to learn to analyse programs that aim to develop positive self-concepts. Lists of possible programs are included in this section as examples. Students should not feel restricted to these, but should endeavour to research other appropriate programs.

A number of health-promoting programs are operated by the New South Wales Department of Health that are aimed at building positive self-concepts for young people in three key areas: self-worth, healthy body image and **self-efficacy** in personal skills. Some of these are listed below.

Self-efficacy is a person's degree of confidence in being able to carry out a particular task.

- Suicide: We Can All Make a Difference (NSW Suicide Prevention Strategy)

- The Dumping Depression Project
- Youth-Link Program for young offenders in the juvenile justice system
- Resourceful Adolescent Program
- School-Link Program (helping adolescents with depression and related disorders)
- NSW Youth Health Policy: NSW Centre for the Advancement of Adolescent Health (CAAH)
- *No Body is Perfect* and *Unreal Images*, video and other resources from the NSW Department of Health
- Fresh Tastes: NSW Healthy School Canteen Strategy
- NSW Youth Illicit Drugs Strategy



APPLICATION

Health promotion

Research one health-promoting program listed above that aims to enhance young people's self-concepts. Use the following questions as a guide for your research.

1. What are the goals of the project?
2. Who is the target audience?
3. What are the main messages?
4. How could the program assist young people to develop positive self-worth, a healthy body image or self-efficacy in personal skills?

eBookplus

Begin your research by using the **NSW Health** weblink in your eBookPLUS, or by doing a Google search using key words.

study on

Concept code: PDH-102

Practice HSC exam questions

Developing a sense of connectedness

Young people are an integral part of society and the future. Governments and the local community are becoming increasingly aware of the valuable contribution young people can make when they are allowed to participate in the decision-making process. By developing policies and providing young people with opportunities that encourage responsibility, the community can develop a sense of connectedness, which promotes good health for all.

Connectedness with the community

When a person feels a sense of belonging to an organisation or group of individuals then they share a common set of values, beliefs and sense of purpose. Young people need to feel they are a valuable resource in their community. By being made to feel part of the community, young people are more likely to:

- express concern for community members and work towards supporting the community as a whole
- respect the differences that make us all individual
- value the benefits of cooperating to achieve common goals such as safety for all
- develop interpersonal skills.

Being part of the community allows young people to access the expertise and support that is available through many adults. The support may be in the form of mentor programs, access to facilities and resources, or financial grants. A sense of connectedness with the community will lead young people to appreciate the value of older generations.

Positive interpersonal relationships

Positive interpersonal relationships allow individuals to relate effectively with one another to avoid conflicts. They are based on respecting differences in people and valuing the ability to coexist with others. The trend towards residing in the larger cities has led to greater anonymity, alienation and fracturing of family life. This is adversely affecting young people's skills in developing positive interpersonal relationships.



Self-concept and connectedness skills

Read the following scenario and answer the question below.

> Bianca is a year 11 student who has lately become withdrawn. She rarely calls her friends and doesn't want to socialise.
>
> Bianca has been very unhappy since an incident of bullying occurred at school two months ago. She is also a highly skilled state soccer player, but no longer plays due to an injury. However, Bianca still loves the game and watches her younger sister's team play each weekend.

Analyse the scenario above and propose a five-step plan of action that would develop Bianca's self-concept and connectedness with the community.



Leadership opportunities for young people

Contact the youth officer at your local council and make a list of the programs aimed at developing leadership and citizenship skills in young people in your community. Alternatively, examine what is being done in your own school. Present and discuss your findings with the class.

Supportive networks

Throughout all stages of life, support networks function to promote good health. These networks may be informal (for example, friendships) or more formal (for example, the family, school or support groups for specific illnesses). Support networks can also include programs and government agencies.

Identifying the need for support

A young person may need their support network when they show the physical, social, mental or emotional symptoms of being unable to cope with circumstances. In the case of stress, a young person may display symptoms that are:

- physical — muscle aches, headaches, stomach in knots, fatigue, elevated heart rate, loss of appetite or overeating
- social — withdrawal, substance abuse or aggressive behaviour towards others
- mental — low self-esteem, inability to concentrate or negative self-talk
- emotional — constant feelings of anxiety or fear, rapid mood swings or persistent worrying.

If young people are aware of these symptoms, they are usually able to recognise that they have a potential problem and can therefore do something about it. Otherwise, they may enter a state of denial and be reluctant to seek help or accept help when it is offered.

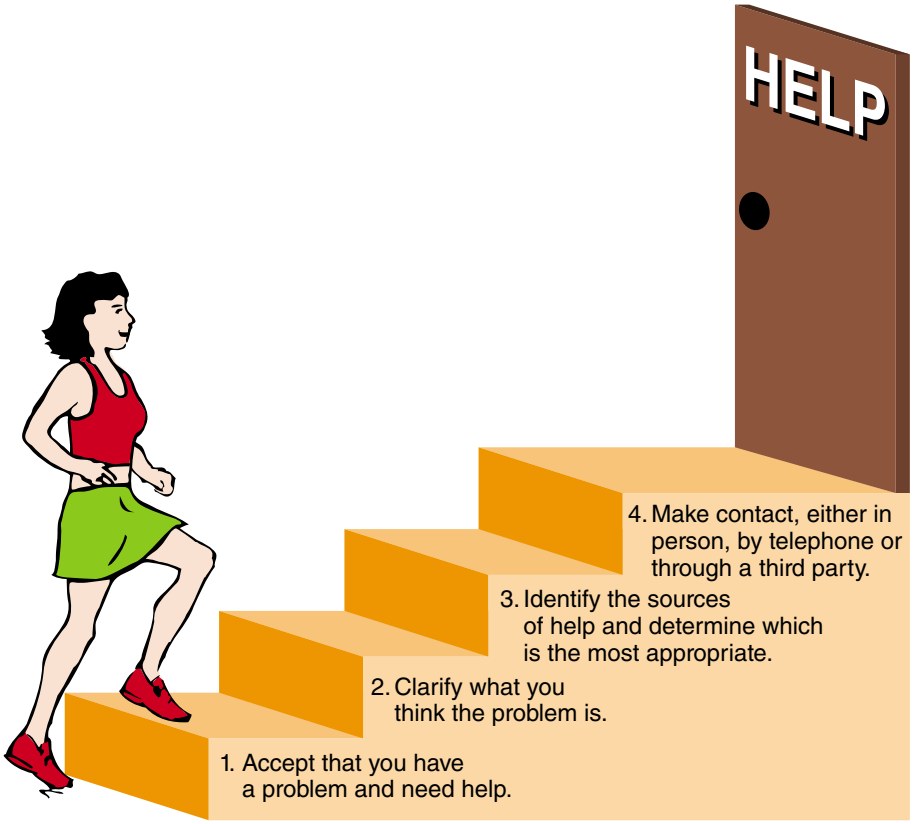


Figure 9.18: Steps that can be used to seek help

INQUIRY

The need for support

1. Consider a common health problem experienced by young people (relevant to one of the major health issues) and identify the indicators that demonstrate help is needed.
2. Suggest appropriate sources of help.

Seeking help for self and others

Help is available through:

- schools, TAFEs and universities via counsellors or year advisers
- community groups
- area health clinics
- doctors and medical centres
- church groups such as Anglicare
- private groups such as women's refuges
- government departments and websites, such as Youth NSW (www.youth.nsw.gov.au)
- telephone via Kids Help Line.

Receiving support

The various types of support available are:

- counselling — advice and guidance
- financial assistance — for example, Austudy
- accommodation — emergency and long term
- legal advice
- employment placement
- medical — for example, free STI screening.

Table 9.27: Overcoming barriers to support

Barriers to support	How to overcome the barriers to support
Fear of being seen as different or being labelled, stigmatised or judged	Promote greater acceptance of diversity in the community through cultural exchange events.
Fear of repercussions	Strengthen personal support structures.
Socialisation of young males to feel they must solve problems by themselves	Improve role models in the media.
Creation of stereotypes; for example, only sexually promiscuous young people get STIs	Show a more balanced representation of young people.
Health information not always available in all languages and doctors for specific ethnic groups not easily located	Health professionals need to visit communities and inform them of services that are available and provide information in a variety of languages.
Fragmentation of the family through divorce; most relatives not in the same suburb	Re-establish the importance of the family in maintaining good health for all its members.
Poor health literacy and not knowing where to seek advice	Schools need to develop programs and curriculums that move towards becoming more health-promoting.
Beliefs and values of different cultural groups; for example, a young person engaged in premarital sex may be alienated by the family	Provide culturally sensitive health and counselling services. Specific ethnic support groups also need to be created.
Parental expectations; for example, a young person who has engaged in unsafe sex and contracted an STI may not seek help	Establish programs to educate parents about the problems faced by young people.
Geographical isolation or lack of transport in low socioeconomic areas	Lobby governments for improved infrastructure.
Young people's belief that they can 'handle it'	Educate young people about professional support networks.

Establishing a mentor relationship

A **mentor** is a wise or trusted adviser.

Many successful people will admit to having a **mentor** of one type or another. Mentors use the benefit of their knowledge and experiences to guide younger people. Mentors widen a person's perspective on how to deal with problems or make suggestions about possible solutions. Young people are strongly urged to develop a mentor relationship at school, in the community or in the workplace to fast-track learning.

Developing resilience and coping skills

An individual's ability to cope with life's ups and downs directly influence his or her level of health. Young people especially need to develop the skills and actions that promote resilience. This resilience improves when an individual's mental responses to situations reflect a positive outlook on life.

Seeing problems in perspective

Every day, we face problems; it is a natural part of living. There are some problems that are relatively minor and can be solved quickly, while others can cause complete devastation and take many years to overcome. Stress develops in young people when they think they can control all the factors in their lives.

Having a good self-image and self-esteem can help a person to see the positive aspects of any problem. Each problem should be viewed as an opportunity

to demonstrate resourcefulness, initiative, determination, creativity and, most importantly, to develop resilience. These are personal life skills that are essential to maintaining good health in young people. It is important for young people to see a problem in perspective and understand that many people in society face far greater problems than they do.

Positive thought habits

Positive thoughts are important in maintaining good self-esteem. A positive approach enables a young person to see alternatives and see beyond the problem to the future. It elevates self-confidence, as the person believes in his or her own ability to overcome the challenge. The development of negative thoughts causes people to enter a downward spiral that can make them look for the 'bad' elements in any situation. When something bad does happen, they are then able to say, 'See I knew something bad was going to happen'. Negative thoughts narrow perspectives and are counterproductive.

Table 9.28: Types of thought we can have

Positive	Negative
Rational thoughts about what you can do and what is just beyond your control *Optimistic* thoughts that have a sense that some good will eventually come from the situation *High self-efficacy* thoughts that reflect a belief in your own ability to plan and deal with events	*Irrational* thoughts that are unrealistic and highly subjective *Pessimistic* thoughts by individuals who see themselves as victims of circumstance *Low self-efficacy* thoughts that doubt you have the ability to change anything

Source: Adapted from Bernard, M., *Taking the Stress out of Teaching*, Collins Dove, Melbourne, 1991, pp. 103–9.

Distancing and disengaging

Disengaging is a process of letting go of one's personal or emotional involvement with a situation or belief.

To cope with stress, people sometimes need to distance themselves from situations. Distancing lets a person step back and have the space and time to consider alternatives. The individual may discover that there is a humorous side to the whole dilemma. By **disengaging**, a person can realise that the issue is not personal and that other people are likely to be experiencing the same problem elsewhere.

Sometimes, by taking a break, the subconscious is able to work on relieving the stress. For example, 'sleeping on it' can sometimes be a very good approach to a problem. When the emotions are aroused, we can experience intense feelings of frustration or anger, which can be detrimental to health.

Disengaging also allows individuals to seek out others to help resolve the stress and to possibly share the burden. At school, conflicts can often be resolved by counsellors, year advisers or peer mediators.

Developing a sense of purpose

When an individual has goals and plans for the future, they develop a sense of purpose. By remaining positive they can see that their development as an adult relies on experiences that improve life skills, such as healthy decision making, problem-solving ability, coping skills and the attainment of knowledge.

Recognising and rewarding personal success

When faced with stressful circumstances, the mental promise of a reward at the end can keep a person focused on dealing with the stressor in a positive way. It can improve self-esteem and self-confidence in dealing with future similar events. A material reward, such as a new article of clothing, might also help recognise the achievement in personal growth.



INQUIRY

Personal coping processes

Design a flow diagram that represents your own personal process for coping with stressful circumstances, such as going for a driving licence test.

1. Explain the benefits of following such a process.
2. Identify the coping skills you have used in this process.
3. Rank these skills in order of importance.

Arguing constructively

Intense arguing can lead to high levels of stress and anxiety, resulting in physical responses such as elevated blood pressure, headaches and nausea. When people argue, they try to defend a point of view or belief. Often in arguments, the point of view or belief can become lost as people are forced to defend themselves, usually verbally but sometimes physically. When individuals run short of points, they then descend into personal attack and the language of 'put-downs' to score points over their opponent.

To argue constructively, a person needs to:

- not use the language of put-downs or blame others
- focus on the problem and not be distracted by other side issues
- avoid personal attacks
- think before speaking and choose words carefully
- be aware of the tone of voice being used
- be aware of the body language being used (for example, the pointing of a finger can be seen as threatening)
- be aware of their emotional state and take a break if needed
- not lay blame or criticise others
- find an appropriate time to express an opinion.

Arguing constructively can be beneficial in relieving the stress that accumulates inside a person when issues are not resolved.

Negotiation and compromise

Negotiation is a process in which two or more parties rationally discuss a problem and, through compromise, come to an agreement that adequately satisfies the needs of all those involved.

Negotiation and compromise result in a win–win situation. Both parties feel somewhat satisfied by the result and are more likely to abide by the agreement. Students often feel they are not included in the decision-making process that affects their lives at school. Negotiation and compromise will enhance self-worth and give them a sense of empowerment and equality.

Conflict resolution

An inability to resolve conflict generates a high level of stress and makes it difficult to maintain positive interpersonal relationships. Conflicts usually arise over:

- needs and wants — whose should be met first
- opinions and ideas — who is right
- qualities — who or what is the best.

Table 9.29: Steps to resolving conflict (the CUDSAIR model)

Tasks	Illustrative skills
Step 1: Initiate the cooperative problem-solving process.	***C****onfront the problem.* Owning the existence of the problem, deciding whether or not to confront, keeping calm, picking a proper time and place, asserting that the problem exists, inviting cooperation in problem solving.
Step 2: Defuse emotions, clarify positions, clear up misunderstandings.	***U****nderstand one another's perspectives.* Expressing feelings, reasons and requests assertively; owning responsibility for your contribution, sticking to the issues, using honest positives, using listening and showing understanding skills, turning a deaf ear to negative statements, admitting to and altering misperceptions.
Step 3: Arrive at mutually acceptable defintion of problem.	***D****efine the problem.* Avoiding unfair fight tactics, identifying common ground, identifying hidden agendas, identifying specific actions that sustain the problem, stating the problem clearly and simply
Step 4: Generate and assess solution.	***S****earch for and assess solutions.* Generating solutions, assessing solutions rationally
Step 5: Agree upon a win–win or no-lose solution and state it clearly.	***A****gree upon the preferred solution.* Making compromises and concessions, stating agreements clearly
Step 6: Back up words with action, to build and maintain trust.	***I****mplement the solution.* Keeping your word, avoiding overreacting to non-compliance
Step 7: Ensure solution works in best interests of both partners.	***R****eview implementing the solution.* Renegotiating rather than breaking agreements, modifying and changing agreements when necessary, returning to earlier steps of the CUDSAIR model if new problems emerge

Source: Nelson-Jones, R., *Human relationship skills*, 3rd ed, Harcourt Brace, Sydney, 1996, p. 385.

Being empathic

Empathy is the ability to understand another person's feelings, or to 'stand in their shoes'.

A **stigma** is a mark of shame or disapproval.

Using an empathic (or empathetic) approach to problem solving means that an individual is more aware of another person's thoughts, feelings and needs. When people have **empathy**, they are able to respect each other's rights and points of view. For example, a young person at school may be suffering severe depression as a result of trying to come to terms with their sexuality. Their behaviour may then become unpredictable and out of character. If peers take pleasure in tormenting the individual to provoke a reaction, life can become unbearable. This person is suffering from poor mental health and must deal with the problems in their life and the **stigma** that society places on those people. By being empathic, young people can show genuine concern for another's welfare and this will help towards finding a solution.



Problem solving

Explain how social problem-solving skills can be used in responding to a health issue relevant to young people.



Resilience and coping skills

Read the following scenario and answer the question below.

> Joe is a year 12 student who recently ended his relationship with his girlfriend of two years. Since the break up he has missed a lot of school and did not submit two assessment tasks. His friends have tried to talk to him, but he becomes very aggressive and says 'nothing matters any more'.

Analyse the scenario and propose a five-point plan of action that would help Joe develop the skills of resilience and coping in this situation. Also explain your role as his friend.

Developing health literacy and accessing skills

Health literacy is the ability to understand and interpret health information and use it to promote and maintain good health.

Children and young people make up nearly 40 per cent of the total population. The habits they develop while growing up should be ones that promote good health throughout their lifetime. Schools, therefore, have an important role in providing **health literacy**. The role of the school is to:

- provide accurate information and present it at the appropriate developmental stage of the child in a safe and supportive environment
- dispel myths
- provide a cost-effective method of following up national and state health-promotion campaigns
- develop, through the school curriculum, important health skills, such as problem solving, decision making and interacting
- identify individual students' needs and obtain specialised assistance if needed
- address students' specific health concerns
- be sensitive to cultural values in the community
- be aware of the current health issues affecting young people
- provide an interface with the community for joint projects such as 'Jump Rope for Heart'.

In Australia, the Health Promoting Schools project, established in the 1990s, seeks to develop students' health literacy through integrating quality teaching strategies with the school ethos and environment, and create partnerships with the wider community (see figure 9.19).

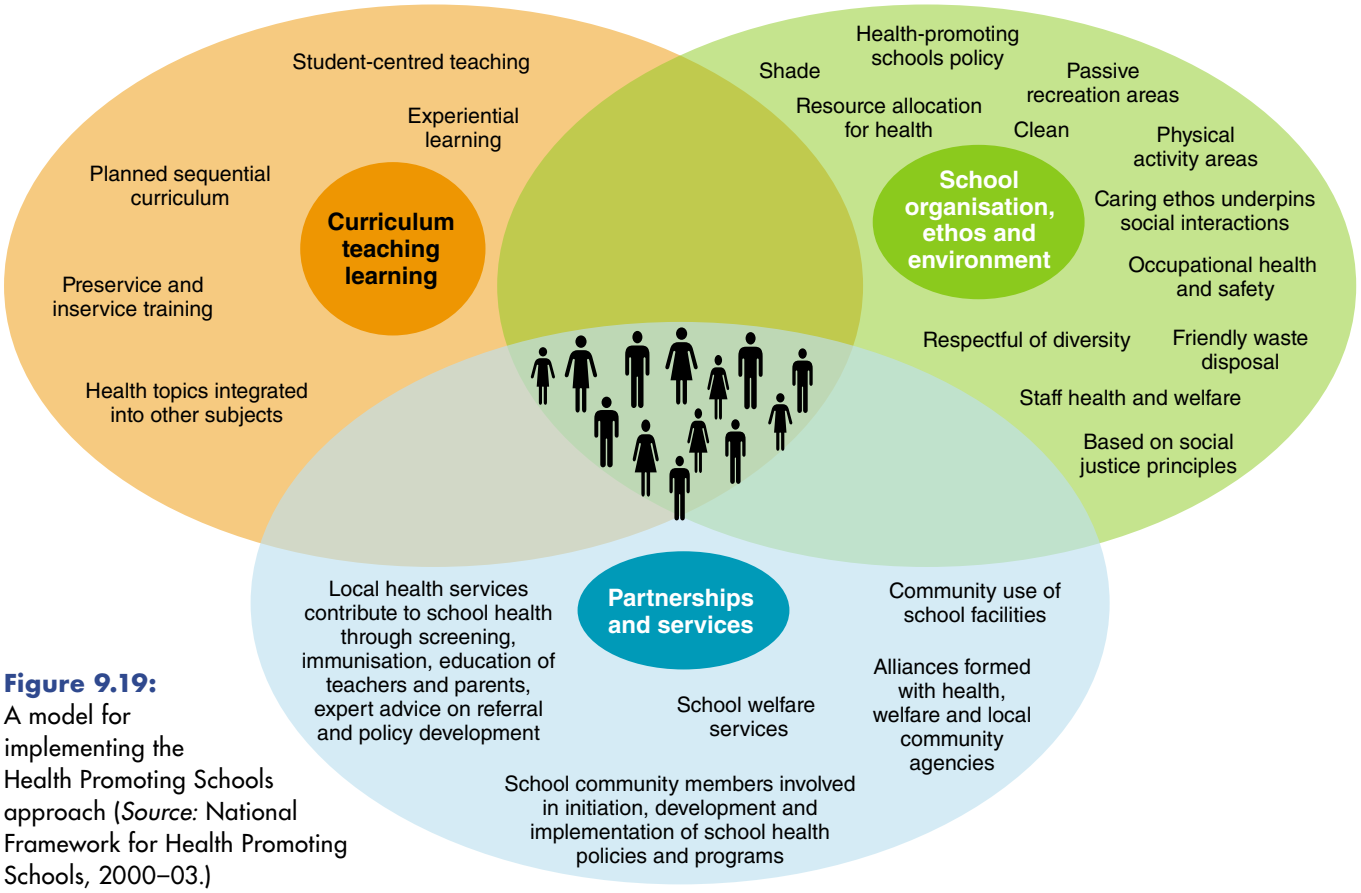


Figure 9.19: A model for implementing the Health Promoting Schools approach (*Source:* National Framework for Health Promoting Schools, 2000–03.)

INQUIRY

The health-promoting school

1. Using figure 9.19, critically analyse how your school is currently developing the health literacy of students in terms of:
   (a) the curriculum, teaching and learning
   (b) the school ethos and environment
   (c) community partnerships and services.
2. Justify the role the school plays in developing the health literacy of young people.

Developing communication skills

It is not always easy to communicate what we think or feel to others and this is particularly true for young people, so it is important that they develop their skills in this area. When we communicate we share information with others. This communication can be both verbal and non-verbal and helps us to create connections with others. These connections then develop into relationships that can be positive or negative.

To develop effective communication skills, young people need to consider the following.

- Take the time to organise thoughts and feelings before you begin to communicate, especially if a topic has painful memories or stirs up strong emotions of anger. If necessary, write down your thoughts and feelings first.
- Seek advice from a trusted friend or adult on how to approach a person or subject. You may even need to delay communication until you have calmed down.
- Understand that some people have a shy or passive personality that makes it more difficult for them to speak and so they may need more time or encouragement to communicate effectively.
- Remember that communication is a two-way street and it involves active listening rather than passive listening. Passive listening involves little thought or processing. Young people need to analyse what is being said by taking note of the message, tone of voice used and body language.
- Make sure verbal messages match the non-verbal messages and don't conflict. For example, pointing a finger at someone while talking can be very aggressive or intimidating and escalate a minor misunderstanding.
- Check that the correct message has been received by asking the other person to repeat important parts of the information back to you. (Who hasn't at least once got the time, date or venue mixed up when meeting friends?)
- Use the appropriate language and tone for the situation. In formal interviews or discussions the language needs to be free of jargon or slang words.
- Assess your environment and delay communicating in environments that are noisy or full of distractions.
- Be aware that when we communicate using means that aren't face to face, such as texting, emails and online chat rooms, our message may not always be received as intended or be sent by the person we think. Password and identity security is essential.

Accessing health services

Young people are extremely fortunate in being able to access a large range of health services. These health services can include public and private hospitals,

specialists, GPs, health centres, specific illness clinics and emergency accommodation. Medicare, the national health insurance scheme, allows relatively free access to most of these services, although private health insurance provides greater choice and reduced waiting times.

Young people may also choose to access health information and support services by telephone or via the internet. For sensitive issues young people may find this an excellent starting point as it can be done anonymously and at no cost. When making contact, young people need to ensure the information they receive is from a reputable organisation such as Kids Help Line or from a government department such as NSW Health, so that they are not putting their lives at any further risk.

It is important for young people to have strategies to overcome any barriers that may prevent them from accessing health services. Examples of strategies are shown in table 9.30.

Table 9.30: Barriers to accessing health services and strategies to overcome them

Barrier	Strategies
Low socioeconomic status	• develop a budget and stick with it • choose health insurance without any unnecessary extras, such as basic cover • eat nutritious foods and exercise to maintain good health • choose a doctor who bulk bills
Low level of education	• remain at school until year 12 • listen to the radio, read newspapers and watch current affairs type programs that screen important health information; for example, reminders for breast checks or mammograms
Cultural differences	• seek out health information printed in your own language • use telephone interpreter services • choose a doctor who understands your cultural beliefs
Distance	• schedule regular checkups and attend • avoid unnecessary risk-taking behaviours such as excessive alcohol consumption or drug use



Accessing health services

Read the following scenario and answer the question that follows.

> Rachel and Daniel have been in a relationship for six months. Recently they were invited to a party held by a friend of Daniel's older brother. They didn't think it would be a problem because they had met him once before and he seemed lots of fun. While at the party they suddenly became very intoxicated and went upstairs because they felt unwell. Rachel and Daniel don't remember much of the night, but Rachel is sure she remembers several boys in the room before she passed out. Daniel also doesn't remember much of what happened. Rachel thinks their drinks were spiked.

Analyse the scenario above and suggest a course of action to be taken by both Rachel and Daniel. Consider which health services and authorities they should contact and what questions they both may need to ask.

Community service and involvement

There are many ways for young people to become involved in serving their community. As an unpaid volunteer they may:

- help raise funds for charity organisations such as Red Cross or the Salvation Army
- work on environmental projects such as Landcare or Clean Up Australia, which plant trees or clean up rubbish
- provide support services to the elderly and disabled via church or scout organisations, or raise awareness of health issues by supporting other young people with diseases such as cancer through projects like Camp Quality or CanTeen
- choose to be involved in the community by coaching or refereeing junior players for the different sporting organisations that are essential for the future development of sport.

Regardless of how young people contribute, involvement in the community has benefits for both the individual young person as well as the community. As an individual they may develop their feelings of self-worth by being valued and respected by older generations when they offer their time and energy. They may also find through interacting with a wider range of people they can develop communication skills that can benefit them in their working lives. Successful young people are often linked with adults who have acted as their mentors and provided valuable support and knowledge at critical times in their lives. Indeed, when young people's contributions are valued by the community it helps to develop their sense of belonging and purpose, both important for good mental health.

Empowerment refers to an individual's ability to make decisions about, or have personal control over, their life.

Young people also learn important self-management skills when they are involved in the planning, implementation and evaluation of community projects. Furthermore, tolerance and the valuing of compromise are skills that enhance a young person's ability to develop **empowerment** and autonomy.

When young people begin to connect with their community they help to break down stereotypes that some older people have of younger people. These stereotypes are largely based on the media sensationalising the behaviour of small groups of young people who engage in risk-taking behaviours such as street racing. These stereotypes can be overcome when young people show leadership in community work and are recognised with citizenship awards such as Young Australian of the Year or community-based awards conferred at school assemblies or council meetings. Young people who are involved as leaders in their community, such as school captains or school council members, are then able to express their needs and be involved in making important community decisions through a consultation process.

The community benefits by involving their young people in many ways. Large projects can be achieved by many hands and the costs can be kept to a minimum. Landcare projects work to protect the environment for all generations and rely on all members of the community to work side by side. Young people who join volunteer-based groups such as Surf Life Saving develop life skills, but also become the future leaders of these important community organisations. Without young people these organisations would not continue to grow.



Figure 9.20: Surf Life Saving Australia's introduction of the burquini in 2007 empowered Muslim girls to swim without breaking religious rules and become qualified as surf lifesavers.

Creating a sense of future

The responsibility for creating a sense of future rests with both the individual and society. The individual needs to develop positive personal actions, while society needs to support these actions with appropriate programs and strategies.

Establishing a purpose

Society expects young people to perpetuate its own culture and work towards creating a future that supports continued survival. If young people lack a sense of purpose and take a negative and pessimistic view of the world, they are likely to suffer from depression and not feel able to make positive lifestyle changes that will improve their health. By maintaining a positive frame of mind and formulating a plan for achieving goals, a young person is more likely to face the challenges of life with confidence and identify opportunities when they come.



INQUIRY

A sense of purpose

Read the statements contained in the snapshot 'Young Australians: Vision for change' below. Critically analyse the effect that these statements would have on individuals and the community. Describe your own reactions to the statements and explain why you reacted that way.



APPLICATION

Creating a positive future for young people

Interview a group of young people about their ideas on strengthening individual and community-based strategies that will create a positive future for young people in your local area. Draft a letter that outlines your findings and present it to your local council for consideration.

SNAPSHOT

Young Australians: Vision for change

Wherever there is a social issue, there is a young person who can resolve or improve it. I believe it's important for all young people to have this mentality. If we work towards resolving the issues we have immediate access to, and understand that there are other young people doing the same globally, then together we form an alliance, a team. One person cannot resolve the entire world's issues. But a band of passionate and inspirational young people can.

Morgan Coleman, Foundation for Young Australians intern

I believe that young people are comfortable with change that moves humanity forward. They are a source of energy and inspiration as we adapt to new frontiers. I think the former US Attorney General Bobby Kennedy captured the potential of young people beautifully in this quote:

Our answer is the world's hope; it is to rely on youth. The cruelties and obstacles of this swiftly changing planet will not yield to obsolete dogmas and outworn slogans. It cannot be moved by those who cling to a present which is already dying, who prefer the illusion of security to the excitement and danger which comes with even the most peaceful progress.

This world demands the qualities of youth; not a time of life but a state of mind, a temper of the will, a quality of the imagination, a predominance of courage over timidity, of the appetite for adventure over the love of ease. [Robert Kennedy, Capetown University, South Africa 1966]

Chris Raine, Hello Sunday Morning founder

Source: Research, projects and partnerships to unleash the brilliance of young Australians, Foundation for Young Australians.



APPLICATION

Health checkup

Complete the following health survey by placing a number 1 in the appropriate column (yes or no). To understand how your health rates tally the score for column 1 and check against the rating chart on page 341. If you are unsure of a response to a health question then place a 1 in the 'no' column.

Rating your health

	Have you ever had or do you have . . .?	Column 1 YES	Column 2 NO
1.	High blood pressure		
2.	High cholesterol or triglyceride levels		
3.	Pain or tightness in the chest		
4.	Any heart condition		
5.	Experienced unusual fatigue or shortness of breath when engaging in your usual activities, such as climbing stairs		
6.	Breathing difficulties or asthma		
7.	A body mass index that classifies you as either overweight or obese		
8.	Diabetes		
9.	A major injury or disability that prevents you from exercising on a regular basis		
10.	Crohn's disease or any disease that affects your health		
11.	Epilepsy		
12.	Headaches on a regular basis or migraines		
13.	Back pain		
14.	Rheumatic fever		
15.	Any type of cancer		
	Total score		N/A

Health rating chart — add the points of column 1 only

Good	Average	Poor
Total score 0–4	Total score 5–10	Total score 11–15



INQUIRY

Analysing survey results

1. As a class discuss the results of the survey. What does it reveal about the general nature of the health of young people?
2. Create a table in your book or on the board and identify the positive and negative influences that would account for the results. Consider the individual, sociocultural, socioeconomic and environmental determinants.



APPLICATION

What's harming me?

Complete the following health behaviour survey by placing a number 1 in the appropriate column (yes or no). To understand how your health behaviours rate then tally the score for column 1 and check against the rating chart on page 341. If you are unsure of a response to a health behaviour question then place a 1 in column 2, which indicates 'no'.

Rating your health

	Have you or do you . . .	Column 1 YES	Column 2 NO
1.	Eat takeaway meals more than three times in a week		
2.	Find it difficult getting time to regularly participate in planned exercise such as jogging, swimming or cycling		
3.	Consider yourself to be overweight or obese		
4.	Engage in restrictive dieting practices on a regular basis		
5.	Regularly skip breakfast		
6.	Become easily frustrated by other people when they do not perform to your expectations		
7.	Bottle up your emotions and not tell others what is really bothering you		
8.	Find it difficult to enjoy activities that in the past made you feel good and happy		
9.	Prefer to be alone most of the time		
10.	Prefer to talk to friends online or by texting rather than communicating face to face		
11.	Find it difficult to catch up with friends for social gatherings because of school or work commitments		
12.	Look in the mirror and feel unhappy with what you see		
13.	Think the world will be worse off in another 10 years		
14.	Feel having religious beliefs is not a necessary part of your life		
15.	Been a victim of some form of bullying		
16.	Drink alcohol at levels that are classified as risky or high risk		
	Total score		N/A

Health behaviour rating chart – add the points of column 1 only

Good	Fair	Poor
0–6	7–11	12–16

Analyse the results of column 1. For any health behaviours that are causing concern devise a three-step plan that will encourage you to adopt a more health-promoting behaviour.

For example: question 16. If you are drinking at levels that are classified as risky or high risk you could lower the risks by (a) drinking lower alcohol drinks or beers, (b) alternate alcoholic drinks and soft drinks, (c) occasionally meet friends at alcohol-free venues such as movies, bowling and rock climbing centres.

Actions targeting health issues relevant to young people

In this section students are required by the syllabus to evaluate a range of strategies that have been implemented by government and non-government agencies that target the *two* major health issues students have been analysing in detail. To give students a starting point to conduct their own research, a general overview of these strategies follows. It is essential students conduct their own research for the *two* health areas they have studied.

These actions can be divided into social actions, legislation and public policy, and health promotion initiatives.

Social action

Social action is any deliberate activity aimed at enhancing the well-being of others and oneself by acting collectively and bringing about change.

Supportive environments are the places in which people live, work and play and that protect them from threats to health and allow them to make health-promoting choices.

Society has a responsibility in promoting the health of its young people. Besides the basic requirements of providing an adequate supply of water, food, clothing and shelter a society needs to ensure its **social actions** reflect the particular health needs of its young people.

In Australia, our society works towards improving the health of its young people in a number of ways:

- creating **supportive environments**; for example, by making clubs, restaurants, workplaces and transport systems smoke-free to reduce the risk of cancer; improved road design that divides oncoming traffic to reduce injuries; healthy canteens that promote more nutritious foods to help reduce obesity levels; and community centres for teenage mothers in disadvantaged areas who are at risk of poor mental health
- via Medicare, providing free access to general health services and immunisation programs such as the HPV vaccine
- providing access to specialised health services, such as local suicide prevention task forces in rural and remote areas who treat young people at risk with depression; community service officers who can allocate emergency housing or supported accommodation assistance for those suffering violence; or brain injury units to deal with victims of motor vehicle accidents
- promoting the importance of cultural diversity as a positive benefit to all Australians and developing in young people tolerance to differences
- addressing all issues of racism, harassment and discrimination so that young people are free to develop positive self-esteem and self-confidence
- strengthening community action by including more opportunities for young people to be involved in political and community decision-making in which their individual and cultural needs are expressed, resulting in them feeling more empowered
- ensuring young people are well educated and have opportunities for full employment so that their health is not limited by having a low socio-economic status
- providing access to important health information that improves young people's health literacy; for example, how to stop the spread of STIs or the dangers of alcohol consumption
- providing 24-hour help lines or information on the internet for a generation of technologically minded young people
- encouraging the media to provide balance when reporting events so that young people can develop a positive view of the future
- reducing the level of violence that people are exposed to on television and in the movies so that fewer young people become victims of assault
- empowering youth through programs that develop leadership skills and connectedness to the community, such as Scouts, Guides, Surf Life Saving or church-run youth groups
- giving greater acknowledgement to initiatives undertaken by youth, such as Young Australian of the Year or Streamwatch programs
- developing in older generations a more sympathetic view of the problems faced by the youth of today; for example, cyberbullying, drink spiking or drugs such as ecstacy and ice
- giving greater financial assistance to youth programs so that more young people can become involved.

study on
Concept code: PDH-103
Practice HSC exam questions

study on

Concept code: PDH-104

Practice HSC exam questions

Legislation and public policy

Australia has a wide range of legislation and public policy regarding criminal prosecution, sanitation, education, transport, finances, taxes and health. The legislation is applied through laws, rules and regulations that protect us from being harmed by others or doing harm to ourselves. For example, some laws protect us from violence from others by banning concealed weapons, while other laws protect us from ourselves by enforcing the wearing of a seatbelt in a motor vehicle. Public policies provide a direction that focuses important resources towards improving society, especially in the area of health.

Legislation

In relation to the health issues of young people this legislation can include:

- all motor vehicle laws regarding the compulsory wearing of seatbelts, passenger number limits and speeding that aim to reduce deaths and injuries
- specialised laws for young people; for example, extended L plates, restricted P plate licences, blood alcohol limits, passenger limits at certain times and restrictions on driving high performance vehicles
- the minimum age for the purchase and consumption of alcohol. Consuming excessive alcohol is strongly linked to poor mental health and increases the risk of injuries and violence.
- the minimum age for marriage and sexual intercourse to protect young people who may be physically mature but emotionally immature and at risk of depression or abuse
- defining what is sexual consent. Using a drug or force can be categorised as rape and lead to criminal prosecution.
- minimum wage limits that aim to improve the financial security of young people so that they can afford nutritious food or appropriate housing, which reduces the risk of diseases
- anti-discrimination and racism laws that reduce the risk of depression and self-harming behaviours such as substance abuse or suicide
- classifying as illegal cannabis and other drugs because of the harm they do, especially to the development of the brain and the strong link to mental illnesses for young people
- compulsory food labelling which allows young people to make healthy food choices and limits the possibility of developing obesity or diabetes later in life
- workplace laws that protect young people from inhaling chemicals that may trigger an asthma attack, or working without the provision of safety equipment, such as harnesses
- smoke-free workplaces and smoke-free public transport systems that reduce the risk of developing cancer later in life
- compulsory school attendance until a minimum age so that young people have the literacy and numeracy skills to enable them to gain meaningful employment.

Public policy

The New South Wales youth policy is one example of an important public policy that aims to promote a healthy lifestyle and a safe environment for young people by:

- mainstreaming health-care services to be more responsive to young people's needs
- establishing youth-specific and friendlier health services, including outreach services

- developing partnerships between government and non-government agencies
- improving health literacy for young people
- targeting health issues with better health promotion campaigns
- involving young people in the development, delivery and evaluation of health-care services
- conducting more research into the health needs of young people
- improving confidence in the appropriateness of health services.

Other examples of public policies include:

- healthy canteen policies in most schools that aim to move young people towards making more nutritious food choices
- 'no hat, no play' in most primary schools that encourages young people to protect themselves from exposure to sunlight and the development of skin cancers later in life.



APPLICATION

Researching public policy

Contact your local council and inquire if they have a youth policy or any public policies that target the health of young people; for example, the development of more recreational facilities, such as skate parks and basketball courts, for young people.

Health promotion initiatives

The federal, state and local governments, in conjunction with other non-government agencies such as the Heart Foundation, Cancer Council and Asthma Foundation, aim to improve the health status of young people through the various health promotion initiatives they have in place. These initiatives use a variety of strategies based on the five action areas of the Ottawa Charter (developing personal skills, creating a supportive environment, strengthening community action, reorienting health services and building healthy public policy). The strategies used included:

- raising awareness of emerging health issues; for example, the need for young women to regularly examine their breasts for any changes that may lead to breast cancer in later years, or when to get a Pap smear
- providing education and information regarding the dangers of drugs or lifestyle behaviours; for example, alcohol and speeding
- teaching important personal skills such as self-diagnosis, such as how to identify changes in the skin that may indicate a melanoma and require subsequent treatment
- raising funds to allow continued research into treatments or to provide support services; for example, Jeans for Genes Day or Red Nose Day
- changing the environmental factors that contribute to the disease; for example, allocating funding for the construction of improved roads to reduce injuries, or shade areas at swimming pools to reduce sun exposure for young people
- immunisation programs to protect young people from the spread of disease; for example, the HPV vaccine to prevent the spread of HPV
- reorienting some health services to areas of greatest need, such as health taskforces to reduce the incidence of suicide in some rural areas
- specific training for professionals who work with young people at risk; for example, guards who work in the juvenile justice system learn to diagnose the early signs of depression
- organising communities to come together to discuss important health issues and to devise strategies that will work for their situation; for example, the

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Do more
Health promotion initiatives
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incidence of violence or drug taking in some regional centres has resulted in curfews or alcohol-free communities
- sponsorship of sporting teams, such as the Speed Blitz Blues (New South Wales state cricket team).

The focus for each initiative may alternate between groups of individuals; for example, teenage mothers, smokers, underage drinkers, P plate drivers or sexually active young people; or focus on communities such as Aboriginal and Torres Strait Islander peoples, or migrant groups who are at a higher risk of specific diseases such as glaucoma or obesity. The whole population may also become a focus because the health problem is across a wide range of ages and socioeconomic circumstances; for example, low levels of physical activity.

The focus often determines the medium for delivery. For larger audiences, TV and radio are effective, especially when it is scheduled for the peak viewing and listening times of the targeted audience. However, TV and radio advertising is very expensive and health promotion funding needs to be allocated cost effectively. A cheaper alternative for smaller groups can be through the distribution of pamphlets or sample bags, or by having health information printed on carry bags or drink coasters in pubs and clubs. Health professionals may also be invited to educate groups at school or in workplaces. This face-to-face contact allows young people to ask important questions, but is limited by time and availability factors. Sometimes it is necessary to mobilise health resources and make them more accessible; for example, mobile breast screening vans and Life Education vans that visit all areas of Australia.

Table 9.31: Sources of health promotion initiatives

Government	Non-government
• Australian Department of Health and Ageing www.health.gov.au • NSW Health www.health.nsw.gov.au • Victoria Health www.health.vic.gov.au • Cancer Council www.cancercouncil.com.au • Department of Education and Training www.det.nsw.edu.au • Roads and Traffic Authority www.rta.nsw.gov.au • Area health service — Greater Southern, Greater Western, Hunter and New England, North Coast, Northern Sydney and Central Coast, South Eastern Sydney and Milleara, South West and Sydney West • Local councils in your area	• Heart Foundation www.heartfoundation.com.au • Asthma Foundation www.asthmansw.org.au • Diabetes Australia www.diabetesnsw.com.au • Father Chris Riley www.youthoffthestreets.com.au • Mission Australia www.missionaustralia.com.au • Salvation Army www.salvationarmy.org.au • Mental Health Info. service www.mentalhealth.asn.au • NRMA www.nrma.com.au • Rotary www.rotary.org.au • McGrath Foundation www.mcgrathfoundation.com.au • Kids Help Line www.kidshelp.com.au • Alcohol and Drug Foundation www.adf.org.au • Family Planning Association www.fpahealth.org.au • PCYC www.pcycnsw.org

Table 9.32: Examples of health promotion initiatives

Examples of initiatives	
• Slip, slop, slap, wrap — skin cancer • Active Australia, Walk Safely to School Day — physical inactivity • New South Wales suicide prevention strategy — mental health • Go for 2 and 5, health-promoting schools program — nutrition • Healthy Canteens — nutrition • Dumping depression, Resourceful adolescent program and Mind matters — mental health • Call to arms — men's cancer awareness • Dark side of tanning — skin cancer • Rock Eisteddfod Challenge — drug abuse • Don't turn a night out into a nightmare, Drink, drunk the difference is you, Drinking kills driving skills — injuries • Quit NSW — smoking/lung cancer • If it's not on it's not on — STIs and pregnancy	• Missionbeat and other youth services — for homeless youth • Youth off the Streets — a program for young people at risk or at risk of reoffending • Red Nose Day, Daffodil Day, Jeans for Genes Day, Jane McGrath Day — awareness and fundraising for particular conditions and diseases • U-Turn the Wheel — driver education program • 24 hour Kids Help Line — telephone advice • Ronald McDonald House — temporary housing for families with sick children • G-Line — help and information for gambling addicts • Cybersmart website — www.cybersmart.gov.au — for advice on cyberbullying



APPLICATION

Researching health promotion initiatives

Tables 9.31 and 9.32 give a general overview of some of the health promotion initiatives run by government and non-government agencies. Use them to begin your own research into the *two* health issues you have selected for further study. Focus your research on who is the focus of the initiative, the strategies used, the method of delivery and its overall effectiveness. Form groups within the class and share your findings.

SUMMARY

- Young people are a diverse group in terms of developmental stages, motivations, values, sociocultural backgrounds, family backgrounds, and peer influence; therefore, society should avoid using stereotypes to describe them.
- As a group, young people are the healthiest of all groups in the population, but are at greater risk of death caused by accident or self-inflicted injury.
- Young people suffer from a high incidence of poor mental health.
- The factors that impact on the health of a young person are classified as individual, sociocultural, socioeconomic or environmental.
- Young people who are the victims of racial intolerance are likely to develop poor mental health.
- A person's reaction to stress determines whether it will adversely affect their health.
- Adolescents need to be ready to adapt to changing relationships to avoid the negative consequences of stress.
- The increasing incidence of suicide by young people is a concern for the future and has led to the development of the NSW Suicide Prevention Strategy, which is a whole-of-government approach aimed at health promotion.
- By creating a sense of a positive future in young people, it is hoped there will be a reduction in the incidence of depression leading to suicide.
- The development of social problem-solving skills in young people helps them to alleviate many of the symptoms of stress and can contribute to lowering the incidence of suicide. Personal support structures are important in maintaining good health.
- Many young people are reported to be developing a distorted body image, which often leads to disordered eating patterns and eating disorders such as anorexia nervosa and bulimia nervosa.
- There is a rise in the number of young children being classified (by the BMI classification) as obese.
- The development of a positive self-concept is important in achieving good health for young people.
- Schools provide an important role in developing health literacy in young people so they can maintain good health throughout life.
- Achieving connectedness with the community improves young people's self-esteem by making them feel valued by the community.
- Strategies used to help improve the health of young people target social actions, legislation and public policy, and the implementation of health promotion initiatives by government and non-government agencies.

QUESTIONS

Revision

1. Global events and trends can influence young people's lives in both positive and negative ways. Identify two global events or trends (one positive and one negative) that you think have had an impact on young people's lives. Explain how each has altered or influenced the way young people view the world. (H15) (6 marks)
2. Reflect on the transition from childhood to adolescence and identify the significant factors that contribute to a person's development, both positive and negative. (H15) (3 marks)
3. Account for the difference in health status of young people compared with other age groups. (H2) (5 marks)
4. Discuss the major causes of mortality for young people. (H2) (5 marks)
5. Briefly discuss the sociocultural factors that affect the health of young people. (H2) (5 marks)
6. Young people from low socioeconomic backgrounds suffer poorer health compared with other young people. Outline the roles of the government and the community in addressing this issue and strategies that they could adopt to improve the health status of this group. (H5) (5 marks)
7. Poor mental health is a health issue relevant to many young people. Identify the groups of young people most at risk of depression, schizophrenia and suicide. (H2) (2 marks)
8. Outline the benefits of part-time work for young people. (H15) (3 marks)
9. Explain how discrimination can impact on a young person's health. (H15) (5 marks)
10. Argue the benefits of promoting the connectedness of young people with their community in reducing anti-social behaviour, such as vandalism, and unnecessary risk taking, such as drink driving. (H14) (8 marks)
11. Briefly outline the skills that enable young people to maintain and promote their good health. Use specific examples. (H6) (3 marks)
12. Justify the importance of developing racial tolerance among young people. (H14) (8 marks)
13. Explain the role of schools in developing the health literacy of young people. (H6) (5 marks)
14. Argue the case for using harm minimisation strategies when dealing with substance abuse by young people. (H15) (8 marks)
15. 'Improving health-promoting actions and choices for young people will go a long way towards addressing issues of social injustice and inequality in health.' Discuss. (H14) (5 marks)

Extension

1. The new public health approach to health promotion places greater emphasis on individuals accepting responsibility for their own health. Outline how the Australian government, through its youth policy, is trying to promote this approach among young people. Explain the benefits of this approach. (H4) (8 marks)
2. Critically analyse, in terms of accessibility and reliability of information, a range of information sources available to young people on a health issue relevant to them. Focus your research on resources in your local area and on the internet. Present a report to the class on your findings. (H16) (12 marks)

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CHAPTER 10

Sport and physical activity in Australian society



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H12**, **H16** from the PDHPE HSC syllabus.



HOW HAVE THE MEANINGS ABOUT SPORT AND PHYSICAL ACTIVITY CHANGED OVER TIME?

CRITICAL QUESTION

How have the meanings about sport and physical activity changed over time?

Beginnings of modern sport in nineteenth-century England and colonial Australia

Australia's sporting and physical activities have been strongly influenced by those that developed in England from the nineteenth century onwards. Therefore, to develop an understanding of sport and physical activity in Australian society it is necessary to examine this history.

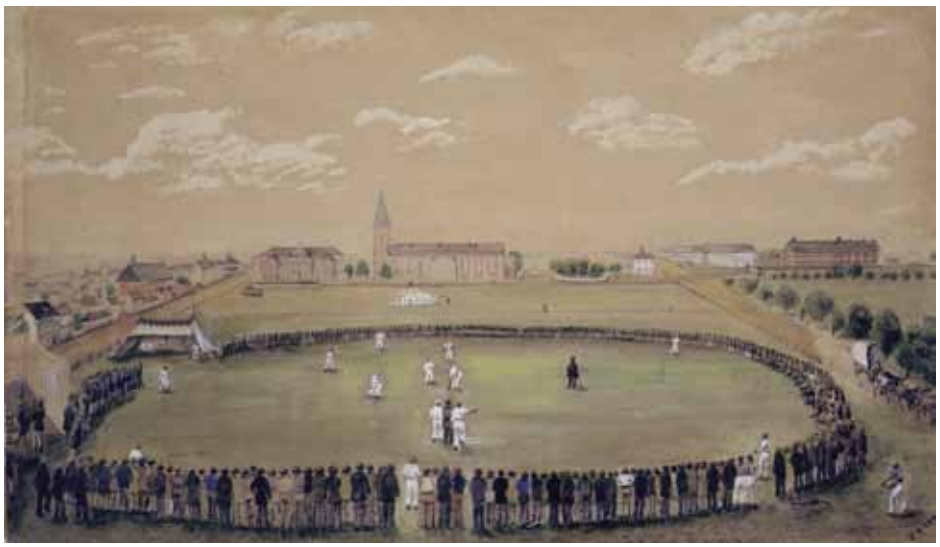
Many of today's popular sports had their origins in England; for example, cricket, football and tennis. These games soon spread throughout the colonies of the British Empire and have even been adopted by other nations as their traditional games — for example, cricket in India.

Links with manliness, patriotism and character

The British Empire and its colonies extended into many regions of the world, including Australia. To administer this empire, Britain needed public servants and army personnel to maintain its policy of colonisation. Because these people were spread throughout the world and were far from home, Britain also needed to be sure they would protect its interests. It became essential to instil in these people a sense of **patriotism**. Organised sport became the perfect way to achieve this. Through the education systems — public schools, elite private schools and the universities — virtues such as team loyalty, discipline and sacrifice were encouraged and developed, particularly in males.

Patriotism is a devotion to one's country and a willingness to defend it.

Figure 10.1: A painting from 1870 showing a cricket game in Hyde Park, Sydney



Hyde Park — the old days of merry Cricket Club matches
c. 1870?
Thomas H Lewis
Mitchell Library, State Library of NSW

From the late 1850s in England, a concept known as **Muscular Christianity** became an influence in schools, universities and working men's clubs. This term described people who were healthy, morally upright Christians, and who were ready to serve and defend their country. The defence of the British Empire was considered to be 'man's work' and school sports such as rugby and cricket instilled the characteristics of courage, determination, self-discipline and **manliness**. Women were also expected to aid in the defence of the British Empire by supporting their husbands and travelling to wherever they were posted.

Muscular Christianity was a concept of a healthy body combined with fine morals including sportsmanship, playing by the rules, and leading an actively Christian life.

Manliness is a tendency to show particularly male characteristics.

Meaning of amateur and professional sport

Amateur is the term for someone who participates in a sport or activity without being paid for it.

During the nineteenth century it was believed that a true sportsman should be an **amateur**, someone who participates for no reward other than a love of the game. This had the effect of excluding all except for the wealthy, because they were the only ones able to afford the time to train or compete and could do so without suffering any loss of income. At this time, England had a rigid class system and this concept of amateurism also helped to keep the social boundaries in place. Sports such as athletics were controlled by the amateur sporting clubs and because the lower classes could not afford to join they were not allowed to participate. No athlete was allowed to accept prize money without risking their amateur status and thus being excluded from further competitions. Sports such as cricket and rugby were considered to be the pastimes of the upper classes.

Professional players receive payment for playing a sport or make it their livelihood.

The working classes needed to develop their own entertainment and competitions that allowed the players to receive payments. In 1895, the code of rugby league split from rugby union. Rugby league became widespread and eventually developed into a **professional** sport, whereas rugby union remained amateur until 1995. Soccer also developed into the 'people's game' for the working classes and became professional. These games had to turn to professionalism to survive, because the lower classes who played needed to be reimbursed for travelling expenses and for the time that they could have spent working. The chance to earn extra money by gambling on games ensured competitions became regular events and were supported by the masses.

Colonial Australia was a reflection of British culture and society. It adopted many of its traditions and developed its sports in a similar manner. The officers, free landholders and convicts were the first to introduce 'blood sports' such as hunting and bare-knuckle boxing, but later horse racing and other sports such as cricket, rowing, rugby, billiards and foot races increased in popularity. In the beginning, many sporting activities were played during the holidays or celebrations, with the local publicans organising the events.

The opportunity to earn some extra money and improve one's social status in the colony was never missed, and resulted in a strong association between gambling and the growth of professionalism in sport in Australia. Australia's Stawell Gift is the world's oldest professional foot race and began in 1878. The wealthy class 'sponsored' runners who competed for the large prize money. Many of the best runners were young Aboriginal males who received modest rewards for their services. Boxing also provided an opportunity for participants to earn extra income. Professional boxers toured the colony offering bouts to all-comers. Although a person's social class was not used to exclude them from competition, unless they had a financial backer to provide the entrance fees, travelling expenses, uniforms or equipment, the athlete or player could not compete. This meant that the 'benefactors' profited by taking most of the prize money. Also, athletes who accepted prize money could then not compete in future amateur competitions.

As the colony continued to grow, the sport of rugby found its way to Australia, but a unique form soon developed that became known as Australian rules. It was a combination of rugby, hurling and Irish football, and it was supported strongly by the masses.

The wealthy people in colonial Australia were the only sportspeople to compete as amateurs and continued to support pastimes such as tennis and golf. The rest of the population pursued activities such as cycling and after-dark

swimming — a dangerous pastime considering many colonists were poor swimmers and sharks were more numerous in those days (eventually enclosed baths were built).



The relationship between social class and sport

1. Explain the relationship between social class and sports such as rugby union, soccer, rugby league and cricket.
2. Critically analyse how the meanings associated with sport differed for the different social groups in colonial times. Is this similar to or different from today? Discuss.



Amateur versus professional

1. Discuss how the meanings of the terms 'amateur' and 'professional' have changed over time. Describe the changes in society and within sport that led to the need to change.
2. Account for the reasons why rugby union remained amateur until the 1990s while many sports began to turn professional.
3. Outline the underlying social conditions that resulted in the growth of professionalism.
4. Select a sport (for example, golf, tennis or surfing) and carry out research to locate the rules that apply currently to its participants. Use this information to determine whether the sport has amateur or professional status. You may wish to use the **Golf Australia** weblink in your eBookPLUS or investigate a sport of your choice. Report your findings to the class.



Women's historical participation in sport

Few records of women's sport were kept in nineteenth-century England. It was a time when males dominated sport and traditionally kept the official accounts. Women's sport was deemed to be less important and was even trivialised in the media. Women of the Victorian era were expected to be fragile, pale, feminine and sedentary. Their ultimate role in society was motherhood, and it was important for them to be decorative, not strong and sporty.

Those women who showed an interest in physical activities were discouraged from participating further in sport because of medical opinions, which arose from a male-dominated medical profession. Listed opposite are some examples of the myths endorsed by the doctors of that era.

- Women's reproductive systems can be irrevocably damaged by strenuous activity.
- Women who participate in sports will become coarse and be degraded and defiled.
- Women's bone structure is too fragile for contact sports.
- Women develop unattractive muscle bulk through training.
- Women are unable to handle the stress of competition.
- Women's bodies are unsuitable for long-distance running.

The perpetuation of these myths hampered the development of women's sport for a long time.



Perpetuation of myths

Identify who might have benefited from the perpetuation of medical myths about women's involvement in sport and in what ways.

In nineteenth-century Victorian England, women of the wealthy classes were expected to be good wives and mothers who supported their husband's career. Their education was essentially limited to being able to run the household and their main physical activity was dancing at social events with their husband or, if unmarried, with potential husbands. To actively compete against men was frowned upon. If women wished to participate in a more active sport or more physical activity, society dictated how they should be dressed. In that era they were generally required to wear corsets, and heavy, long skirts which hindered any efforts to participate actively.

In the 1880s, women in England campaigned strongly to have physical education included for girls in schools. This led to the introduction of sports mistresses, but they had little experience in developing women's sport. One of the first activities that was developed involved girls moving heavy skittles in patterns. This form of exercise evolved into modern gymnastics and physical culture.

At the beginning of the early twentieth century, swimming was a popular activity for many. Women's swimming costumes were designed to conceal the body, but were also heavy and impractical. Separate bathing was common, which meant that women were not allowed to participate in swimming races in the company of men and were required to perform behind closed doors. It was not until 1912 in the Stockholm Olympics that women were allowed to participate in two swimming events, and then only in the company of chaperones. (The longest swimming race for women in the modern Olympics is 800 metres freestyle compared to the 1500 metres freestyle for men.)



Figure 10.2: A group of Australian women dressed for a day of golf in 1900

Figure 10.3: Women practising for a physical culture competition in Australia in the 1920s



Practising for the C.G.A.S.A. competition
Eleanor M. Hinder — photographs and realia 1916–1968
Mitchell Library, State Library of NSW

Australians star in Olympic pool

MONDAY, 22 JULY Australia has emphatically shown the world its strength in swimming at the Olympic Games in Stockholm, Sweden. The Australians won six medals at the games — all in the pool.

Swimming pin-up girl Fanny Durack won gold in the first swimming event ever contested by women at the Olympics — the 100 metres freestyle held on 12 July. Our other gold was won by the Australasian relay team in the 4 × 200 metres freestyle event.

Mina Wylie finished just behind Durack to win a silver in the women's 100 metres, while Cecil Healy also collected a silver in the men's 100 metres freestyle. Classy distance swimmer Harold Hardwick rounded off our medal hunt with two bronze medals — in the 400 and 1500 metres events.

The Olympics were well organised by the Swedes and saw the first use of public address systems and electronic timing devices, with the crowds clearly approving of both innovations.



Fanny Durack, Australia's first female Olympic gold medallist

Figure 10.4: The first Australian female Olympian, Fanny (Sarah) Durack in 1912 (*Source:* R Cashman, *Australian Sport Through Time*, Random House, Sydney, 1997.)

As a result of World War I and the Roaring Twenties, society's views of acceptable female physical activities began to change. In 1928, women were finally allowed to compete in a limited number of athletic events, although no greater distance than 800 metres was allowed for females. It was not until the 1970s — and at Olympic level not until 1984 — that women were allowed to compete in marathons.

CASE STUDY

Attitudes to women's sport in the early twentieth century

In 1918, sport for women was really a school girl and varsity [university] affair, and a relatively elite affair at that. The opportunities available for young women to be involved in organised sport were limited …

[Margaret] Watts and [Eleanor] Hinder were welfare workers with a particular concern about the needs of women in a rapidly industrialising and urbanising Australia. Much had been said about the problems of 'the city boy' in modern times, less regard was paid to the problems of the city girl, especially in relation to vocational training and recreation. 'The girl is regarded as a temporary unit in Industry,' observed Watts, 'her work an incident before marriage. The boy's education, recreation and leisure time pursuits have first place.'

The implications of this attitude for the resourcing of women's sport were obvious. 'Sports Grounds for the youngest girls in Industry are rare facts, every available piece of ground being allocated for boys' cricket or football.'

Furthermore, statistical evidence collated by Watts demonstrated that the period between leaving school and marriage, for most Australian women, was a long 'incident'. 'The average girl in Australia marries at twenty-five years of age, which means that she is at work some ten years,' Watts argued. 'When she leaves school and begins to earn her living, what she misses most in her new sphere are the organized games and the team spirit of her school.' Put simply, urban working girls missed companionship … 'When one reflects upon how unselfishness, team spirit and other fine qualities are bound up in games, one realizes that sport is a foundation in character,' she observed. Therefore, what the women of Sydney needed was an organisation 'of national purpose for the promotion of health and sport, comradeship and good citizenship'.

[The City Girls' Amateur Sports Association] began in 1918 as a meeting of representatives of twelve affiliated business houses and doubled its membership in the space of five years. Annual fees for clubs and members were kept as low as possible, to make the association as inclusive as possible. Apart from organising competitions in the existing sports of hockey, cricket, tennis, rowing, swimming and athletics, the association was instrumental in establishing netball (then basketball) as an organised sport in New South Wales. A health clinic ran out of their offices and members organised an active social program with regular excursions into the country arranged …

[A]part from the opportunity to be active and make friends, involvement in the CGASA taught women valuable life skills. 'Consequent training in group leadership is of fundamental value,' Watts observed, not only to the individual but to the nation. 'Women's Health is the Nation's Wealth' was the CGASA motto …

The matter of a dedicated sports ground for the women of Sydney was, quite literally, a never-ending concern for the CGASA. Men's and boys' sport was always given priority access to the available playing fields and the high demand for the venues controlled by the Sydney University Women's Sports Association meant that waiting periods, especially on the weekends, were lengthy. Of course, the more women who became involved in sport, the more acute the shortage became …

In its short but active life, the CGASA played a vital role in establishing organised sport for women and girls outside the school system, and in so doing contributing significantly to the development of sport as a 'democratic' activity in Australian culture. Factory girls played hockey against the students at the University of Sydney; Farmer's [department store] office girls joined the cleaners in the basketball team. If an interest in sport is regarded as 'the great leveller' in Australia, then the CGASA clearly had a place in the development of that tradition.

Source: Extracts from 'City Girl's Amateur Sports Association' by Dr Nikki Henningham, from *She's Game: Women Making Australian Sporting History*, Australian Women's Archives Project, 2007, www.womenaustralia.info.



INQUIRY

The effect of attitudes to women and sport

Read the case study and explain how attitudes towards women affected their participation rates in sport and physical activity during the early twentieth century.

Sexism is the upholding of attitudes that stereotype people according to their gender, rather than judging them on individual merits.

In the past, the lack of participation by women in sport or physical activity was due mainly to:

- **sexism**, which limited the number of sports available to women
- society's concept of femininity, which restricted women's freedom
- fewer female sporting role models presented in the media
- a lower level of parental encouragement or involvement
- society's expectations regarding marriage and the raising of a family
- past school experiences, which tended to be negative
- peer influence, resulting in girls conforming to non-participation patterns of behaviour
- the development by males of sports which suited males.

Today, few of these traditional attitudes and beliefs still exist. Society now views sport and physical activity as essential to promoting good health and longevity for both sexes.

Sport as a commodity

The modern era has witnessed a change in sport. Sport is no longer simply for those people who participate or spectate for the sheer enjoyment of the sport. Increased professionalism, sponsorship and interest by big business has caused some sports and athletes to become commodities that can be bought, sold or traded by franchise agreements or player contracts. Furthermore, they are then 'packaged' by image consultants or management companies to make them a marketable 'product'. This product — the player — then participates in events carefully scheduled throughout the year, with the viewing rights sold at home or to interested overseas countries.

The development of professional sport

There have always been professional athletes or sportspeople. Our earliest records reveal that athletes or players in competitions often received symbolic rewards, such as the olive wreath in the ancient Olympics, or material rewards such as land, livestock or money. Entrepreneurs who staged the events realised that, besides profiting from the spectators, if they developed their own athletes or players then they could share in the prize money and gamble on the outcome as well. For many of the athletes and players, the payment for their services and the opportunity to improve their life was important.

In the latter half of the twentieth century, the business world soon realised that it could exploit the rivalry that existed between towns, districts and cities. Workers were given time off from work on the weekends to play sport for a local team. These players then became semi-professional. Astute businesspeople soon began to buy teams of players and develop competitions so that they had more control and could therefore profit more. Players and athletes remained semi-professional for a long time until, eventually, payments became more than their wages and they were able to give up full-time work.

Since the 1980s, many players have been paid six figure sums and above annually. These salaries may be justified when the professional careers in some sports are relatively brief, as in rugby league or basketball. The possibility of sustaining an injury that cuts short a brilliant career is a factor to be considered in negotiating these salaries. High salaries are also paid to particular players because they attract the crowds and major sponsors, and because their performances will contribute to winning competitions for the club and owners. Golf is one sport in which careers can be quite long by comparison, but rather



Figure 10.5: Professional golfer Aaron Baddeley at the 2008 Masters at Augusta. As an 18-year-old in 1999, Baddeley won the Australian Open. His decision to forgo $189 000 in prize money allowed him to remain amateur and develop his game for the future.

than being tied to a salary, players earn money from sponsorships, endorsements and prize money. The general effect of professionalism has been to improve the standard of sport everywhere.

In some sports it is difficult to determine the professional and amateur status of players, as earnings may be held in trust funds, taken as educational scholarships or declined.

The Olympic Movement resisted professionalism for a long time, keeping the competition for amateurs only and upholding the ideals on which it was founded. Eventually it too gave in to pressure, particularly from the United States and the changing attitudes in the world, and allowed professional athletes to participate. In 1992, the 'Dream Team' in basketball was the first US Olympic team to include NBA star players, and a worldwide interest in the sport exploded. Likewise, the best professional tennis players from around the world could compete for the honour of representing their country. The financial benefits of winning a gold medal are generally not the reason these players participate.

The need for greater professionalism in sport is driven by financial reasons, such as:

- the rising costs of training — hire of facilities, equipment, coaching
- the need to travel within the country and overseas for competitions
- the need for accommodation if an event is scheduled over an extended period
- medical costs such as physiotherapy, rehabilitation, dietitians and sports psychologists
- the demands of training, which do not allow full-time work
- audiences that have much higher expectations of players and athletes
- greater media attention, which requires a polished performance from players and athletes
- sponsors of major competitions who expect top-level performances constantly
- the need to be competitive internationally
- the fact that sport is now big business and highly marketable.



INQUIRY

Professionalism in sport

Read the following quotes from the ABC TV series *Timeframe*, then write a one page synopsis explaining your own view of professionalism in sport, outlining what you see as the positive and negative consequences.

David Hill: *I think that whatever a sportsman is being paid now, he or she is worth whatever the market will stand because they are entertaining huge audiences, in many cases worldwide.*

Raelene Boyle: *I think money has partially destroyed [sport]... because the whole motivation to get out there and be good... is money motivated. Whereas we didn't really think like that. We did it because we had a passion and we gave up our personal time to do that.*

Sport as big business

Big business is an integral part of modern sport. According to the Australian Bureau of Statistics, Australian households spent $8293.8 million on sports and recreation products in 2009–10 — 1.5 per cent of the amount spent on all products. This continues to increase because our climate, the availability of sporting venues and the Australian people's interest in sport and recreational activities promote this growth.

The participation rates of Australian men and women in sport and physical activities are considered to be quite high for our population. This results in a high turnover in the sporting goods industries. Business uses the various media to advertise sports goods and products. Well-directed advertising influences individuals to make decisions that inevitably make them consumers. Sporting heroes such as Tiger Woods are used to convince these consumers that, as players, they need to wear the appropriate clothes and shoes (different shoes for different surfaces) and purchase the appropriate equipment so that they can have a better chance of winning. The latest technology is used to enable players to hit the ball further, gain greater control or develop the 'edge' on the competition.

To ensure future sales, businesses constantly market new fashions or products. The golf clubs a person bought last year will be quickly superseded by 'NASA-type' technology or a 'dramatic design breakthrough' that has produced an even better set of clubs. This cycle continues for as long as there is a market to satisfy. The large sporting goods manufacturers such as Nike, Dunlop, Spalding and Reebok compete fiercely to increase their profiles and sales.

The growth of modern sport has been paralleled by a growth in costs. Once it was common for spectators to sit around a field, consume their own food from a picnic hamper and watch a game of cricket or football. Today, major sports now need large venues such as the Sydney Cricket Ground (SCG). The SCG comes complete with ticket collectors, tiered seating, grandstands, toilets, food outlets, souvenirs, security guards, technicians and cleaners. It also has an international-standard cricket pitch maintained by a team of ground staff around the clock during the cricket season. During autumn and winter, fans of the Sydney Swans AFL team flock to the SCG for the home games.

Teams in major competitions, such as the National Rugby League competition, are supported by fitness trainers, physiotherapists, dietitians, managers, coaches, skills coaches, administrators, public relations officers and their own field ground staff. While some money is received from local councils and the government for the upkeep of some sporting facilities, the gate receipts from spectators and club membership fees do not cover all the costs. Additional revenue can be gained by running social clubs associated with the sport, as various rugby league and soccer clubs do, but the answer to most financial problems in sport is major sponsorship.

Sponsorship, advertising and sport

Sponsorship involves an organisation covering all or part of the costs of the competition or activity in return for advertisement of their product and other rights.

The level of **sponsorship** an athlete, sport or team will achieve is usually equal to the amount of publicity that he, she or it receives or the profile of a team's players. Small clubs such as the local football or netball club may attract only local businesses as sponsors. In return for sponsoring teams or competitions, businesses are able to advertise in newsletters, on uniforms and sometimes at the grounds. Often businesses are approached to donate prizes at fundraising events for sports, which becomes another opportunity for them to promote



Figure 10.6: Football stadiums promote a game's sponsors on players' jerseys and through advertising signage and television coverage.

their company or products. Because the exposure of such companies will be limited, their financial contribution is not expected to be substantial.

The higher profile sports and athletes cannot exist without major sponsorship because of the huge overheads involved in running their large organisations. Large companies or organisations will only provide major corporate sponsorship to sports or athletes in relation to the amount of television coverage or newspaper space that can be attracted. This means that, unfortunately, the smaller, lesser known sports usually struggle to find sponsors. Without sponsors, their sport's potential for growth is limited and so the sport becomes trapped in a cycle. The administrators of these lesser known sports then have to work hard on the media to get any publicity, or they resort to paying the media to cover events or do profiles on players. This can become very expensive.

The importance of major sponsors in high-profile sporting codes is also highlighted when a controversy arises; for example, if inappropriate behaviour by players receives media attention. Major sponsors may withdraw their support rather than align their brand with an organisation or players whose reputation is damaged.

Many sports and events rely on the merchandising of products to provide additional income. Each rugby league, basketball or AFL club sells club memorabilia. These may be mugs, scarves, beanies, jackets, or the club jersey, which is changed each year to promote more sales, or indeed any product that can have a logo printed on it. Limited edition, autographed, framed photographs of special games, can be purchased and are often advertised as being an investment for the future. The world's largest sporting event, the Olympics, generates substantial revenue from the sale of merchandising rights to companies. This merchandise is available a year before the official opening of each Games. Special Olympic pins celebrating the number of 'days to go' are promoted as collector's items.

What are the benefits of sponsorship for sport?

- Economic growth for a city or state, especially in tourism, associated business and employment. There was rivalry between the states for the right to stage the Australian Grand Prix, for example. This premier event draws an international audience and thousands of cashed-up visitors. The costs of setting up the event are soon returned through an increase in business activity.
- Improved administration of the sport is possible because jobs that were previously done on a part-time voluntary basis become paid, full-time jobs for highly skilled professionals with management experience.
- Athletes have the opportunity to compete overseas because the expenses are covered by the sponsors in return for exposure. Some lesser known athletes may need several sponsors to cover the costs.

- There is greater recognition of the sport through increased media coverage because sponsors push to have events publicised in the different segments of the media.
- Many large sponsorship deals for clubs include money being put towards supporting the development of juniors. Some companies develop long-standing associations, which promotes club development.

What are the disadvantages of the sponsorship of sport?

- Media coverage is dominated by high-profile sports and these tend to be the traditional male sports. The lesser known sports struggle to survive because they don't have the exposure needed to encourage new members. Australia has many highly successful individuals or teams, such as the women's water polo team, which, until recently, received little recognition of their achievements.
- Inappropriate sponsorship occurs, such as brewing companies sponsoring cricket. Alcohol is often a contributing factor leading to the death or injury of young people involved in motor vehicle accidents. It is also linked to life-style diseases and many social problems such as domestic violence.
- Sponsors can force changes in rules; for example the need for 'time-outs' for advertisements. The ball used in the game may carry a sponsor's logo and jerseys are often redesigned to suit the sponsor.
- Sponsors can ignore decades of tradition and rename sporting events to suit themselves. For example, in the 1990s the Sheffield Shield was changed to the Pura Cup. The names of much-loved sporting fields can be changed, as occurred when Cronulla's Endeavour Field was renamed to Caltex Field, Shark Park and then to Toyota Park.
- Some clubs are likely to lose their identity as traditions are bypassed to make clubs attractive to new sponsors. The power then rests with the sponsors rather than the club.



INQUIRY

Sponsorship, advertising and sport

1. Identify some inappropriate sponsorships such as those by cigarette companies, fast-food companies or soft-drink companies.
   (a) Explain why you believe the sponsorship is inappropriate.
   (b) Account for the reasons why some sports may seek such sponsorship.
   (c) Discuss the effect that inappropriate sponsorship may have on health promotion initiatives.
2. Despite international success by many Australian teams, some teams have not attracted high levels of sponsorship. With reference to particular individuals and teams, suggest why some have not been as successful as others and explain the effect a lack of sponsorship has had.

Athletes and advertising

To **advertise** is to endorse particular brands or products in order to increase the sales for the sponsor company.

Athletes require funds to cover the costs of competing in their sport. These costs include travel to the various competitions, accommodation, equipment, clothing, coaching and having the free time to train. They therefore need to secure sponsorships and, in return for these sponsorships, they **advertise** for that company or organisation or endorse its products or services.

Athletes advertise for their sponsors by:

- wearing a particular brand of clothing, shoes or cap with the company's logo
- using only a particular brand of equipment

- appearing in television commercials or print advertisements to promote the product or service
- mentioning sponsors' names during interviews
- thanking the sponsors after major wins
- running coaching clinics for juniors
- eating certain types of food in public
- driving certain types of motor vehicle
- wearing particular brands of sunglasses.

While athletes have obligations to their sponsors, they are also required during competitions to abide by the restrictions imposed by their governing body on the amount of advertising space that is allowed on their uniform or equipment. In tennis, logos are discreetly placed on sleeves, skirts and shorts. Occasionally conflicts develop in the sponsorship between an athlete and an event sponsor, as happened between Kellogg's and Uncle Toby's during the development of the Ironman series.



INQUIRY

Advertising and sponsorship of sportspeople

1. In groups, discuss current examples of athletes who endorse particular products.
2. Outline the reasons why sponsors select particular athletes to advertise their products.

Economics of hosting major sporting events

To host any major sporting event such as the Olympics or the World Cup of soccer, rugby union, cricket, netball or rugby league requires considerable organisation before, during and after the event, but also a high level of government support and financial resources.

Several years before a sporting event is due to take place, countries make a bid to the governing body of the sport to host the event. This bid must outline their overall vision, plans and budgets for staging the event. Special consideration must be given to environmental issues, infrastructure development (stadiums), transport systems, security, telecommunications/broadcasting, medical treatment, merchandising, advertising, ticketing and accommodation for participants, spectators and officials. The bidding process is highly competitive with no absolute guarantees of success and a return on investment. Some countries make bids for events 10 to 15 years in advance. However, when a country's bid is successful it focuses international attention on that country, intensifies feelings of national pride in its people and has the potential for stimulating economic growth, if the costs are managed effectively.

This economic growth is achieved through attracting world media attention, infrastructure development, increases in employment, investments from overseas businesses and an influx of tourists. Governments are generally interested in financially supporting these events as it is hoped that a legacy of world-class sporting facilities and services is left for future generations. The costs of providing these resources may not be possible through normal government funding and allows money to be reallocated into other areas.

Direct costs relate to expenditure for construction of venues, wages for workers, technology etc.

Indirect costs are secondary expenditures on transport systems, medical treatment, drug testing etc.

The cost of hosting a major sporting event can be divided into **direct costs** and **indirect costs** (see the case study on page 362 for some examples). These costs vary according to the existing facilities of the host country, the sport involved, the number of participants/spectators and the fact that all costs continue to rise because of inflation.

The economics of hosting the Olympics

When the International Olympic Committee (IOC) declares that a city is to be the venue for an Olympic Games, that city knows it is responsible for staging the world's largest and most popular event. Besides being the host country for athletes from around the world, the Games showcase the city as a tourist destination. Other benefits include the prospect of job creation, increased business activity and a boost to the economy as a whole.

Staging the Olympics involves a major financial commitment for the host city. When the first modern Olympic Games were held in Athens in 1896, the funding was obtained through:

- private donations (67 per cent)
- stamps (22 per cent)
- tickets, coins and medals (11 per cent).

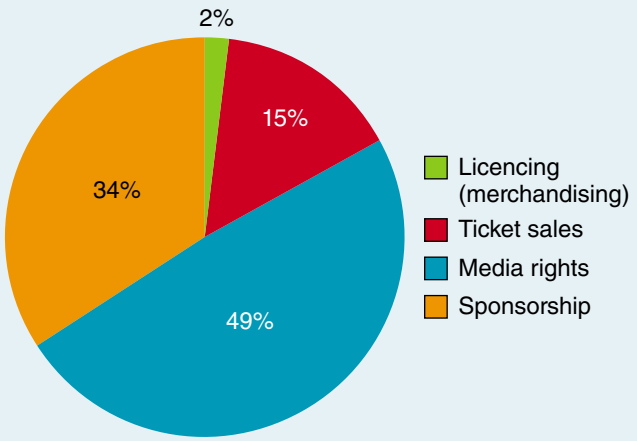


Figure 10.7: Revenue sources for the Olympic Games cycle 2010–12, including the 2010 Winter Olympics in Vancouver and the 2012 Games in London.
Source: Sportcal, issue 26, July 2012.

Over 100 years later, the Olympic Movement's revenue in the four-year games cycle 2010–12 amounted to $8 billion. The breakdown of revenue sources for this period is shown in figure 10.7.

The cost of the Olympics can be divided into:

- Direct costs, for example:
  - the construction of permanent and temporary sporting facilities
  - the opening and closing ceremonies, and medals for all the events
  - transport for all Olympic officials and delegates before and after the competition. Teams need to be moved between venues and the village. Visiting athletes' airfares are also absorbed into the transport costs.
  - the wages for administrators and officials from the time of staging a bid
  - accommodation and meals in the Olympic Village for athletes and officials
  - the high level of security with trained personnel on standby before and during the games, 24 hours a day
  - the cost of communications and of setting up the special broadcasting facilities to accommodate the world's media
  - computer technology at the venues
  - specialised ticketing
  - laboratories and drug-testing facilities.
- Indirect costs, for example:
  - for the Olympics to be successful requires a great deal of infrastructure to be in place prior to the Games (roads, railways, other transport services)
  - the increase in the wages of essential services such as bus and rail employees
  - the Olympics must be marketed and publicised to make it a success
  - there are the logistical costs, such as staging the torch relay
  - medical treatment must be provided for Olympic athletes and officials during the Games
  - laboratories and drug-testing procedures need to be developed.



Figure 10.8: Sponsorship and merchandising at the London 2012 Olympic Games

SNAPSHOT

Olympic Games sponsorship

The Olympic Games are one of the most effective international marketing platforms in the world, reaching billions of people in over 200 countries and territories throughout the world.

Support from the business community is crucial to the staging of the Games and the operations of every organisation within the Olympic Movement.

Revenue generated by commercial partnerships accounts for more than 40 per cent of Olympic revenues and partners provide vital technical services and product support to the whole of the Olympic Family.

Each level of sponsorship entitles companies to different marketing rights in various regions, category exclusivity and the use of designated Olympic images and marks.

Source: International Olympic Committee website, http://www.olympic.org/sponsors.



INQUIRY

Economics and the driving force of the Olympic Movement

Read the case study on page 362 and the snapshot above.

1. Discuss the changes in the sources of revenue for the Olympic Movement between 1896 and 2012.
2. In what ways could the Olympic Games be seen as a sporting commodity?
3. Conduct your own research into the economics that were involved in hosting any *one* of the following major sporting events: 2012 London Olympics; 2008 Beijing Olympics; World Cups — soccer, rugby union, cricket, netball or rugby league. Present your findings as a table with the direct costs and indirect costs indicated.
4. Write a brief report on the personal and environmental costs of hosting this major sporting event and justify why it should continue to be staged.

Consequences for spectators and participants

The emergence of sport as a commodity has both positive and negative consequences for the participants (players) and the spectators. Tables 10.1 and 10.2 provide a summary.

Table 10.1: Sport as a commodity — consequences for players/participants

Positive	Negative
• very skilled players can earn high incomes in a short period of time • a higher public profile can allow some players to supplement income with endorsement contracts • players are exposed to a higher level of competition, including national and international competition • players travel the world, being paid to play a sport they love • some clubs opt to offer players the security of four-year contracts to ensure their skills are kept within the club • players can receive bonuses for winning performances • as professional athletes, players have time to train and so improve their skills • players have opportunities to become commentators or to remain as trainers, passing on their knowledge and skills to younger players	• beginning players earn very little until they are placed on a contract that may be for a short period • players' private lives come under great media scrutiny and are subject to codes of conduct that can enforce financial penalties or deregistration for bringing the game into disrepute • extended playing seasons cause players to be away from families for longer periods or to play earlier in the year when it is much hotter • players are expected to continually adapt to changes in conditions; for example, day and night games, different countries • a higher standard of competition and higher frequency of games can result in more injuries or players becoming burnt out • salary caps eventually force the higher earning players overseas or to take large cuts in earnings to remain within the country • club loyalty is difficult for players as they are traded between clubs • players are expected to attend sponsors' functions and use particular brands

Table 10.2: Sport as a commodity — consequences for spectators

Positive	Negative
• higher quality games are viewed because competitions are national or international • international players are used as drawcards for teams wishing to build their fan base • changes to uniforms and the rules of some games have made them more exciting; for example, rugby sevens and Twenty20 cricket • changes to times of games have made sport more accessible for spectators, such as cricket day–night games • more sports are available for viewing through pay-for-view stations and sport-only channels that run 24 hours a day • merchandising allows spectators to support their team by wearing the club colours or jerseys • pre-game and half-time entertainment is included in many big events • spectators have benefited by a large array of technology that allows them to be part of the action; for example, replays, hawk eye, hot spot or player cam • spectators also have access to the latest statistics and comparisons of past performances	• some sporting telecasts are delayed due to clashes in programming and so spectators are at risk of hearing a result before they have watched the game • the spectators' favourite players may be forced to move to other clubs because of salary cap issues or be frequently injured because of an exhaustive game schedule • the nature of the game can change when the sport is altered to suit the advertisers, such as the use of white cricket balls for night games • traditional uniforms are changed to suit sponsor logos • cost of tickets precludes some spectators and family groups • demand for tickets — some fans miss out on big games • cost to install pay TV and monthly charges

CASE STUDY

Football Federation Australia — brave new world

By Dan Silkstone

In only five years, soccer has emerged from nowhere to become a major sporting code in Australia … But if you think the hard work is all done, think again.

Five years ago, Football Federation Australia was created out of the ashes of the National Soccer League after the government-initiated Crawford Report recommended sweeping changes.

Australian soccer was broke. Revenue was less than $14 million but costs far exceeded that. The sport was losing $4 million a year. This year, revenue is $85 million and soccer runs a modest profit of just under $1 million. In every measurable way the reach of the sport is greater.

The battle for survival has been won. Now awaits the battle for parity — then perhaps, supremacy — with Australia's other football codes. While crowd increases and sponsorship growth can add to the bottom line, and participation numbers continue to be strong, the chance for a leap forward ultimately rests with one area: television rights.

For the past four years the sport has attracted television money of $17 million a year. When that deal with Foxtel was signed, Australian soccer was desperate for friends and had little to sell but a popular Socceroos brand and an A-League that was purely theoretical. The result was a small deal compared with rival codes and a sport shown exclusively on pay television.

During that period, much has changed. The league has thrived — television ratings are up by 7 per cent this year alone — and the average game is pulling in 100 000 viewers. Solid numbers for pay TV.

In 2013, the TV deal with Foxtel will lapse, but long before that the process of renegotiation will begin. This time FFA will be selling an established brand with an entrenched position on the sporting calendar. Depending on broadcasters' preferences, A-League rights could be bundled with Socceroo games or sold separately. With the Ten Network creating a new sport-only digital channel — and Australian soccer a key programming target — a bidding war is distinctly possible. A-League rights could be divided between multiple channels. A quantum leap in the money flowing into the sport is a strong possibility.

Ben Buckley — who took over the stewardship of FFA from [John] O'Neill in 2006 — has been here before. It was Buckley who led the negotiations in 2005 as the AFL played off rival networks Seven, Nine and Ten to snare a gobsmacking $780 million TV deal … Getting a good deal will be one of his big challenges.

Few believe soccer will achieve AFL dollars but it should win a massive pay-rise. TV revenue is significant because it adds massively to the bottom line without incurring additional costs. That would free up more money for the soon-to-be 12 A-League clubs, allowing the salary cap to be raised, clubs to be more profitable and the level of players recruited to improve.

Some fret that the league has stagnated. Perth and Sydney have displayed fragility and a frustrating inability to capture the public. New Zealand's participation is questioned and Queensland is tied to an unaffordable stadium deal. The 'marquee' names some imagined being signed have mostly not eventuated. Some 'old soccer' fans of the ethnically based NSL teams feel ignored.

But important strides have been made. A National Youth League has been added this year, giving young players a pathway into the elite level but also making the running costs for all clubs higher. The vast majority of the A-League's clubs are still not profitable. Only Melbourne Victory is an unqualified success. 'The financial performance of clubs is a key challenge for us,' Buckley says.

At present, revenue from Socceroos matches and other streams prop up a loss-making league. The challenge is to make it stand alone ...

At the end of last season, crowds averaged almost 15 000. FFA was thrilled. This year has seen a drop of around 12 per cent. 'There is a little plateau effect that seems to be occurring in some cities,' Buckley says. 'I think that's natural. We've had some novelty factor, some curiosity factor. Now it's up to the FFA and the clubs to work harder to become more meaningfully engaged with the community. To be followed in the same tribal way that people have followed the AFL and NRL for decades.'

It's hoped that expanding the league will add freshness but difficult economic times will also make it risky. More clubs will compete for players and sponsorships. Seasons will lengthen, costs will rise.

'We think it is the right time for us,' Buckley says. 'We need to have A-League teams in the major population centres to support the development of the game ... we need a national footprint that's appealing to broadcasters and sponsors ...'

Another goal set during the original revolution was to qualify for all major tournaments at men's, women's and junior levels. With a couple of exceptions, it has been achieved. The 2006 World Cup gave the sport a massive fillip and the Olyroos made it to Beijing. But the way they played there — and the inability of most of that squad to force their way into the seniors — has some worried that the next generation might be less accomplished.

Crowds

Spectator numbers have increased dramatically since the dark final days of the National Soccer League but the A-League will be concerned that crowd support appears to have stagnated ... Partly it reflects the growing uptake of pay TV in Australia. As more homes are able to watch the product on television perhaps fewer people are inclined to leave their lounge room on match day. TV ratings are certainly up, by 7 per cent this year ... Socceroo fixtures have become a blue-chip event on the Australian sporting landscape and state governments routinely outbid each other for the right to host matches ...

Participation rates

Junior numbers have long been soccer's ace card and the gap between the round ball and other codes has only grown since the sport's administrators became more organised and professional. This year, soccer has 350 000 junior players — still well in front of Australian rules and rugby league's numbers. At all levels, a healthy 970 000 men, women and children play the game. Women's soccer is leading the charge, growing by around 10 per cent each year and the sport has worked hard — through the formation of the W-League — to reach female players and supporters. But the men's game is also attracting larger player numbers, growing at around 5 per cent. Traditional clubs are still the mainstay but numbers have been boosted by Football Anytime — a program that mimics the AFL's successful Auskick.

Sponsors

Sponsorships bring in $17 million a year for the FFA. A decade ago the sport had two major sponsors, now it has eight. Soccer has deals with some of the biggest names in corporate Australia, including Qantas, Hyundai and Westfield. But, corporates aside, the most important 'sponsorship' for the sport could be the Australian Government. Under [Frank] Lowy and Buckley, soccer has forged close ties with the Rudd Government, already receiving millions in funding and more has been sought for a World Cup bid that would be a godsend for the sport. Rudd and his ministers have grasped the global reach of the sport and demonstrated a keenness to use it for a variety of political purposes including health policy outcomes and international trade relations.

Source: *The Age*, 3 December 2008, Sport, p. 6.

INQUIRY

Case study — Football Federation Australia

Read the case study on Football Federation Australia and answer the following questions.

1. Identify the main factors that have played a role in the development of Australian soccer as 'big business'.
2. What are the most important financial deals that will secure the sport's continued development?
3. Describe the impact of pay TV coverage on the popularity of the sport.
4. Draw up a table of two columns and, in each column, list:
   (a) the problems that Football Federation Australia faces
   (b) the possible solutions to the problems.
5. Explain what have been the consequences of adopting a business focus for each of the following:
   (a) Football Federation Australia
   (b) players
   (c) spectators.

WHAT IS THE RELATIONSHIP BETWEEN SPORT AND NATIONAL AND CULTURAL IDENTITY?

CRITICAL QUESTION

What is the relationship between sport and national and cultural identity?

Australian sporting identity

Australia's sporting identity has for a long time been a significant part of our national identity. Australia has always measured itself against other countries, particularly England, and now against the United States. Australia's sporting achievements have accompanied its growing independence and sense of national pride. In Australia, regions take great pride in being the birthplace and training ground for the nation's future champions. These champions are provided with support from the government through the Australian Sports Commission and its main body, the Australian Institute of Sport.



National and regional identity through sporting achievements

Australia's national identity is based on the fact that the majority of Australians love sport. Australians generally like to be seen as outdoor types, athletic and adaptable. Sporting success has given Australians confidence to take on the rest of the world. The first victory in the Ashes cricket series was an important symbolic event for many Australians. It meant that England had been

Figure 10.9: When basketballer Lauren Jackson led the Australian team into the Olympic Stadium at London in August 2012, Australians felt a pride in the team representing the nation.

beaten at its traditional game by the so-called outcasts of their society. Even today, Australians get particular enjoyment from a win in this series.

Likewise, the medal tally of each Olympics is used to rate our performance on the international stage. The type of event in which the medal is won does not matter as much as the fact that it was won by an Australian citizen. Even when overseas athletes such as weight-lifters migrate to Australia and compete as our national champions, we take great pride in their achievements, regardless of their recent arrival. The pressure to win medals at the Games is intense. The media profiles prospective champions and scrutinises their pre-Games performances in the lead-up to the Olympics. All of the country's nationalistic dreams are then placed on the shoulders of usually very young athletes. At the 2000 Olympics, Cathy Freeman ran the 400 metres knowing she bore the expectations of all Australians. At the finish, she was physically, mentally and emotionally exhausted. As a nation we also like to celebrate the achievements of long-standing sporting heroes such as rower James Tomkins.

Part of our national identity is tied up with Australians' perception that we are the 'underdog', a concept perpetuated through the media and in Australian literature. A prime example of this occurred in 1983 when Australians competed in the America's Cup. Despite yachting being considered a 'rich man's sport', all Australians celebrated when the United States' 132-year-old winning streak was broken by the yacht *Australia II*. The financial backer for the challenge was a signwriter turned self-made millionaire named Alan Bond. The symbol of the nation's fighting spirit became the boxing kangaroo, which was used to encourage nationalistic feelings. Such was the emotion aroused by the event that the then Prime Minister, Bob Hawke, virtually declared a national holiday so that all Australians could celebrate the victory.

In 2006, Australia stopped again to watch the progress of the national soccer team in the World Cup. This was the first time in 32 years that the national team had made the finals tournament of the World Cup. The Socceroos earned the admiration of the country for their spirit and determination against their often higher profile opponents.



INQUIRY

National identity

1. Less attention has been given to the America's Cup since Australia has been unsuccessful at regaining the trophy. As a class discuss why this may be so.
2. Identify other instances when sport has been used to promote Australia's national identity. Create a list on the board and discuss it.
3. As a class, discuss the effect that Australia's achievements in the 2006 Soccer World Cup had on you and on the national identity.

Regional identity — state versus state

Several sports in Australia feature a 'state of origin' game or competition, in which players are selected according to the state in which they played their first club game. Such games attract support and interest through interstate rivalries. States are often characterised with a certain identity; for example, in the rugby league State of Origin series, the New South Wales Blues are known as the 'cockroaches' and the Queensland Maroons are the 'cane toads'. Promotional posters and television advertisements dramatise the sporting contest as a 'battle' with pride at stake and players compete for selection for the honour of wearing the state colours.



Figure 10.10: Promotion for the rugby league State of Origin

CASE STUDY

Rugby League State of Origin

Interstate contests in rugby league in 1979 held diminishing relevance for the average rugby league supporter in NSWRL, if not Australia.

The financial power of Sydney clubs, sustained by poker machines in leagues clubs, sucked the best footballers out of Queensland and made the Sydney premiership — now expanded into the NRL — the benchmark of rugby league excellence for evermore.

Realising the implications of these increasingly one-sided contests, Queensland supremo Senator Ron Macauliffe devised the audacious plan of having players represent the state with which they had first played senior football.

Despite Kevin Humphreys's support, the NSWRL clubs and media were lukewarm on the idea at best, and the only way they would agree to the plan was if the first two matches had seen one state secure the series.

The return of Arthur Beetson to Queensland as captain of the Maroons in the first encounter inspired them to a magnificent 20–10 win, and since then State of Origin has never looked back.

Since 1982, the interstate series has been based purely on the lines set down by Senator Macauliffe and Kevin Humphreys and is one of the greatest sporting events on the sporting calendar for all Australians each year.

The television ratings continue to set new records, the interest flows to wherever league fans congregate throughout the world and the quality of the football never ceases to amaze.

Among the heroics performed on both sides of the Tweed River, two can be selected to highlight the experience. In 1987 Mark MacGaw pounced on a wobbling kick in the dying seconds at Lang Park in Game One of that year to steal a win that still sends shivers down the spine.

Queenslanders can look back with equal pleasure on Mark Coyne's try in the final moments of Game Two in 1994, when the ball went through nearly every player's hands in the lead up to a try that is still talked about in Brisbane bars.

State against state, mate against mate — the interstate contests in other sports pale into comparison when placed next to the magic that is State of Origin football. Even the elite players admit Origin matches are a step up for them and it is this quality which, year after year, continues to astound and captivate rugby league fans.

Source: website of New South Wales Rugby League, www.nswrl.com.au.



INQUIRY

State of Origin

1. Read the case study 'Rugby League State of Origin' and identify the reasons given for the popularity of the series.
2. What role do you think the media plays in intensifying the rivalries between the states?

3. Outline the benefits of a successful State of Origin competition for:
   (a) the NSW Rugby League organisation
   (b) the media
   (c) the players
   (d) the spectators.
4. Identify the words and phrases in the extract that highlight the rivalries and the passion in the sport.

Rural areas and regional identity

Many regions of Australia can boast champions of their own — that is, athletes who have progressed from district level to higher sporting achievements. Depending on the player's level of success, ovals, parks, courts, streets or even small grandstands may be named in his or her honour. For example, the town of Bowral dedicated an entire museum to Sir Donald Bradman for his contributions to the game of cricket.

Sometimes entire regions associate themselves with particular sporting traditions. In country areas, being involved in sport is seen as important in promoting social interaction, providing entertainment, and developing toughness and resilience. The Riverina region, for example, prides itself on producing 'tough and hardy' footballers for the national competition.

CASE STUDY



Figure 10.11: Schoolchildren from Wagga Wagga receive the winners' trophy in the Paul Kelly Cup from the former Sydney Swans captain himself who grew up in Wagga Wagga.

Wagga Wagga — a regional sporting centre

Wagga Wagga … is the largest inland city in New South Wales [480 km west of Sydney] and is considered the capital of the Riverina area. It has fine buildings, tree-lined streets, parks and gardens. The surrounding area is made up of properties growing wheat, dairying and mixed farming.

The city's claim to fame is that it has produced so many world-class sporting greats. An often asked question about Wagga Wagga is 'what's in the water?'

There are many theories as to why it is such a breeding ground for athletes. Some of the greats who achieved their prowess there have become household names in Australia. Tony Roche, Steve Elkington, Arthur Summons, Peter Sterling, the footballing Mortimer and Daniher brothers, Mark Taylor, Michael Slater, Geoff Lawson, Pat Dwyer, Scobie Breasley, Paul Kelly — and the list goes on. Here are a few of the theories — you be the judge.

1. Some believe it is simply a communal willingness to 'have a go'. As an example, three per cent of the population run in the annual city-to-lake run, compared to one per cent of Sydney's population running in the annual City to Surf run.
2. Others believe it is because there is not much else to do but play and compete in sporting events.
3. The city has six rugby league venues, eight Australian rules fields, 51 tennis courts and loads of other sporting facilities for water sports, basketball, clay target shooting, cricket grounds, hockey grounds, equestrian facilities, netball courts and a horse racing track.

Wagga Wagga City Council established a Sporting Hall of Fame to recognise the achievements of its athletes. It shows why the city is known as the City of Good Sports.



INQUIRY

Regional identity through sporting achievements

1. How has Wagga Wagga achieved its reputation as a 'city of good sports'?
2. What effect does Wagga Wagga's reputation have on its regional identity?

CASE STUDY

City versus Country rugby league

It seemed like a good idea built on previous successes in other regional centres. When it was announced that Coffs Harbour would host the 2013 AAMI Country V City Origin Clash, there was excitement all round. The idea was that mid-north coast crowds would surge into BCU International Stadium to see a showcase of some of rugby league's top NSW talent. There would have been considerable financial benefits for both NRL and the Coffs Harbour business community, and locals would see a great game of footy as the NRL promoted the 'greatest game of all' in regional areas.

Instead, the state's best players didn't turn up to play, citing injury, and locals baulked at ticket prices of $50. The result was the lowest turnout (4635) for the event in 25 years. Given last year's success in Mudgee, NRL officials now believe that Coffs Harbour was the wrong choice of venue, suggesting that the heartland of rugby league lies more properly in the bush.

Coffs Harbour officials said the region had done its best to promote the game but blamed player withdrawals for the poor attendance.

The NRL had planned to take the competition to Broken Hill in 2014 but whether that will go ahead is now uncertain.



INQUIRY

City versus Country competitions

Read the case study 'City versus Country rugby league'. What reasons are given for the poor turnout at the 2013 event? Why might the NRL consider it important to continue the competition at other rural centres?



APPLICATION

Recognition of local sportspeople

1. With the aid of your local street directory, examine the names of local parks and ovals. Identify any examples that recognise sporting personalities in your area. Did you find any female sportspeople or indigenous sportspeople honoured?
2. Discuss the implications of your findings with the class.

Government funding

The Commonwealth Government provides funding to sport in Australia through the Australian Sports Commission (ASC). The increasing amount of funding (over $268 million in 2011–12) recognises the 'contribution sport makes to the Australian way of life'.

The ASC allocates funds to a wide range of facilities, services and programs, at both the elite athlete level, which includes the Australian Institute of Sport (AIS), and the local community level.

INQUIRY

The Australian Sports Commission

Read the case study on the objectives of the Australian Sports Commission (ASC).

1. How do the outcomes and goals of the ASC demonstrate the importance of sport to the Australian way of life?
2. Comment on the proportion of funds allocated to the ASC's two outcomes.

CASE STUDY

Australian Sports Commission

The Australian Sports Commission (ASC) is the Australian Government body that supports, develops and invests in sport at all levels in Australia. It works closely with national sporting organisations (NSOs); peak sporting bodies; state, territory and local governments; state and territory institutes and academies of sport; and schools and community organisations to support the development of the Australian sport sector from the grassroots community level to high performance sport.

The ASC delivers the program and two outcomes through the four goals outlined in its strategic plan, as illustrated below. The table below also provides a breakdown of the 2011–12 budget information according to the Commission's two outcomes.

	Outcome 1: Improved participation in structured physical activity, particularly organised sport, at the community level, including through leadership and targeted community based sports activity	Outcome 2: Excellence in sports performance and continued international sporting success by talented athletes and coaches, including through leadership in high performance athlete development, and targeted science and research
	Program: Australian Sports Commission	
	Goal 1: Increased participation in sport	Goal 2: Increased international success
	Goal 3: Sustainable sport	
	Goal 4: Enhanced ASC capability to lead, partner and support	
Total expenditure	$117.367m	$188.465m
Government appropriation	$97.841m	$170.852m
Other revenue	$19.526m	$17.613m

Source: Australian Sports Commission, annual report 2011–12, pp. 8–9; Australian Sports Commission, *Annual Operational Plan 2011–12*, p. 27.

Australian Institute of Sport

The Australian Sports Commission provides funds to the Australian Institute of Sport (AIS), which in turn uses these funds to develop elite sport at a national level. The AIS administers the Olympic Athlete Program (OAP) and the Sports Assistance Scheme (SAS) as well as the following:

- Sports Development and Policy — coordinates the national development of sport from the junior level through to adults and special interest groups such as the disabled
- the International Visitors Program — for athletes and coaches who wish to exchange knowledge
- the Australian College of Sports Education
- Sport and Business Services — manages the commercial aspects of the ASC such as sponsorship deals and the hire of facilities
- the management of the scholarships in sport programs for developing athletes.

The AIS allocates funds in areas such as:

- international competition
- elite coaching
- National Sports Program (training camps)
- intensive training centres
- sports science/sports medicine support
- direct athlete support
- high-performance management
- athlete development
- sports equipment
- athlete career and education support
- talent identification
- sports research
- information services.

The AIS also funds the Sports Assistance Scheme, directing funds to national sports organisations to:

- finance the management of sport — the officials to run events, the general support and development of individual athletes, the costs of competition at international events, improvements in coaching and the encouragement of participation at all levels in sports
- run the Aussie Able Program, which provides financial assistance and advice to the disabled in sport
- prepare the athletes of the Australian Paralympic Federation for competition.



The Australian Sports Commission

eBookplus

Use the **Australian Sports Commission** weblink in your eBookPLUS. Investigate the following.

1. Outline how government funding has increased in the last decade. In particular, find out what happened when Australia won the bid for the 2000 Olympics.
2. Compare the funding given for the Atlanta Olympics with the 2000 Sydney Olympics. Discuss the implications as regards the importance of Australia's sporting identity.
3. Discuss what has happened to the funding of particular sports since the 2000 Sydney Olympics.

Politics and sports

Athletes can use their profile in sport to convey political messages, such as when Cathy Freeman, at the 1994 Commonwealth Games in Canada, did her victory lap holding both the Aboriginal flag and the Australian flag as a symbolic gesture. Sport can also be used by politicians to enhance their individual image or their party's popularity. By sending messages, presenting trophies, having themselves photographed with winning teams or attending major sporting events, politicians hope to make an association with people who are winners. Sport can also be useful for deflecting attention from political problems or issues. Don Bradman's success at cricket during the Depression of the 1930s gave many Australians relief from their impoverished circumstances, and drew attention away from politicians' ineffectiveness.

Politics are involved at all levels of sport. At club level, there can be competing interests in deciding how to allocate funding, develop resources and

plan for the future. Moreover, club presidencies or positions on committees may be decided by a vote on the part of members, who can be biased.

At a national level, politics are often involved, as the following examples show.

- When selecting members for Australian teams, players from all states must be considered and given an equal opportunity.
- Athletes and the administration can often come into conflict. For example, Jane Flemming was criticised by the athletics administrators for her part in the development of the Golden Girls Calendar, which aimed to obtain a better sponsorship deal for female athletes.
- Laws have been put in place regarding racial discrimination in sport and any form of racial abuse is punished.
- The Australian Institute of Sport (AIS) was created as a result of Australia's declining sporting efforts in the 1970s to 1980s — especially at the Montreal Olympics. The country and sporting organisations demanded that the government support its athletes better. This resulted in centralising (in Canberra) the coaching of many sports. This did not please all the states, as it meant that any athlete showing ability was then encouraged to attend the AIS in Canberra, which depleted many of the regional competitions and talent in the states.

At an international level, the politics of sport becomes more serious, as the following examples show.

Boycotts result when a person, organisation or country refuses to deal with another country as a means of protest.

- Sporting **boycotts** can arise as a consequence of unresolved political conflicts. Although the action is directed at a country, it is usually the athletes who suffer. Some athletes may even find it necessary to take up citizenship of another country in order to compete.
- International Olympic Committee delegates may be courted for their votes by potential host countries during the bidding process.
- In each sport there is usually an international federation that helps to control the game and that has ultimate power. In boxing, for example, boxers must compete against approved opponents only, or they risk losing their titles.
- Governments have cooperated with federations to speed up the processing of entry visas of officials responsible for catching drug cheats in sports.

Sport and politics can be used in a positive way. Trade negotiations between countries may be made easier by friendly competitions. An example of this occurred between China and the United States when their relations were improved as a result of games of table tennis and basketball between teams from their two countries. To ensure the success of this political event, each country picked a sport that they were guaranteed to win, so neither country could 'lose face'. This came to be known as 'ping pong diplomacy'. In more recent times, world leaders may play a game of golf before settling into the business of tough trade negotiations.

Politics and the Olympics

Propaganda is the organised release of ideas, information or arguments in order to further a cause or damage an opposing cause.

The Olympics is considered to be the ultimate sporting event. It attracts a lot of media coverage and is therefore extremely vulnerable to political intrusion. During the Olympics held at the time of the Cold War, the United States and the USSR struggled with each other to prove which ideological system was superior — communism or capitalism. This tension spilt over onto the sporting fields and each victory was used as **propaganda** against the other country. In 1936, Adolf Hitler tried to use the Berlin Olympics to display the supremacy of the so-called Aryan race (non-Jewish Caucasians) to all other

nations. Jewish athletes were not allowed to participate and black athletes were discriminated against. The 1968 Mexico Olympics was the birthplace of a symbolic gesture for African-American athletes. On the victory dais, the African-American athletes raised clenched fists, and turned their backs to the American flag in protest at America's treatment of African-Americans. The darkest political protest of all occurred at the 1972 Munich Olympics, when Palestinian terrorists took Israeli athletes and officials hostage and killed many of them. The rescue attempt resulted in the deaths of the terrorists. The 1996 Atlanta Olympics was scarred by a senseless bomb attack.

APPLICATION

Olympic politics

1. Research the political consequences of the Munich or Mexico Olympics. Write a brief report of your findings.
2. Find out why the athlete Jesse Owens became famous at the Berlin Olympics.



Figure 10.12: The Olympic Oath

INQUIRY

Olympic ideals versus reality

From reading the Olympic Oath, define the ideals that underline the Olympic Games. Compare these ideals to the political reality of the Games and write a brief report.

Sport used for political purposes

Sporting boycotts have been used to express disapproval of other nations for many years, and have the benefit of avoiding the repercussions of a full-scale conflict. When the USSR moved into areas of Afghanistan, nearly 50 countries, led by the United States and including Australia, took action to boycott the 1980 Moscow Olympics. This political action was not supported by all Australian athletes, so a depleted Australian team defied the Australian government and participated. In retaliation, the USSR and allied nations then boycotted the 1984 Los Angeles Olympics.

South Africa was subject to a sporting boycott from 1970 to 1992. It was excluded from most international sporting competitions by countries, such as Australia, who were protesting against its **apartheid** policy. Cricket and rugby were the two main sports affected. During the period of the boycott, a 'rebel cricket tour' was organised by Australian media owner, the late Kerry Packer.

Apartheid (meaning 'separation') was a policy of discrimination by white South Africans against black and coloured African people that was enforced in South Africa from 1948 to 1994.

CASE STUDY

Boycott of the 1980 Moscow Olympics: an athlete's experience

The 1979 Russian invasion of Afghanistan prompted 45 nations to boycott the 1980 Moscow [Olympic] Games. Australian prime minister Malcolm Fraser backed the US call for a boycott. Australian swimmer Max Metzker recalls: 'It never really hit home until a couple of months before the Olympics when we thought, "Uh oh, they're trying to convince us not to go".'

Metzker has the robust look of someone who has spent much of his life in surf club swimming. A veteran of two Commonwealth and two Olympic games, he is adamant that politics should stay out of the Games.

'I don't think boycotts work. Every Olympics has proved it. Sticking your head in the sand is not going to help. It never helps any situation.'

In 1980, the pressure on athletes was coming from all directions. The Australian government was offering money to competitors and sporting bodies to try to persuade them to boycott the Games; the media was declaring that Olympians were traitors; and athletes were receiving death threats.

'You've got to be tough. You're going to have hurdles when you're racing, so anything you're subjected to, you've got to be able to put out of your mind,' says Metzker. 'Money doesn't sway you. You're there for the right reasons.' In fact, these hurdles only made Metzker more determined. 'We thought, we'll show them and we will perform well.'

Because of the political debate, the Australian team didn't know whether they were going to Moscow until an Australian Olympic Federation vote two months before the Games began. The decision to go was decided by one vote. 'It came over while we were in training camp, "We're going" and everyone went, "Yes!" That was like a weight being lifted from our shoulders.'

An unexpected honour was awaiting Metzker in Moscow. He was shaving his legs for his race when Olympic official Phil Coles asked him if he wanted to carry the flag. 'I just gave him the thumbs up and said "sweet", and that was it.'

The Australian government requested that the Olympic team march under the Olympic flag rather than the Australian flag to show that Australia did not support the invasion of Afghanistan. Sixteen countries marched under Olympic flags at the Moscow Games. 'I didn't mind that because we didn't want politics involved in it. It was about marching under the Olympic flag because it was about sport,' says Metzker. 'The honour, the pride, didn't really set in until after I'd done it.'

Metzker counts the bronze medal he won in the 1500-metres freestyle as the highlight of his career.

He is now a massage therapist and went to the Atlanta and Sydney Games on the medical staff. 'When you see 10 000 athletes together of all different colours and religions and you see the way they react, they're the ones who can help the world, forget politics.'

Source: Extract from 'Jumping through the hoops' by Fiona Rutkay, *The Age*, 19 July 2008.



INQUIRY

Boycott of the 1980 Moscow Olympics

Read the case study on Max Metzker's experience in 1980.

1. Identify the athlete's reasons for his view that politics should be separate from sport.
2. In small groups, construct the opposing argument that might be expressed by an athlete who chose to boycott the Moscow Games.



INQUIRY

Politics and sporting boycotts

1. As a class, predict the possible consequences of Australia's rebel cricket tour, which broke the rest of the world's ban on sport with South Africa.
2. Analyse the effect of the boycott of the Moscow Olympics on Australian athletes and the public. Discuss as a class.
3. Interview older members of your family to find out what their perceptions of the boycott of the Moscow Olympics were.

Meaning of physical activity and sport to indigenous Australians

History reflects that indigenous Australians have needed to maintain a high level of physical activity to survive. The daily hunting and gathering activities possibly required running, swimming, throwing and the use of teamwork. Besides these daily activities, indigenous people's nomadic way of life meant that they may have had to walk long distances in search of seasonal foods and to conserve the natural resources of an area.

In modern times, sport is perhaps a key to indigenous people's continued growth. There are many talented indigenous players playing AFL and rugby league. Prominent indigenous athletes attract media attention. This attention enables them to act as role models for indigenous youth, to encourage and guide them, and to focus political interest on overcoming many of the social injustices that face indigenous people as a whole population.

Traditional activities and sports

Traditionally, the games and activities of indigenous people centred on the development of the skills required for hunting and gathering and the passing on of Aboriginal culture. Examples of such games and activities include:

- sham fights for children, using smaller, scaled-down weapons
- spear dodging, with lines of boys standing opposite one another then throwing toy spears at the people facing them. Girls would stand in the centre and try to knock down the spears before they hit the intended target.
- bubberah, a game in which players take turns in throwing a boomerang to land close to a target
- boomerang dodge, involving six players standing in a line with their hands on the shoulders of the person in front. The first person then throws the boomerang and, as it returns, they must then jump to avoid it.
- murri murri, which required players to stand in two lines several metres apart facing each other, while a bark disc was rolled between the lines and they tried to spear it
- dancing as part of a corroboree or other symbolic occasion.

APPLICATION

Aboriginal games

Organise a game of bubberah at school or use tennis balls and a discus to play murri murri. Evaluate the performance of the class.

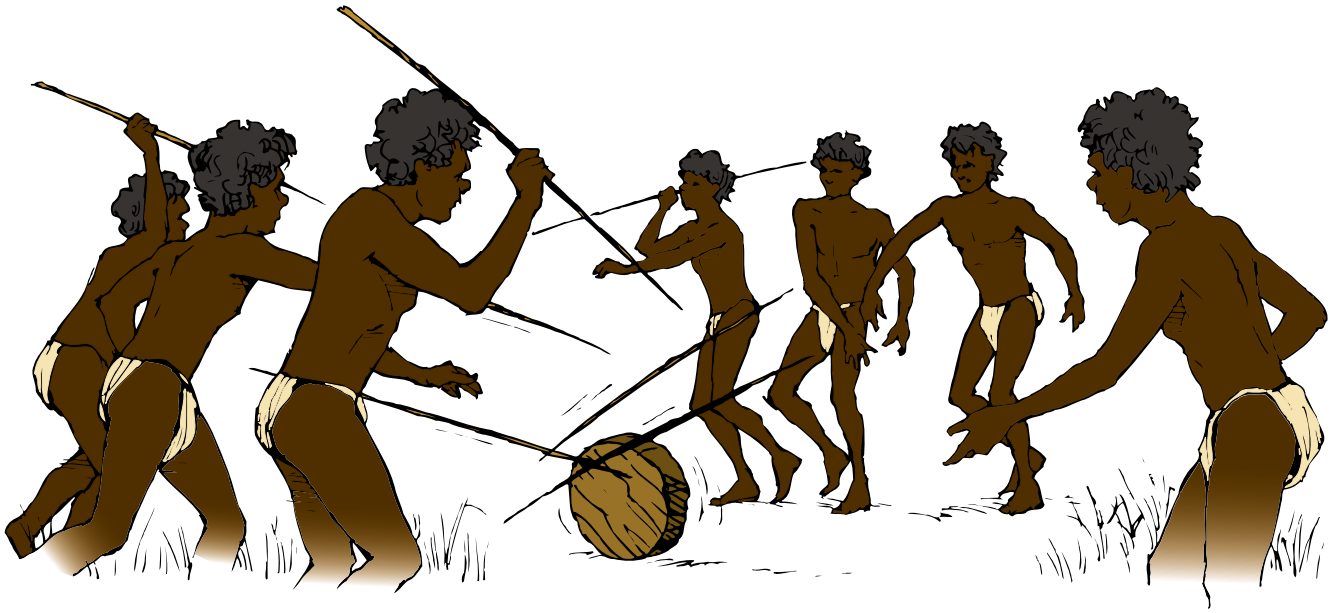


Figure 10.13: A game of murri murri

Links between community and identity

There were many different groups of indigenous people living throughout Australia prior to Europeans arriving. Each tribe or language group had its own unique identity and customs. Unfortunately many of these have been lost. It is generally known that before colonisation, Aboriginal people occupied themselves with games and activities that focused on physical and cultural survival. There was little division between play and work, and games and activities were aimed at developing skills in hunting, gathering, tracking, climbing, running, swimming and wrestling. For example, young children played a game where they had to follow a certain type of animal track back home. Boys and girls would have races to see who could climb up and down a tree the fastest. All these activities promoted strength, endurance and accuracy in throwing, qualities necessary for success as a community.

Dance played an important part in the culture of each group. Stories and folklore were incorporated into dance to entertain and teach younger generations what was expected of them. The dances may have consisted of predetermined steps with specific meanings or may have been a result of spontaneous celebration. Some of these dances may have involved a high level of physical activity. The initiation rites and other spiritual celebrations were included by some groups in a corroboree.

Aboriginal culture had games that were similar to European games such as hide-and-seek and ducks and drakes. Other recreational pastimes included swinging, mud sliding and forms of top and ball spinning. A popular pastime for both sexes was the creation of string figures, similar to those made in a game of cat's cradle. With the aid of helpers, it was possible to make over 200 different representations.

Kinship is a blood relationship.

The rules to any indigenous people's games tended to be very broad and play continued for as long as the enjoyment of the activity was there. Scoring was unimportant and teams were made up from the extended family. This reinforced the concept of **kinship**, which is important to indigenous people. There were some intertribal competitions, which were played at regular intervals and at specific places. The team was selected from each tribe with the remainder of the tribe watching. The activities usually involved 'fights' within certain boundaries and using particular weapons that were aimed only at the knees or feet. At these meetings of tribes it is generally believed that trade and marriages were an important result.



APPLICATION

Sport and indigenous people

1. Create a web diagram that summarises the roles that physical activity plays in the lives of indigenous people.
2. Contact your local Aboriginal consultative group, and research games and traditions that were particular to the indigenous people of your local area.
3. Following is a list of some of Australia's indigenous sport stars. Use this to investigate how physical activity and sport has influenced their lives and identity. Divide the list among students in the class and make a three-minute presentation of your findings. (Students can also choose to research other indigenous sport stars not on the list.)

Arthur Beetson	Rugby league
Preston Campbell	Rugby league
Nicole Cusack	Netball
Mark Ella	Rugby union
Marcia Ella	Netball
Cathy Freeman	Olympian
Jason Gillespie	Cricket
Adam Goodes	AFL
Evonne Goolagong-Cawley	Tennis
Patrick Johnson	Athletics
Anthony Mundine	Boxing
Nova Peris	Olympian
Nicky Winmar	AFL

Physical activity, sport and cultural identity

Different cultures have different values, beliefs and customs. These form the basis for a culture's sports and physical activities, which can, in turn, be an identifying feature of that culture. In some cultures, competition through physical activity is perceived as vital in the socialising process of its people, while other cultures emphasise the importance of cooperative activities and the maintenance of health. As each culture varies, so does its perception of health. Some cultures recognise the physical, social, emotional, mental and spiritual dimensions to health, while other cultures recognise only the physical and social dimensions.

The role of competition

Many Western cultures value competitive sport partly because it is thought to prepare people for living and working in a capitalist system that is based on the concept of competition. Other cultures may regard the arts and education as more important; for example, the Vietnamese see the value of sport and physical activity for recreation, entertainment and for developing a sense of community. The Croatian, Greek and Italian cultures value competition as a means of pursuing national or regional pride. With this in mind, they have created in Australia large social sports clubs such as the Apia and Marconi clubs, which further promote their own cultural activities and traditions around the game of soccer. The Japanese have traditionally enjoyed sports that involve ritual and combat, and that instil notions of rank and order. More recently, though, they have adopted games such as baseball and golf.

Links to cultural identity

Most countries have sports that they feel identify them as a people. For instance, soccer is a national sport for Croatia, Greece and Italy. The Irish and Pacific Islanders consider rugby union to be their national sport. In Australia, many migrant groups have formed sporting social clubs that work to reinforce their own cultural identity and are used for social interaction. Traditional games and pastimes such as bocce (Italy) are played as a means of keeping the links with their home country and of uniting the many fractured parts of their communities in Australia.

Relationships to health

Concepts of health and the importance of physical activity will vary between the different cultures of the world. Many Western cultures and Pacific Islander cultures view sport primarily as entertainment and social interaction rather than for the maintenance of good health. This is in contrast to Asian cultures, which encourage people from an early age to adopt activities such as Tai Chi and the martial arts in order to maintain good health and to find spiritual fulfilment. Yoga is another example of a physical activity that is performed for health and spiritual improvement.



Figure 10.14: Yoga and Tai Chi are physical activities that can improve physical and mental well-being.

Ways of thinking about the body

Ancient Greek philosophers believed the body should be regarded as a 'temple' and developed sports that enhanced physique and skill.

The Asian philosophy maintains that, in order to achieve good health, a balance is needed between the mind, body and soul.

The Western way of thinking tends to regard the body with less reverence, which may account for the high rate of lifestyle diseases, disordered eating patterns and levels of inactivity in Western nations. Western beliefs have also created problems to do with body image. The perpetuation of unrealistic stereotypes for males and females means that many people become dissatisfied with their body's appearance. This may lead them to seek surgical remedies and muscle-enhancing drugs or to become caught in cyclic dieting and intense weight-loss and exercise programs, rather than engaging in regular physical activities.

Opportunities for physical activity for girls of different cultural backgrounds

In some cultures, a woman's main priority is her husband, family and household. Physical activity is therefore a very low priority for them. In Australia, many migrant women must work to maintain the socioeconomic standard of the household. This can result in both parents having to work and the girls of the family, in particular, being expected to look after the younger children.

The multicultural nature of Australian society means that there can also be a conflict between what a particular culture feels is appropriate for girls and women and the values they may be exposed to outside the home. For example, some cultures prefer to divide the sexes during physical activities, whereas Australian society, through schools, is moving towards the promotion of mixed-sex competition in sports such as netball and touch football.

Young girls of certain cultural backgrounds are sometimes expected to pursue the traditional sports or activities of their homelands rather than those of the new adopted country. Their culture's concepts of femininity may also dictate, to a large extent, what activities they will feel comfortable participating in.

Participation in physical activities may also be limited by language difficulties, particularly when learning new sports such as aerobics or cricket. This can restrict their opportunities for developing new skills and maintaining an active lifestyle.



APPLICATION

Culture and physical activity

1. Conduct a survey in your school of students from different cultural backgrounds about their opportunities for physical activity. Try to include a survey of parents.
2. Using the results of your survey, discuss the cultural significance of sports.
3. Identify the barriers to participation for some groups of people and suggest ways in which these barriers might be overcome.

HOW DOES THE MASS MEDIA CONTRIBUTE TO PEOPLE'S UNDERSTANDING, VALUES AND BELIEFS ABOUT SPORT?

CRITICAL QUESTION

How does the mass media contribute to people's understanding, values and beliefs about sport?

Relationship between sport and the mass media

The term 'mass media' describes communication that is directed from one source to a large percentage of the population. Mass media includes television, movies and radio (electronic media) and newspapers and magazines (print media). The mass media is one of the most powerful influences on people's opinions, beliefs and habits. It can either unite or divide a country on an issue such as drug use in sport.

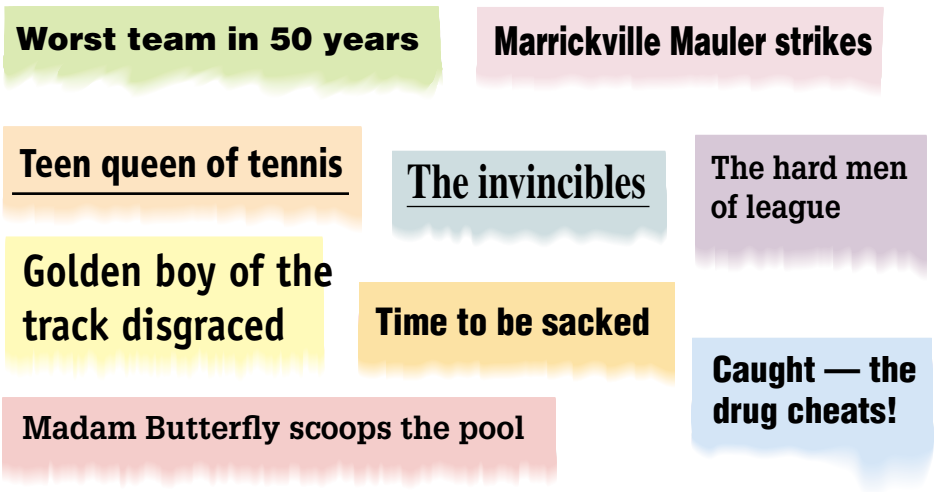


Figure 10.15: Sensational headlines — some positive and negative examples

Between sport and the media a relationship has developed that is inter-dependent. Some high-profile sports such as rugby league and cricket depend for their budgets on media coverage. The media in turn relies on sport to attract businesses who wish to advertise. Without media exposure, the lesser known sports find it difficult to obtain major sponsorship or to develop their sports fully. The media's relationship with sport has even resulted in changes to games to make them more suitable for television.

APPLICATION

The relationship between the media, sponsorship and sport

As a class, discuss the relationship between the media, sport and sponsorship. List your points on the board. Then construct a mind map or a PMI chart (plus, minus, interesting) to represent the main features of this relationship.

INQUIRY

The influence of the media

With reference to figure 10.15, explain the effect the media can have on public opinion.

Representation of sport in the media

Australia's passion for sport is reflected in the representation of sport in the print media. Reporters use metaphors and clichés, such as 'Gladiators of League' to create images of players as sporting idols. They describe male players as being mentally tough, fiercely competitive, driven by the passion for the game and totally focused on winning. Special articles that profile players are released to coincide with major sporting events. These articles may depict players as 'legends of the game', focus attention on their luxurious lifestyles or even portray them as 'eligible bachelors'. When important games are played between teams, they are compared to battles, as in 'the battle for the Ashes' in cricket, or the State of Origin rugby league matches which are billed as 'mate against mate'.

The representation of female sport in the print media tends to differ from the representation of male sport in both the language used and in the amount of coverage. A narrow range of women's sports are reported on and the length of the story tends to reflect the fact that women's sport is regarded (at least by the media) as less important.

The main sports represented in the newspapers tend to be the traditionally male-dominated sports such as cricket, rugby league, rugby union, AFL and soccer. Recreational magazines focus on specialist sports such as surfing and fishing, which are also male dominated.



APPLICATION

Analysing the depiction of sport

1. Collect one weekend newspaper and cut out articles on sports matches that are exclusively male or exclusively female.
2. In the classroom, attach a large sheet of cardboard to a wall. Divide the cardboard into two columns. Label one column 'Male sports' and the other 'Female sports'. Put the articles in the appropriate columns.
3. Then, as a class, critically analyse the reasons for any differences in the way the matches are depicted.
4. Compare the language used and identify the similarities and differences.

Sport and television

The media can actually be responsible for the growth of new sports. Programs such as *Wide World of Sports* can create an interest in different sports such as snowboarding or mountain biking. The television coverage of each Olympics has introduced millions of people to new sports. This promotes the growth of these sports and improves the standard of international competition. Similarly, following a win by an Australian team in the Davis Cup, there is an increase in young people willing to take up tennis. Australia's qualification for the Soccer World Cup of 2006 encouraged young soccer players of the future.

Most sports programs are devised by programmers with a very specific group in mind: males aged 25 to 45. When media tycoon the late Kerry Packer instigated the rebel cricket concept called 'World Series Cricket', he designed and packaged a sport that was purpose-built for television. The uniforms were more colourful, the rules were changed to make the game faster and more exciting, the times of the games were adjusted to suit peak viewing times and even the ball changed colour. In other sports, changes have been

made to attract new audiences by simplifying the game or increasing the scoring opportunities. Some changes to the features of particular sports include:

- the penalty shoot-out in soccer
- scheduled time-outs in gridiron (American football)
- sports such as AFL having matches on Friday nights in order to attract more television viewers
- sudden-death play-offs in soccer
- the skins concept in golf
- the shot clock in basketball and the three-point line
- the tennis tie-breaker
- see-through courts in squash.

Relatively new sports concepts have also been created: survival of the fittest, beach volleyball and the Ironman series.



INQUIRY

Media exposure and sport

As a class, discuss how previously low-profile sports, such as netball or beach volleyball, have been altered to attract more media coverage and attention.

How have sport and television changed?

Because sportspeople and spectators alike feel a need to be involved in the action, programmers were encouraged to use developments in technology to produce such innovations as 'race cam', 'stump cam', slow-motion replays, new sound effects and visual effects such as the duck in cricket. To make audiences more interested in sports coverage, it was also felt the viewers needed to be made aware of:

- statistics, such as the number of hit-ups or the amount of time in possession
- player profiles, with information including interests and hobbies
- information such as pitch condition or wind direction
- what the field looks like from above and how the teams are set out (views often supplied by sponsored airships)
- how the players felt after the game
- who is the best player, or 'man of the match'
- the comparison of a performance with a world record, by using, for example, the computer-generated line in swimming.

Economic considerations of media coverage and sport

Sport is popular with television programmers because it is both entertaining and relatively inexpensive to produce. The events are scheduled throughout the year, they make use of existing facilities and the sporting associations themselves are keen for publicity. Financially, the media also benefits from the relationship. Television stations, for example, can get great mileage out of past footage with a replay of last year's grand final, plays of the week, plays of the month, legends of the game and with the lead-up commentary to the event. This has led some sports such as the AFL to seek greater control of their own media rights and so profit more from the relationship.

Deconstructing media messages, images and amount of coverage

Demographic data arise from statistical studies of the population — its size, structure, distribution and habits.

Demographic data gathered on viewers' and readers' opinions will, to a large extent, dictate the types of stories or messages given in the mass media. If target audiences are not satisfied, then they will discontinue viewing certain programs or buying particular newspapers and magazines. Newspapers, magazines and television stations generate income by selling advertising space and time in their papers and programs. It is therefore in media owners' interests to promote stories that are entertaining, have social impact or report on dramatic events.

To generate interest, heroes and heroines seem to be created almost daily and are sometimes resurrected on 'slow' news days. Important stories on social injustices such as homelessness can be quickly replaced with headlines declaring, as a matter of national importance, 'Australia beats Pakistan 2–0 in cricket'. Australian society tends to value sporting success more than social justice issues.

Difference in coverage of sports across print and electronic media

The intense competition between newspapers and television stations lends itself to sensationalism in stories. Violent images in sports are often promoted, sometimes overshadowing the rest of the game, as when fights in rugby league or AFL are replayed. Tantrums in tennis are so widely reported by the media that it has resulted in a generation of racquet-throwing children and adults.

The media's first responsibility should be to provide a balanced perspective, but often a viewpoint is taken and fixed stereotypes are used to validate a stance and satisfy public opinion. For example, media reports tend to focus on those soccer matches at which violence occurs. People could get the impression that soccer games are attended by hooligans intent on rioting and causing public mischief, when in fact the majority of spectators are law-abiding citizens.

The media's second responsibility should be to encourage public debate on social issues. The drugs in sport debate is one area that has had extensive media coverage. The future of sport and the Olympics will be affected by how well this issue is publicly examined, so that a feasible solution can be achieved.

Whatever descriptions are used for male or female athletes, they tend to conform to society's general expectations of what is masculine and what is feminine. Male performances are described, for example, as 'tough encounters' or 'awesome displays of strength'. These phrases reflect admiration of the courage, determination and power involved. Visually these descriptions are reinforced with images that reflect manliness.

Female performances are described more in terms of the aesthetically pleasing movements of the athlete or her overall appearance. 'Style' and 'teamwork' are key words in the post-performance analysis.

The emergence of extreme sports as entertainment

Extreme sports by nature involve a high element of risk and have been around in various forms for many years. The earliest forms included bareback horse racing, parachuting and mountaineering. In modern times new forms have



Figure 10.16: Big wave surfing is an extreme sport that carries high risk of serious injury.

emerged such as big wave surfing, base jumping, street luge and motorcycle/BMX stunt jumping. Regardless of the form of extreme sport it generally satisfies the individual's need for expanding their skills, seeking out new challenges and releasing adrenaline because of the danger factor. For spectators it satisfies their increasing need to be entertained in new and exciting ways while remaining within their own comfort zones.

Television is the most easily accessed source of entertainment for most people. The television stations receive their income by broadcasting programs that will attract audiences for their advertisers. They therefore have a high demand for cost-effective programs. Broadcasting traditional sports requires the purchase of the television rights, large stadiums that need to be filled with spectators and games that are played only at specific times of the year. The advantages of the use by the media of extreme sports are that it requires fewer people to be involved, has lower production costs, can be stored for when needed and it fills the gaps in traditional sport coverage.

However, a problem has developed that is the responsibility of both the audience and the media. The increased coverage of extreme sports to satisfy the high demand for new entertainment by audiences and the media has inadvertently pushed athletes to take increasingly higher risks: to jump higher, go faster or do more complicated manoeuvres. A double somersault just doesn't impress anyone anymore; it needs to be a triple or quadruple somersault to get the audience's attention. Furthermore, the audience wants to be part of the action and the experience, so filming is often done with handheld cameras, helmet-mounted cameras, or by camera operators who also put themselves at risk in the same environment for the close-up of the action.

Adding further to the problem is that many extreme sports are also self-regulatory at best and there is a grey area regarding rules, safety requirements and responsibility. What the audience views in the final edited package may not reflect the high level of skill, training and preparation required to perform that sequence or any evidence of a major injury that may have resulted when things went wrong.

It must be remembered that individuals who engage in extreme sports are often experienced athletes who have practised for years and used safety equipment such as harnesses, trampolines or jumps into dams to perfect their skills. Young people often try to copy their sporting heroes and risk serious injury if they are relatively inexperienced, miscalculate the risk or are unprepared.



The media and athletes in extreme sports

Debate the topic 'The media is causing athletes in extreme sports to take excessive risks'.

CASE STUDY

Big wave surfing

It's by the big wave equivalent of a hairs'-breadth — but Maroubra's Mark Mathews is $20 000 richer after collecting the Biggest Wave Ridden award at a gala presentation for the Oakley Surfing Life Big Wave Awards.

In what judges described as the closest contest in the event's seven year history, the 24-year-old Mathews just edged out Bronte's Kobi Graham and Western Australian Damien 'Taco' Warr for the big one, with a ride estimated at nearly 14 metres (45 feet in surfer lingo) at Cow Bombie, WA last September . . .

'I'm ecstatic', exclaimed Mark as he was surrounded by hectic well-wishers at the celebrity-studded Bondi Pavilion party. 'I still think we should've had a paddle -in contest to decide the winner from the finalists. I know it was that close.'

Judges were torn until they were able to view high-quality video of Mathews's ride, provided by well-known surf filmmaker Tim Bonython. Bonython's footage's role was rewarded with $3000 for the Biggest Wave Shooter Award. 'I didn't know if Mark wanted me to submit the footage,' said a thrilled Tim. 'Then he called me at the last minute. Now I'm extremely stoked I did!'

Marti Paradisis made his own kind of history last night by becoming the first surfer to take two awards in the one year: one for Biggest Paddle-in Ride (at his beloved Shipstern Bluff), and one for Best Overall Performance for 2008–09.

And in a sensational, crowd-rocking announcement, event presenters Oakley busted out an extra $5000 People's Choice Award for young Western Ozzie boy Kerby Brown, whose crazy 'slab' ridden last year at a secret reef near his home town has had everyone slack-jawed. The wave fell just short of Biggest Wave contention — yet it, and some other super-thick waves entered this year, will almost certainly become the new benchmark for the hell-wave fraternity this coming season.

Said Kerby: 'I'm without a major sponsor at the moment so the money will allow me to continue doing what I love: chasing the biggest swells around the country and finding new crazy waves to ride.'

'These surfers are like gladiators,' he continued. 'Taking on anything nature can throw at them. It's got to the point where it is extremely dangerous and lives are on the line so hats off to everyone pushing it so far. We are only going to see bigger and heavier rides this year. I can assure you of that!'

Source: Australia's Surfing Life, 19 February 2009, http://surfinglife.com.au.



INQUIRY

Big wave surfing

Read the snapshot on big wave surfing.

1. Describe the awards presented and the prize money for each award.
2. Apart from the competitors, who else gains monetary rewards and increased reputation from the winner's achievement?
3. How does Kerby describe the surfers and the risks they take?



APPLICATION

The media's role in giving meanings to sport

The aims of the task are:

- as a class, to analyse the media's role in giving meanings to sport
- develop skills in gathering, interpreting and communicating information.

As a class, allocate tasks from the list below.

1. To complete your analysis, collect a copy of *The Australian*, *The Sydney Morning Herald* and your local area paper. They do not have to be in any particular order and their dates can be random.
   (a) Examine the amount of space given to the different sports, and to male sports and female sports and calculate these as a percentage of the total.

(b) Compare where the stories are located in the papers, and check whether photographs are included and what they reflect.
(c) Critically analyse the type of language used in several of the articles.
(d) Locate an article on an international sporting event that incorporates issues of national identity and describe the writer's approach.
(e) Find an article that discusses sponsorship in sport, either of an individual, a team, a club or a sporting event, and explain the advantages of this sponsorship.

2. Visit a newsagent and ask permission to do a survey. Calculate what percentage of shelf space is devoted to the different sports, and to male sports and female sports. Also try to establish the target age groups.
3. Obtain a current television guide for free-to-air television.
   (a) Using the television guide, calculate the amount of time devoted to different sports in a week.
   (b) With the aid of a stopwatch, calculate the time given to the different sports on each channel at the allotted news hour for one week. Consider the ratio of female to male sports coverage.
   (c) Watch one female and one male sport on television and analyse the level of sponsorship.

   (Discuss how best to achieve uniformity of results and how to present the final report.)



WHAT ARE THE RELATIONSHIPS BETWEEN SPORT AND PHYSICAL ACTIVITY AND GENDER?

CRITICAL QUESTION

What are the relationships between sport and physical activity and gender?

Sport as a traditionally male domain

Sport in its earliest forms was created by men for men. It emphasised competition and the development of qualities that represented manliness. As society has changed, so has sport. Society now has to consider the close relationship between sport and gender and the implications of this relationship. The media, in particular, plays a prominent role in constructing meanings of masculinity and femininity through its reporting of events.

Sport and the construction of masculinity and femininity

The expression 'boys will be boys' is frequently used to explain particular boys' behaviour. This statement can have both a positive and a negative message. Boys as well as girls are taught how to behave from an early age and failure to behave as expected can have consequences. Society gives boys a very narrow view of what it means to be masculine. In general terms, society equates masculinity with being:

- competitive
- tough
- aggressive
- able to control one's emotions.

In the playground, males are therefore expected and encouraged to exhibit these qualities while playing. Similarly, as they move to the sporting field, much of this learned behaviour is reinforced by society. The crowds cheer, trophies are awarded and team-mates congratulate each other for successful, manly performances.

Problems develop when society's broad expectations regarding masculinity are challenged. There are many young boys whose bodies are simply genetically not suited to contact sports, and their participation could risk serious injury. Others simply do not enjoy contact sport because it is an activity that does not interest them, or they lack the skills to perform at a level that is personally satisfying. This can result in a young male's self-esteem being damaged because he perceives himself to be less masculine.

It is much more difficult for boys to display their masculinity in the less popular sports such as diving or dancing. In fact, some of these activities are labelled negatively because they are perceived as not reflecting masculine qualities. This can lead to these sports receiving a low level of support or promotion.

Some sections of the media believe that sport glorifies mental and physical toughness, and that part of being masculine is linked to being dominant. Sport does provide the opportunity to challenge oneself against others, without necessarily resorting to a higher level of violence (the exception being the full-contact sports such as the martial arts). These challenges are conditioned responses that many males have learned to believe are necessary as part of their personal growth. The need to feel dominant in a sport can quite often see a friendly game such as touch football develop into something a lot more serious. Likewise, basketball, which is supposedly a non-contact sport, contains a great deal of bumping and blocking to intimidate the opponents.

Most males have a mental picture of what society believes a man should look like, so sport and physical activities are sometimes used to develop the muscular physique that resembles this stereotype. This particular body image also seems to require a stereotypical attitude. As a test of masculinity, some males engage in risk-taking sports, which demonstrate their level of courage and 'prove' their manhood — for example, base jumping.

The concept of femininity is learned from society. Modern society encourages women to participate in sport, providing their femininity is not challenged. The types of games they are expected to play involve little body contact and have a greater focus on aesthetic or well-coordinated types of movement. For instance, netball is considered by some to be a more feminine sport than women's basketball, which is very similar in skills but has the potential for more deliberate body contact. Young girls who are self-conscious about their body or who are unable to master the intricate movements of dance or gymnastics may find it difficult to participate and may question their own femininity because of it.

Figure 10.17: Netball is Australia's most popular female sport.



For women to satisfy society's views of femininity requires considerable effort. The top female athletes and players, who compete under similar conditions to males, are still expected to perform with 'grace'. Their appearance, which can have no bearing on the performance, can be scrutinised by the media.

Many of the traditional female sports such as netball and swimming tend to require a narrow range of body shapes if the participant is to be successful beyond a certain level. Other activities such as dancing and gymnastics don't necessarily require a particular body

shape but girls tend to be discouraged or excluded if they are the 'wrong' shape or size. This fact is likely to contribute to the non-participation patterns of many females in such activities.

Implications for participation

An individual's participation in a physical activity is a result of many factors. Past experiences, family background, genetic potential, geographical location and socioeconomic status all have an impact on the individual. However, it seems the major factor affecting participation in a sport or physical activity is society's attitudes to gender. This determines what types of activities are deemed suitable and how these activities or games should be played.

Table 10.3: Proportions of men and women participating in sport and physical recreation in 2011–12

Age group (years)	Males %	Females %
15–17	85.1	70.3
18–24	76.2	66.8
25–34	70.0	70.4
35–44	69.6	67.7
45–54	61.4	65.3
55–64	61.8	63.5
65 and over	52.9	48.1
	Estimate ('000)	
Total playing sport	5896.2	5840.6

Source: ABS, *Participation in sports and physical recreation, Australia 2011–12*, cat. no. 4177.0.

Table 10.4: Children's participation in the top 10 organised sports (including dancing), 2012

Sport/activity	Number ('000)	Participation rate (%)
Boys		
Soccer (outdoor)	309.7	21.7
Swimming/Diving	235.2	16.5
Australian Rules football	212.7	14.9
Basketball	131.3	9.2
Cricket (outdoor)	123.1	8.6
Tennis	119.6	8.4
Martial arts	111.2	7.8
Rugby league	107.4	7.5
Rugby union	57.9	4.0
Dancing	50.7	3.5
Girls		
Dancing	367.4	27.1
Swimming/Diving	256.9	18.9
Netball	220.4	16.2
Gymnastics	109.8	8.1
Basketball	88.9	6.6
Soccer (outdoor)	87.8	6.5
Tennis	85.6	6.3
Martial arts	49.8	3.7
Athletics/track and field	42.7	3.1
Hockey	26.6	2.0

Source: ABS, *Children's participation in cultural and leisure activities, Australia 2012*, cat. no. 4901.0.

Table 10.5: Adult participation in the top 20 sports and physical activities in 2011–12

Sport/activity	Numbers ('000)		Participation (%)	
	Males	Females	Males	Females
Walking for exercise	1 474.1	2 784.7	16.5	30.4
Fitness/Gym	1 343.6	1 745.7	15.1	19.1
Swimming/Diving	671.9	729.2	7.5	8.0
Cycling/BMXing	875.5	490.6	9.8	5.4
Jogging/Running	775.3	585.4	8.7	6.4
Golf	732.5	128.0	8.2	1.4
Tennis (indoor and outdoor)	436.1	314.2	4.9	3.4
Soccer (outdoor)	368.6	120.5	4.1	1.3
Netball (indoor and outdoor)	39.7	410.5	0.4	4.5
Bush walking	219.7	216.8	2.5	2.4
Basketball (indoor and outdoor)	245.6	109.3	2.8	1.2
Yoga	50.2	298.9	0.6	3.3
Football sports	206.2	114.0	2.3	1.2
Cricket (outdoor)	268.3	12.9	3.0	0.1
Dancing/Ballet	30.1	229.1	0.3	2.5
Martial arts	140.3	110.1	1.6	1.2
Fishing	213.1	34.1	2.4	0.4
Lawn bowls	157.4	87.6	1.8	1.0
Australian Rules football	222.6	18.9	2.5	0.2
Surf sports	195.5	30.6	2.2	0.3

Source: ABS, *Participation in sports and physical recreation, Australia 2011–12*, cat. no. 4177.0.



INQUIRY

Differences in male and female participation in sport

1. Using the information in tables 10.3, 10.4 and 10.5, account for the differences in participation rates for males and females in the various sports.
2. Discuss why some sports have become traditionally associated with men and some with women.



APPLICATION

How active are young people?

Arrange to view a group of male and female students participating in an activity. It could be soccer, netball, touch football or aerobics. Then critically analyse:

1. how the boys and girls interact in the space/field/court
2. whether the umpire or instructor treats the males or females differently
3. whether the involvement of both sexes in the activity is equal.

Summarise your findings and discuss as a class.

Sponsorship, policy and resourcing

Sport has traditionally been a male domain. The major sports with the highest profiles are the male sports, so they also receive the highest level of sponsorship by companies, which also tend to be male dominated. The sponsorship of female competitions is steadily rising, but still lags well behind because of its low media profile.

The government has introduced anti-discrimination laws that have helped women in their attempts to achieve equality in sport. The Australian Sports Commission has a Women and Sport Unit that actively promotes a better deal for female athletes. The New South Wales Department of Education and Training has a policy that requires that girls in all schools must be given equal opportunity to develop sporting skills.

Part of creating equal opportunities is the need for adequate resourcing. The greater success of many of the current Australian women's teams and female athletes has been due to this strategy. Training more female coaches and employing more administrators at higher levels of sporting organisations has ensured women's issues in sport are being addressed.



Issues for women in sport

Investigate an issue that affects women in sport and report back to the class.

The role of the media in constructing meanings around femininity and masculinity in sport

The media will satisfy consumer demands and tends to promote socially acceptable role models that support the current constructs of femininity and masculinity. The role the media needs to play is to respond to changes in these **constructs** as they evolve and to present an unbiased perspective of the importance of each.

Constructs are concepts that have a shared meaning and understanding.

Women should be reassured by the media that their 'femininity' is not compromised by their participation in sport and that sport should be pursued for the positive health benefits. Similarly, males should be reassured by the media that participation in a sport such as football does not define a person's degree of masculinity; that they can pursue other less traditional sports that require a high level of skill and fitness, and that these too can be 'masculine'.

The media could be used as a powerful tool in challenging traditional ideas about gender in sport. Sportspeople could be featured participating in less conventional sporting roles for their gender to expand the notions of femininity and masculinity. The language the media uses in reporting events and the images they use should be considered carefully for the implications they convey to young people who are developing a sense of identity. The media, however, relies on ratings to sell advertising space and rarely risks promoting lesser known sports or social issues that challenge our notions of gender.



How the media gives meanings of masculinity and femininity through sport

Obtain a copy of a popular sport magazine such as *Inside Sport*. Critically analyse how males and females are portrayed in the magazine, and the effect that these portrayals may have on the meanings of masculinity and femininity in sport. Report your findings back to the class.



Figure 10.18: Women who play traditionally male sports challenge some stereotypes held by society and the media.

Challenges to the male domain

Society's growing acceptance over the twentieth century of women's right to participate in sport paved the way for many women to enter traditionally male sports. Women have challenged the stereotypes presented in the media and society's perceptions of femininity and masculinity. Females wanting to play contact sports such as rugby have been criticised and stigmatised, as have males wanting to play netball. It is only through strength of character and perseverance by young people in pursuing their interests that there will be a continued redefining of society's expectations.



INQUIRY

The traditional nature of sport

1. Critically analyse the effect of more women entering the traditional male sports such as boxing or rugby.
2. Compare this with males entering traditional female sports such as netball.
3. Use the **Women's Boxing at the Olympics** weblink in your eBookPLUS to read an article about the women's boxing competition at the 2012 London Olympics. Create a table that summarises the opposing views expressed in the article.

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SUMMARY

- Sport was traditionally used in nineteenth-century England and colonial Australia to develop manliness, patriotism and character to support the country's policy of colonisation.
- Women's sport in the twenty-first century reflects greater levels of participation and involvement by women at higher levels in coaching and administration.
- Modern sport is characterised by an increasing degree of professionalism, the need for sponsorship and a stronger association with business.
- The main sources of revenue for the Olympics are from sponsorship, the sale of television rights and the sale of tickets.
- Australia's national identity is partly based on an image of a sporting nation.
- Sport is an important part of the process of socialisation.

- In 2011–12, approximately $268 million was provided by the Commonwealth Government to the Australian Sports Commission to fund the Australian Institute of Sport and other sports bodies.
- Politics in sport occurs at all levels — club, national and international.
- Sport is used by most countries to develop a sense of nationalism in its people.
- Traditional Aboriginal activities centred on developing skills in hunting, gathering and community survival.
- Sport can give cultures an identity and can unite communities.
- Various cultures view sport and health differently.
- The media strongly influences people's opinions, beliefs and habits.
- The male-dominated sports tend to receive greater media coverage and sponsorship.
- Women are challenging the male-dominated sports as a result of changes in policy, sponsorship and resourcing.

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

QUESTIONS

Revision

1. Explain how the meanings of sport and physical activity have changed over time. (H12) (5 marks)
2. Identify examples of patriotism, manliness and character building in current Australian sports. (H12) (2 marks)
3. Briefly outline the factors that contributed to the lack of participation of women in sport and physical activity in the past. Suggest strategies to improve women's participation in sport and physical activity for the future. (H12) (5 marks)
4. Account for the influence of sociocultural factors on the participation patterns in physical activity and sport by Australians. (H12) (5 marks)
5. Account for the increase of professionalism in sports such as rugby league, rugby union, cricket and netball. (H12) (5 marks)
6. Explain the benefits of sponsorship for sports. (H12) (5 marks)
7. The value of sport and physical activity is affected by a person's socioeconomic status, gender and cultural background. Discuss. (H12) (5 marks)
8. Briefly outline examples of negative attitudes or behaviours that can result from participation in sport. (H12) (3 marks)
9. Outline how funds are allocated to sport in Australia. (H12) (3 marks)
10. Identify three examples of how politics has been used in the Olympics. (H12) (2 marks)
11. Identify instances when Australia has used politics in sporting events. (H12) (2 marks)
12. Explain the negative consequences for a nation's identity if one of its sporting teams is found to be involved in cheating, violence or drug use. Use specific examples. (H12) (5 marks)
13. Critically analyse how success at recent Olympics has affected Australia's national identity. (H12) (12 marks)
14. Explain the role of competitive sport for various cultures. (H12) (5 marks)
15. Describe the changes to sport as a result of the influence of the media. (H12) (4 marks)
16. Justify the power that the media has over sport. (H12) (8 marks)
17. Critically analyse the role the media plays in constructing meanings around masculinity and femininity in sport. (H12) (12 marks)
18. Evaluate the role of the media in promoting socially acceptable role models in sport. (H12) (8 marks)
19. Suggest strategies to improve the participation in sports for women and girls from different cultural backgrounds. (H12) (3 marks)
20. Predict the possible outcomes from the rapid growth of women's soccer. (H12) (3 marks)

Extension

Conduct a case study on a sport or physical activity that is outside the mainstream of Australian sport; for example, Tai Chi, skating, snowboarding, a martial art, a cultural dance form (such as ballroom or line dancing), or women's rugby. Research its participation rates, age groups, costs and opportunities for competitions. Present your findings in table or graph form. How do the values and meanings associated with the activity compare with those associated with the more traditional Australian sports? (H16) (10 marks)

CHAPTER 11

Sports medicine



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H8**, **H13**, **H16**, **H17** from the PDHPE HSC syllabus.

CLASSIFYING AND MANAGING SPORTS INJURIES

CRITICAL QUESTION

How are sports injuries classified and managed?



Figure 11.1: Sports injury management initially requires correct identification of the problem.

Direct injuries are caused by an external force applied to the body, such as a collision with a person or object.

study on
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Practice HSC exam questions

Most of us are familiar with sports injuries of one kind or another. Being able to correctly identify the type of injury and administer or advise on proper treatment lays the foundation for a quick recovery.

Ways to classify sports injuries

Injuries are a part of sport. They occur more frequently in contact sports such as football, but may be the result of overuse caused by repetitive movements experienced in activities such as running.

Sports injuries are usually classified according to their cause. The most common classification is to identify injuries as *direct*, *indirect*, *soft tissue*, *hard tissue* and *overuse* injuries.

Direct and indirect injuries

Some injuries are caused by direct forces generated from outside the body. **Direct injuries** result in fractures, dislocations, sprains and bruises. A shoulder dislocation caused by a tackle in football or a broken bone caused as a result of a collision between hockey players are examples of direct injuries.

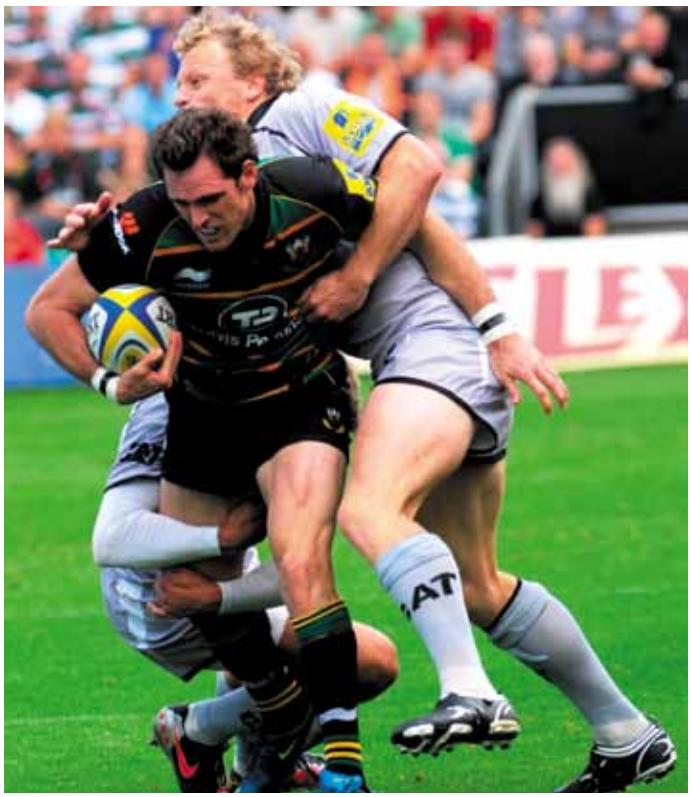


Figure 11.2: Direct injuries are caused by external forces.

Indirect injuries are caused by an intrinsic force — that is, a force within the body.

In contrast to direct injuries, **indirect injuries** are caused by an intrinsic force; that is, a force within the body. Indirect injuries normally occur as a result of inadequate warm-up, ballistic movements, excessive movement, or a fault in the execution of a skill. They are the result of excessive strain being placed on muscles, tendons and ligaments, causing irritation and possible damage to body structures. Examples of indirect injuries include a sprinter tearing a hamstring muscle during a race, or a volleyball player causing stress to ligaments in the knee joint (see figure 11.3).

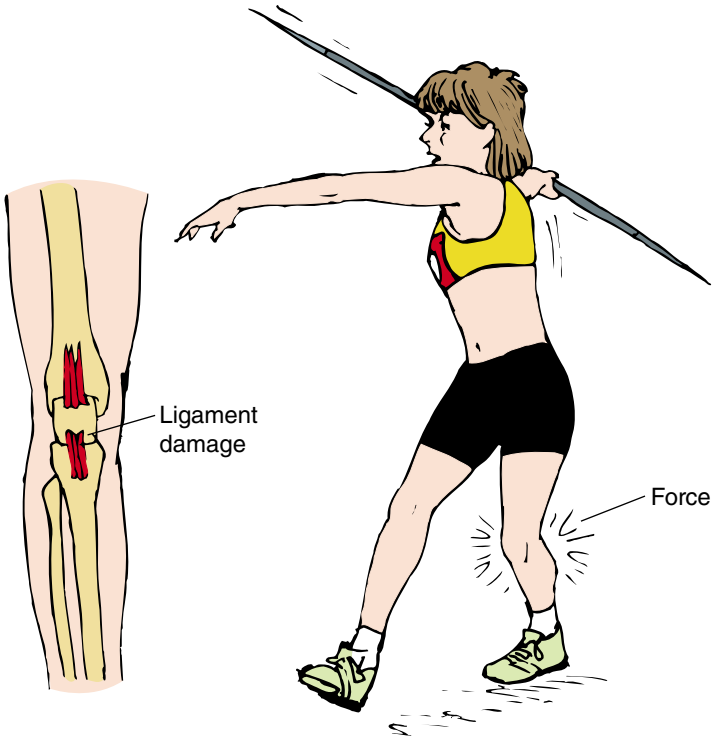


Figure 11.3: Indirect injuries result from excessive stress on muscles and around joints.

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See more
Soft tissue injuries

Practice HSC exam questions

Soft and hard tissue injuries

Soft tissue injuries include damage to muscle, tendons, ligaments, cartilage, skin, blood vessels, organs and nerves. There are many types of soft tissue injury. They may be *acute* (occurring suddenly, such as a sprain) or *chronic* (prolonged). Acute soft tissue injuries include sprains, strains, dislocation, subluxation, torn cartilage, contusions and abrasions. Prolonged soft tissue injuries may include many of the same types of injury, but their severity necessitates a long rehabilitation. Two of the most common soft tissue injuries are tears and contusions.

Hard tissue injuries cause damage to bones and teeth. They are frequently more serious than soft tissue injuries. Examples of hard tissue injuries include dislodging a tooth and fracturing a bone. The most common hard tissue injury is a **fracture**.

Like soft tissue, bone can also be traumatised by physical activity. However, because of its role as a structural support, hard tissue that has been injured must be carefully examined and correctly treated.

Soft tissue injuries are injuries to all tissue other than bones and teeth.

Hard tissue injuries cause damage to bones and teeth.

A **fracture** is a break in a bone.

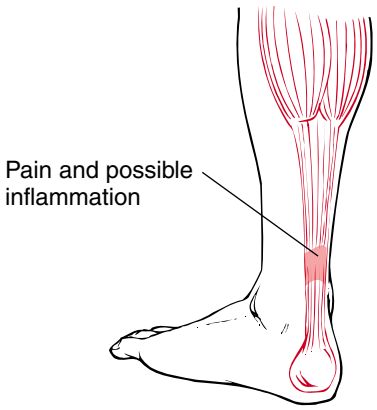


Figure 11.4: Achilles tendonitis is an example of a soft tissue injury.



Figure 11.5: Hard tissue injuries are serious, many causing severe pain and discomfort.

Overuse injuries are caused by overuse of specific body regions over long periods of time.

Overuse injuries

Overuse injuries result from intense or unreasonable use of joints or body areas. They are provoked by repetitive, low-impact exercise such as jogging or stepping. These injuries cause pain and inflammation around the site of the injury. Typical overuse injuries include anterior shin splints (an irritation to the front portion of the shinbone; see figure 11.6) and tendonitis (irritation of tendons; for example, in the Achilles tendon in the heel).

Stress fractures are small incomplete bone fractures caused by repeated pounding, usually on hard surfaces.

Overuse often contributes to **stress fractures** that may be difficult to detect in the early stages. Local swelling and tenderness may indicate a stress fracture. These should be initially treated using the RICER method but ultimately prolonged rest may be necessary for full recovery.

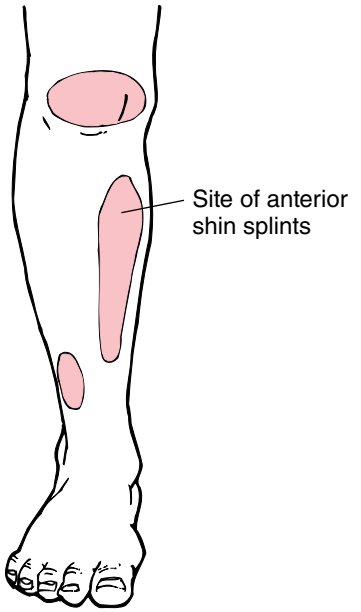


Figure 11.6: Shin splints and stress fractures are common types of overuse injury.

APPLICATION

Classifying sports injuries

1. Read the following scenarios and classify them according to the type of injury most likely to have occurred in each case. Place each letter into the appropriate space in a grid like the one below.
   (a) A cricketer begins to run between the wickets and feels a sharp pain in the calf.
   (b) A gymnast completes a routine on the parallel bars but lands heavily and twists her ankle.
   (c) A baseball player misses a catch and the ball hits his front teeth.
   (d) A long distance freestyle swimmer feels discomfort in the shoulder 1200 metres into a race.
   (e) A hockey player hears a crack as her shoulder collides with an opposing player's head.

	Hard tissue	Soft tissue
Direct		
Indirect		
Overuse		

2. With a partner, think of five other injury scenarios and classify them in the same way.

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Practice HSC exam questions

Soft tissue injuries

Tears, sprains and contusions occur frequently in sport and differ according to the type of damage caused to internal structures.

Tears, sprains and contusions

A tear occurs when tissue is excessively stretched or severed. Two types of tear are sprains and strains.

Sprains arise from the stretching or tearing of a ligament.

Sprains arise from the stretching or tearing of a ligament. These are strong, rigid and relatively inelastic tissue. Their role is to connect bone to bone, thereby providing joint stability. Sprains happen when ligaments are stretched or torn, resulting in pain, swelling and the inability to perform normal joint movements. Proper rehabilitation management techniques are recommended, as healing in the stretched position causes permanent instability in the joint. Healing is a slow process because ligaments have a relatively poor blood supply. Sprains can be classified according to the severity of ligament damage. The classifications are illustrated in figure 11.7.

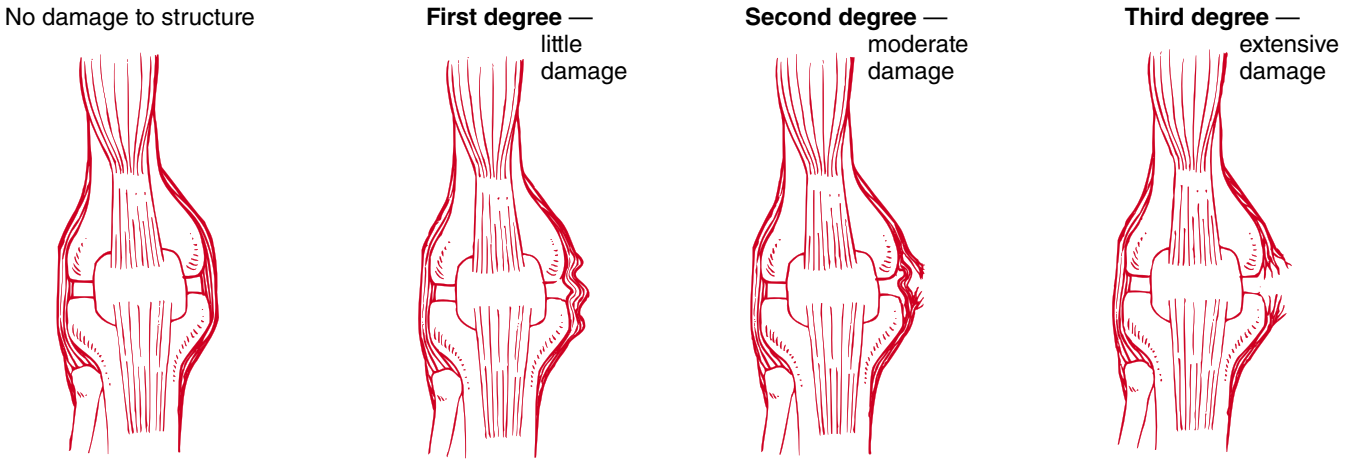


Figure 11.7: Sprains occur only in ligaments and are graded according to severity.

Strains occur when a muscle or tendon is stretched or torn.

Strains occur when a muscle or tendon is stretched or torn. They cause considerable pain and bleeding may cause discolouration around the injury. Any movement in the form of stretching and any pressure on or around the injury will result in sharp pain.

There are three levels of strains; these are illustrated in figure 11.8.

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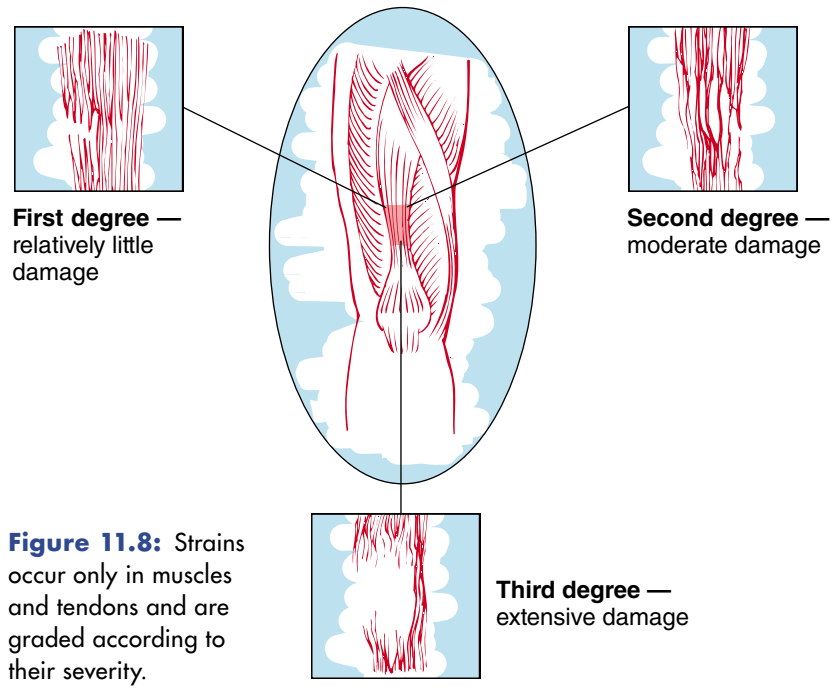


Figure 11.8: Strains occur only in muscles and tendons and are graded according to their severity.

A **contusion** is caused by a sudden blow to the body; a bruise.

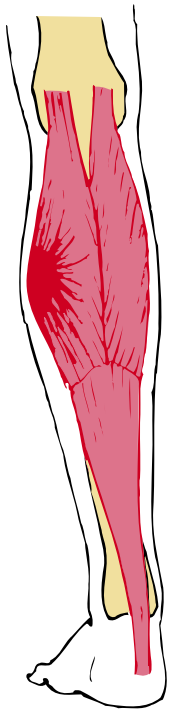


Figure 11.9: Contusions, or bruises, are caused by the crushing of soft tissue.

Impact with a player or object sometimes causes a **contusion**. Contusions vary in intensity. Some are superficial, remaining close to the skin. However, others penetrate deeply, causing bone to bruise. Contusions interrupt blood flow to surrounding tissue. When this occurs, a *haematoma* (blood tumour) forms as the blood clots in the connective tissue membrane. Internal bleeding into the area may continue for a period of time. A typical contusion is illustrated in figure 11.9.

Skin abrasions, lacerations and blisters

Abrasions, lacerations and blisters are forms of skin trauma. They are caused by the application of force, such as scraping or friction to the outer layer of skin. They can cause concern and considerable discomfort.

Skin abrasions

Abrasions occur in games such as netball or tennis, where a player may fall on a dry, hard surface. The injury causes pain and shallow bleeding as a result of the skin being scraped. The skinned area may be embedded with dirt and foreign materials. Treatment requires gentle cleansing and sterilisation of the wound to prevent infection.



Figure 11.10: Abrasions are areas of scraped skin and often occur when we fall or are tackled on a hard surface.

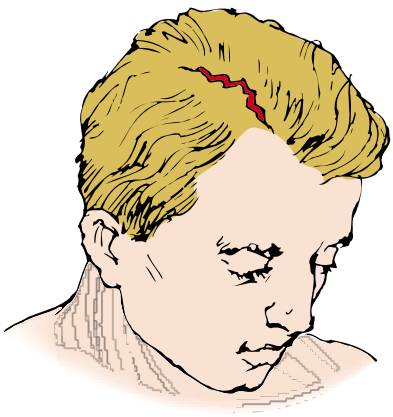


Figure 11.11: A scalp laceration

Lacerations

A laceration is a wound where the flesh has incurred an irregular tear. Particular care must be taken to prevent infection. Lacerations can occur to the scalp and mouth, particularly the lips and tongue if the soft tissue has been forced against the teeth. In the event of a scalp laceration, as illustrated in figure 11.11, the area needs to be thoroughly cleansed with antiseptic soap, dried and a sterile gauze pad applied. Pressure may still need to be applied to prevent bleeding. Lacerations longer than one centimetre need to be referred to a doctor. Mouth lacerations require a thorough inspection to ensure there is no further damage, such as dislodged teeth. The mouth can be rinsed with an antiseptic liquid. Sucking on ice assists in the control of bleeding and swelling.

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Blisters

Blisters are caused by a collection of fluid below or within the epidermal (surface) layer of the skin giving rise to intense pain. Blisters can contain clear liquid or even blood if a blood vessel has been ruptured. Blisters occur when:

- new equipment is being worn or used
- equipment is used for a long time, which may happen with clubs, bats or racquets
- the activity requires sudden changes of direction, causing friction in a sports shoe.

Management initially requires rest for 24 hours, when the symptoms may disappear. However, if the fluid in the blister is still present and causing concern, it may need to be surgically released and a donut pad applied. In the case of torn blisters or where the skin has been worn away, injury management requires the area be washed with soap and warm water and liquid antiseptic be applied. The area should be dried and antibiotic ointment applied. Use of 'second skin' dressing will aid the healing process.



APPLICATION

Identifying sports injuries

Complete the table by identifying the type of injury from the following list and inserting it in the appropriate space.

blister overuse sprain laceration strain indirect injury contusion

Type of injury	Description
	Tendonitis is an example of this type of injury.
	Injury that occurs only in soft tissue
	Injury caused by crushing of soft tissue
	Injury to a ligament
	Fleshy wound with an irregular tear
	This injury results in the collection of fluid just underneath the skin.
	Type of injury caused by the mismanagement of forces within the body

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Do more
Inflammatory response

Practice HSC exam questions

Inflammatory response

When soft tissue is injured, it becomes inflamed but responds by activating a self-healing process. This is referred to as the inflammatory response and may last up to three or four days after the injury occurs, depending on the extent of the damage. The injury will progress through the following phases as part of the healing process.

Phase 1, the *inflammatory stage*, is characterised by:

- pain, redness and swelling around the injured area
- loss of function and mobility
- damage to cells and surrounding tissues
- increased blood flow to the area
- leakage of fluid causing swelling (oedema)
- the formation of many blood vessels to promote healing.

Phase 2, the *repair and regenerative stage*, may last from three days to six weeks. It is characterised by:

- the elimination of debris
- the formation of new fibres
- production of scar tissue.

Phase 3, the *remodelling stage*, can last from six weeks to many months. It is characterised by:

- increased production of scar tissue
- replacement tissue that needs to strengthen and develop in the direction that the force is applied. The type of remodelling varies according to the timing and degree of mobilisation of the injury. Excessive exercise too early causes further damage. Too little exercise allows large quantities of scar tissue to form, which lacks strength and flexibility.

Immediate treatment of soft tissue injuries aims to reduce swelling, prevent further damage and ease pain. In the long term, treatment aims to:

- restore flexibility
- regain full function
- prevent recurrence
- return the player to the field as soon as possible.

Management of soft tissue injuries requires application of the RICER principle. RICER is an acronym that stands for *rest, ice, compression, elevation* and *referral.*

Properly used, the RICER method, which is explained fully in table 11.1, ensures that the injury heals correctly and in the shortest period of time. If RICER is not used, the injury takes longer to repair and has less strength and flexibility. This is illustrated in figure 11.12.

Table 11.1: The RICER method

RICER	Why	How	Time
R Rest	To reduce bleeding into the injury and prevent further injury	Place in a comfortable position with the injury elevated and supported.	Until beginning a program of careful mobilisation
I Ice	To reduce: • pain • blood flow • swelling • spasm • enzyme activity • tissue demand for oxygen	• Crushed ice in a wet towel and wrapped around the injury, or • frozen gel packs using a towel as an insulator (as frozen gel is colder than ice), or • immersion in a bucket of iced water (*Note:* insulating material, such as towels, prevents possible tissue damage from overexposure to cold.)	20 minutes every hour up to four days
C Compression	• Decreases bleeding • Reduces swelling	Wrap an elastic bandage over the injured area, covering both above and below the site.	At the time of the injury and reapplied periodically for at least 24 hours
E Elevation	• Decreases bleeding • Reduces swelling • Reduces throbbing	Raise the injured area above the level of the heart by placing a support (e.g. pillow) under the injury.	Whenever possible during the day and for the following two or three nights
R Referral	• To understand the nature and extent of the injury • To seek guidance in a program of rehabilitation	Appointment with a doctor or physiotherapist	As soon as possible following the injury

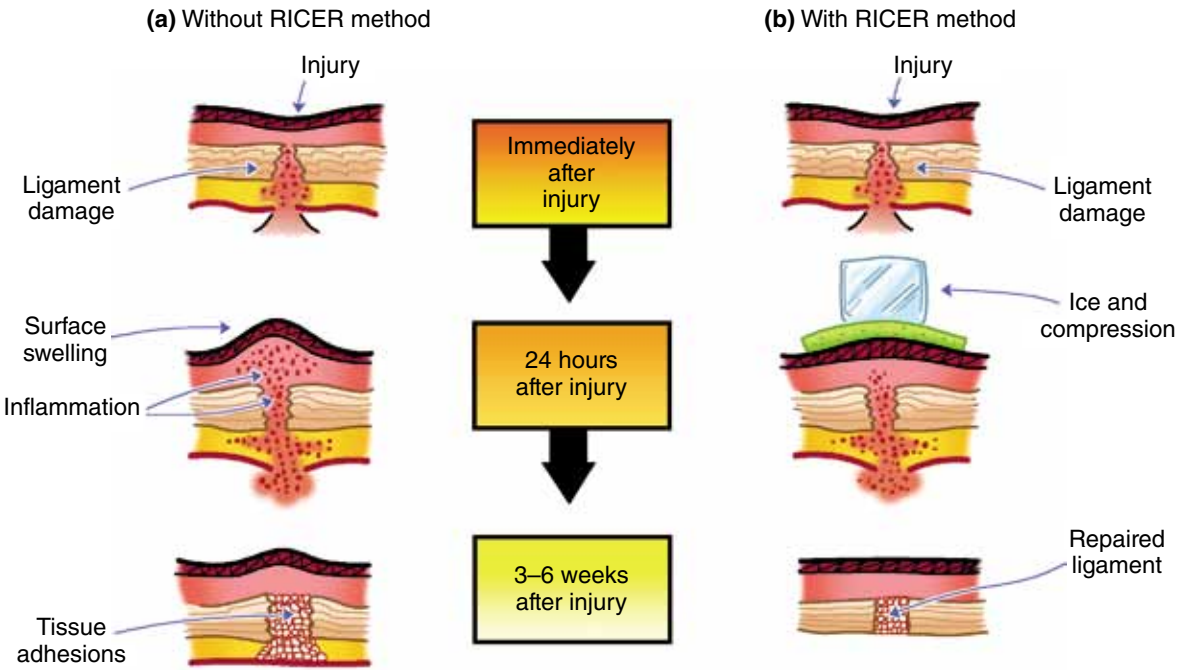


Figure 11.12: Difference in injury repair when RICER is used and not used



Figure 11.13: The first step in managing a soft tissue injury is to surround the injured area with ice.

To ensure effective rehabilitation, it is important to remember that:

- *rest needs to be active*. Rest does not imply lack of physical work for all parts of the body. During rest, it is important to maintain physical condition (for example, through swimming) and to begin mobilisation of the injured part as soon as possible. Soft tissue injuries should not be strapped for long periods of time as this promotes clotting.
- *ice should not be applied to cuts and badly damaged skin* as this reduces blood supply (which provides nutrition) to the area
- *ice should remain on soft tissue until it begins to feel numb* (about 20 minutes).

There should always be padding, such as a towel, between ice and skin.

APPLICATION

Managing soft tissue injuries

For this application, you will need ice or a frozen gel pack, wet towel and bandage. Form groups of three and allocate the following roles: patient, first aider and observer. To begin, the patient chooses an injury from the following list: ankle sprain, calf muscle strain, thigh contusion, forearm strain and knee sprain. The first aider manages the injury while explaining to the observer how the procedures work. When concluded, swap roles and choose a different injury.

INQUIRY

Immediate treatment of skin injuries

Sometimes an injury involves cuts (lacerations), skin scrapings (abrasions) and possibly punctures. The primary concern is to prevent infection. In each case, the wound needs to be cleansed with soap and warm water. Serious wounds require medical treatment and it may be necessary to have a tetanus injection. Injuries such as these should be cleansed, but not treated with antiseptic before referral. Minor wounds must be cleansed and an antiseptic cream or solution applied before they are covered with a dressing.

Examine the injury in the photograph. Use the **Abrasions** weblink in your eBookPLUS together with the information above to help explain how the injury should be managed.

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Concept code: PDH-112

See more
Fractures

Practice HSC
exam questions

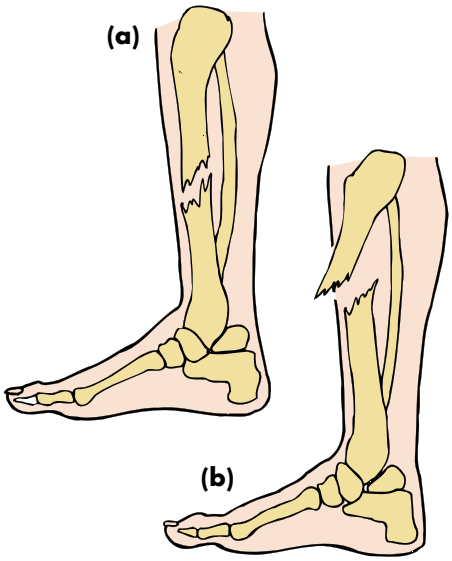


Figure 11.14: **(a)** A simple fracture and **(b)** a compound fracture

Hard tissue injuries

The two most common hard tissue injuries are fractures and dislocations.

Fractures

There are two broad classifications of fractures — simple and compound. In simple (closed) fractures, the bone breaks but remains underneath the skin, as shown in figure 11.14(a). In compound (open) fractures the bone breaks and protrudes through the skin, as shown in figure 11.14(b).

There are many different types of fracture. These include greenstick, comminuted, depressed, impacted, oblique, longitudinal, spiral, transverse and serrated. Some of these are illustrated in figure 11.15.

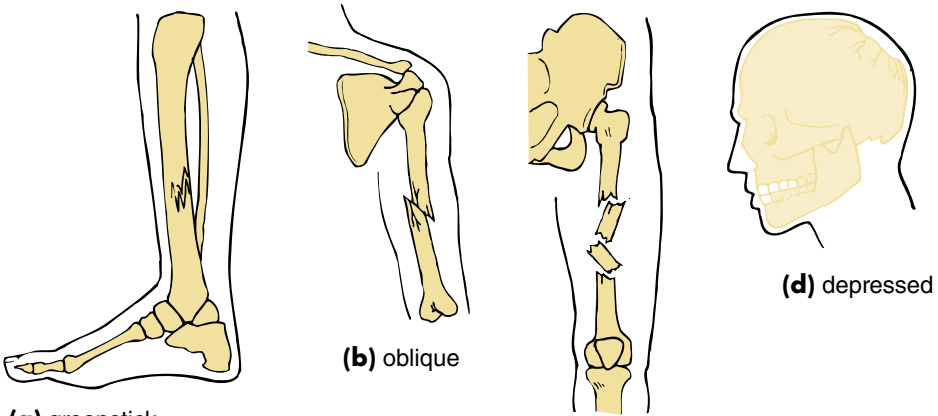


Figure 11.15: Four different kinds of fracture: **(a)** greenstick **(b)** oblique **(c)** comminuted **(d)** depressed

Management of fractures requires:

- use of DRABCD
- controlling bleeding
- treating shock
- use of a splint and bandage to **immobilise** the area
- immediate medical assistance.

Immobilisation restricts movement in the injured area by using splints and bandages.

Most suspected fracture type injuries require medical attention. Generally, medical attention is required if:

- there is obvious deformity
- there is uncontrolled bleeding
- the casualty is unable to complete the TOTAPS regime (see page 406).

Dislocation

Dislocation is the displacement of a bone at a joint.

Dislocations cause pain and are apparent because of the deformity they cause. Technically a dislocation is not a hard tissue injury because, although the bone is displaced, it is not damaged. The real damage is to ligaments that have been stretched or ruptured. In a dislocation, the bone actually comes out of the joint and remains out until it is physically reinserted. Dislocations should not be put back in place except by a qualified practitioner, as more damage can occur if the placement is incorrect.

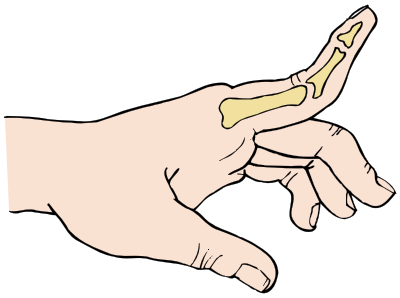


Figure 11.16: Impact on the end of the finger can be enough to cause dislocation.

The common signs and symptoms of dislocation are:

- deformity and swelling
- pain and tenderness
- loss of function.

Finger dislocations occur most often in contact sports. If the finger is dislocated it usually looks as if it is out of its normal position. Management requires:

- securing with a splint to fully immobilise the injury
- ice, elevation and support using a bandage
- immediate medical attention.

When treating a dislocation, follow these guidelines.

- Never attempt to relocate the displaced bone as this might increase the damage.
- Seek medical attention.

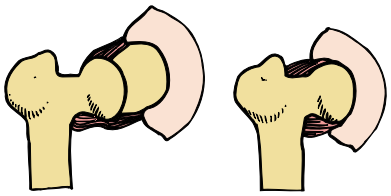


Figure 11.17: With a subluxation, the bone 'pops out' and 'pops in'.

Sometimes a bone might momentarily 'pop out' and quickly return to place. This is called a *subluxation*. Although it stretches the ligaments, it may not cause additional damage at the time. However, the joint will be vulnerable and require rehabilitation and, possibly, surgery. A subluxation is illustrated in figure 11.17.



APPLICATION

Classifying sports injuries

Use a table like the one below to summarise the ways to classify and manage sports injuries. An example has been done for you.

Classification of injury	Management	
	Example	What to do
Direct	Fracture	• Immobilise • Terminate participation in game or activity • Seek medical assistance

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See more
Dislocations

Practice HSC
exam questions

INQUIRY

Management of hard tissue injuries

Investigate the correct management of hard tissue injuries and the possible use of immobilisation procedures.

eBookplus

Use the **Sports injuries** weblink in your eBookPLUS and follow the links to assist with your investigation.

Assessment of injuries

TOTAPS is an acronym that stands for:

- talk
- observe
- touch
- active movement
- passive movement
- skills test.

It is used to assess the extent of injury to a player and determine whether or not the injured person can return to the field. If the player can complete all tasks required, they should be allowed to return to play.

However, if the player is unable to complete any one of the requirements, the player should be allowed to return to the field only after assessment from a qualified medical practitioner.

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See more TOTAPS

Practice HSC exam questions

TOTAPS

To complete the TOTAPS regime, follow these steps.

- *Talk*. Talk to the player to find out exactly what happened. This provides valuable information about the nature of the injury.
- *Observe*. Look at the injury and see if there are any obvious signs of swelling or deformity. The easiest way to assess if an area is swollen is to compare both sides of the body.
- *Touch*. Gently feel the injury for any sign of deformity or swelling and try to pinpoint the area of pain.
- *Active movement*. Ask the player to perform a range of joint movements such as flexion, extension and rotation. If these can be done without pain, then further assessment can proceed.
- *Passive movement*. The assessor physically mobilises the joint (flexion, extension, rotation) using a range of movements aimed at identifying painful areas and any instability in the joint.
- *Skills test*. In this phase the player is asked to perform a skill that is required during the game — for example, a sidestep. If the player is able to perform to the satisfaction of the assessor, then the player can return to the game.

Figure 11.18: Steps in the TOTAPS regime

Assessment can be stopped at any stage if damage is apparent; for example, if the player feels pain. In the case of minor injuries, it is often

possible to continue play. However, should there be a risk of further damage through continued play, it is advisable to remove the player from the game.

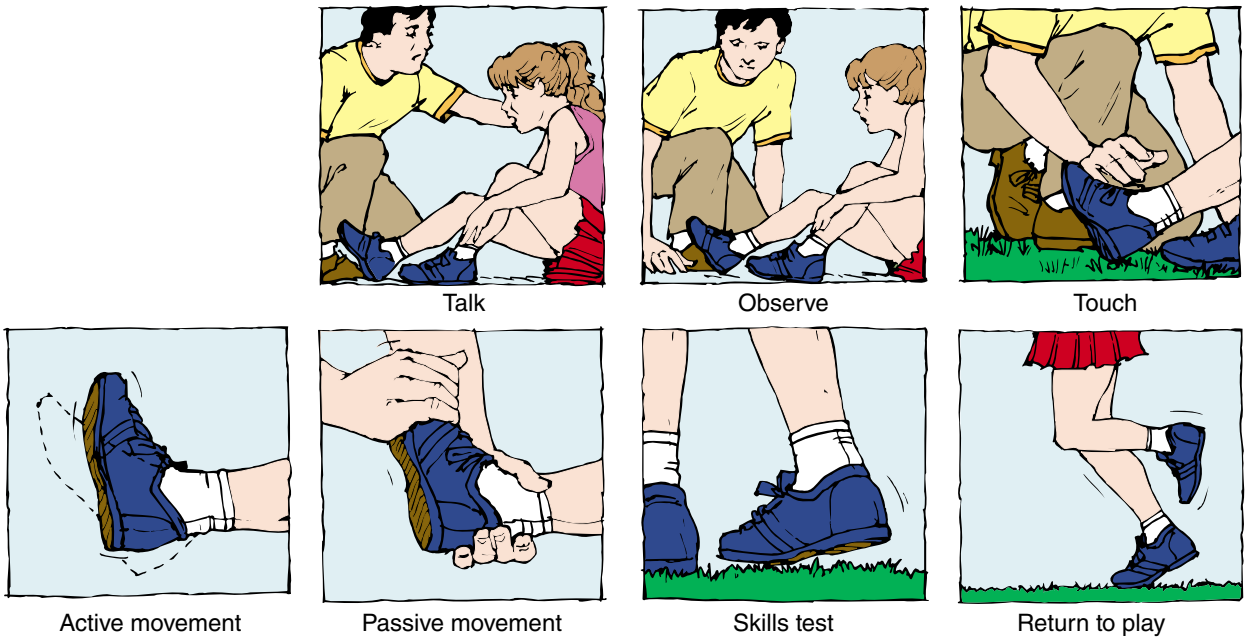


Figure 11.19: The TOTAPS regime



APPLICATION

Simulated injury scenarios

eBookplus

Use the **Sports injury management** weblink in your eBookPLUS and review what you have learned about TOTAPS and RICER. In groups of three, perform the role play activities described at the end of the document.



SPORTS MEDICINE AND THE DEMANDS OF SPECIFIC ATHLETES

CRITICAL QUESTION

How does sports medicine address the demands of specific athletes?

Children and young athletes

Children and young athletes have special needs of which sports medicine practitioners need to be aware. Some of the more important issues concern treatment of specific medical conditions such as asthma, diabetes and epilepsy; management of overuse injuries, providing advice about thermoregulation and giving guidance in resistance training programs.

Medical conditions

Sports medicine personnel need to be aware of the correct management of the medical conditions asthma, diabetes and epilepsy.

Asthma is a condition characterised by breathing difficulty where there is a reduction in the width of the airways leading to the lungs, resulting in less air being available to them.

Asthma

More than 2 million Australians (10 per cent of the population) suffer from **asthma**. While asthma may affect performance if not managed correctly, it should not be an excuse to avoid participation in sport, except in extreme cases.

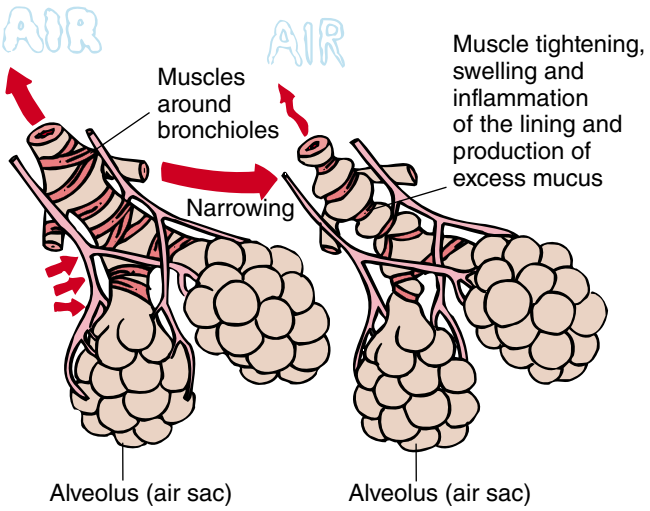


Figure 11.20: During an asthma attack, the airways leading to the lungs become narrow.

In fact, many elite sportspeople, including several Olympic gold medallists, are asthmatic. Asthma usually begins with coughing and wheezing and can lead to considerable fatigue.

Activity can provoke an asthma attack. This is called exercise-induced asthma (EIA). During this condition, the airways are dilated during the physical activity but constrict immediately activity ceases, leading to an asthma attack (see figure 11.20).

Some activities provoke more asthma attacks than others. For example, there is a significant risk of an asthma attack occurring with running, some risk with cycling and little risk with swimming. The cause is related to the cooling process of nerve endings in the air passageways, which is more extreme during running-type activity. Swimming in warm water carries far less risk, as inspired air is saturated with warmer water vapour and the nerve endings are not cooled to the same degree.

It is generally agreed that exercise is of more benefit to asthmatics than no exercise at all. Swimming is the preferred form of exercise, as the warm, moist environment is less likely to cause an attack. During breathing, air is forced out of the lungs and into the water, which improves lung function.

The following measures help sufferers work with and possibly control their asthma.

- Activity should be preceded by controlled breathing and relaxation exercises.
- Use a gradual warm-up and conclude with a leisurely warm-down.
- Exercise intensity needs to be steady.
- If medication is required, it is essential to use it before exercise.
- Adequate water must be consumed.
- If attacks are triggered by environmental factors, remove the athlete from that environment.

If first aid is required, follow the directions outlined by the National Asthma Council in the chart 'First Aid for Asthma' (see figure 11.21).

Diabetes

Diabetes is a disease in which the body does not produce or properly use insulin.

There are two types of **diabetes**. Type I diabetes is caused by the body's inability to produce insulin, whereas the more common type II diabetes is caused by the body's inability to produce sufficient insulin or use it efficiently. Insulin is produced in the pancreas and is important in the metabolism of carbohydrates. The condition leads to high blood glucose levels.

Until recently, children with diabetes were discouraged from participating in physical activity. However, today diabetics participate in all sports although caution needs to be exercised when considering some activities. This is explored in the inquiry 'Diabetes and sport' (page 410).

Exercise is of considerable assistance in managing diabetes. The diabetic athlete must balance insulin by way of injection, food intake and exercise if their physical performance is to be optimal. Their diet needs to be well balanced, with complex carbohydrates forming a significant portion. Because exercise increases the utilisation of sugar, diabetics require a pre-game meal to raise blood sugar levels and hourly glucose supplementation (for example, a banana) if exercise is protracted.

study on
Concept code: PDH-115
Practice HSC exam questions

First Aid for Asthma

1 **Sit the person comfortably upright.**
Be calm and reassuring.
Don't leave the person alone.

2 **Give 4 puffs of a blue/grey reliever**
(e.g. Ventolin, Asmol or Airomir)
Use a spacer, if available.
Give 1 puff at a time with 4 breaths after each puff
Use the person's own inhaler if possible.
If not, use first aid kit inhaler or borrow one.

OR

Give 2 separate doses of a Bricanyl or Symbicort inhaler
If a puffer is not available, you can use Symbicort **(people over 12)** or Bricanyl, even if the person does not normally use these.

3 **Wait 4 minutes.**
If the person still cannot breathe normally, **give 4 more puffs.**

Wait 4 minutes.
If the person still cannot breathe normally, **give 1 more dose.**

4 If the person still cannot breathe normally,
CALL AN AMBULANCE IMMEDIATELY (DIAL 000)
Say that someone is having an asthma attack.
Keep giving reliever.
Give 4 puffs every 4 minutes until the ambulance arrives.
Children: 4 puffs each time is a safe dose.
Adults: For a severe attack you can give up to 6–8 puffs every 4 minutes

If the person still cannot breathe normally, **CALL AN AMBULANCE IMMEDIATELY (DIAL 000)** Say that someone is having an asthma attack.
Keep giving reliever while waiting for the ambulance:
For Bricanyl, give 1 dose every 4 minutes
For Symbicort, give 1 dose every 4 minutes (up to 3 more doses)

HOW TO USE INHALER

WITH SPACER



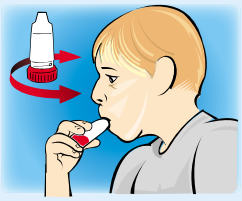
- **Assemble spacer**
- **Remove puffer cap** and **shake well**
- Insert puffer upright into spacer
- Place mouthpiece between teeth and seal lips around it
- **Press once firmly** on puffer to fire one puff into spacer
- **Take 4 breaths** in and out of spacer
- Slip spacer out of mouth
- **Repeat** 1 puff at a time until 4 puffs taken – remember to shake the puffer before each puff
- **Replace cap**

WITHOUT SPACER



- **Remove cap** and **shake well**
- **Breathe out** away from puffer
- Place mouthpiece between teeth and seal lips around it
- **Press once firmly** on puffer while breathing in slowly and deeply
- Slip puffer out of mouth
- **Hold breath** for 4 seconds or as long as comfortable
- Breathe out slowly away from puffer
- **Repeat** 1 puff at a time until 4 puffs taken – remember to shake the puffer before each puff
- **Replace cap**

BRICANYL OR SYMBICORT



- **Unscrew cover** and remove
- **Hold inhaler upright and twist grip** around and then back
- **Breathe out** away from inhaler
- Place mouthpiece between teeth and seal lips around it
- **Breathe in forcefully and deeply**
- Slip inhaler out of mouth
- Breathe out slowly away from inhaler
- **Repeat** to take a second dose – remember to twist the grip both ways to reload before each dose
- **Replace cover**

Not Sure if it's Asthma?
CALL AMBULANCE IMMEDIATELY (DIAL 000)
If a person stays conscious and their main problem seems to be breathing, follow the asthma first aid steps. Asthma reliever medicine is unlikely to harm them even if they do not have asthma.

Severe Allergic Reactions
CALL AMBULANCE IMMEDIATELY (DIAL 000)
Follow the person's Action Plan for Anaphylaxis if available. If the person has known severe allergies and seems to be having a severe allergic reaction, use their adrenaline autoinjector (e.g. EpiPen, Anapen) before giving asthma reliever medicine.

For more information on asthma visit:
Asthma Foundations – www.asthmaaustralia.org.au
National Asthma Council Australia – www.nationalasthma.org.au

National Asthma Council Australia
leading the attack against asthma

Although all care has been taken, this chart is a general guide only which is not intended to be a substitute for individual medical advice/treatment. The National Asthma Council Australia expressly disclaims all responsibility (including for negligence) for any loss, damage or personal injury resulting from reliance on the information contained. © National Asthma Council Australia 2011.

Figure 11.21: First aid procedure during an asthma attack (*Source:* National Asthma Council.)

INQUIRY

Diabetes and sport

eBookplus

Use the **Diabetes and Sport** weblink in your eBookPLUS to read the sections on diabetes management, dietary requirements and sports nutrition strategies. Summarise your findings.

Epilepsy

Epilepsy is a disruption to brain function, causing a brief alteration to the level of consciousness and resulting in seizures or fits.

Epilepsy should not prohibit people from becoming involved in sport or activity. However, the circumstances of each individual should be assessed and they should be guided by their doctor. It is generally believed that, if seizures occur on a daily or weekly basis, collision sports should be avoided. If seizures are controlled through medication or occur only during sleep, epilepsy should not prevent participation in a wide range of sporting activities. Other players, parents or supervisors should be present and know what to do if a seizure occurs. Some activities, such as swimming alone, scuba diving and rock climbing, must be completely avoided, as a seizure may go unnoticed or cause loss of control, leading to serious injury or death.

INQUIRY

Epilepsy and sport

eBookplus

Use the **Epilepsy** weblink in your eBookPLUS to answer the following questions.

1. How may sport benefit people with epilepsy?
2. List six sports that need careful consideration for people who have difficulty with seizure control.
3. What advice should be given to people who experience epilepsy and choose to play sport?

Overuse injuries

Overuse injuries occur because of repeated use of a part of the body, causing tissue damage and considerable discomfort. The injuries are subtle, developing over a period of time and recurring following brief periods of rest. In effect, the injury has not had sufficient time to heal properly. Examples of overuse injuries that commonly affect children and young athletes are stress fractures, tennis elbow, Achilles tendonitis, swimmer's shoulder and runner's knee.

Children and young athletes are susceptible to overuse injury because of different growth rates in bone and soft tissue. The most common causes of overuse injury are:

- high training volume and intensity
- high training frequency
- inadequate warm-ups
- lack of a good general level of fitness
- biomechanical problems leading to stress on particular parts of the body
- unsuitable equipment such as running shoes that do not provide proper support
- poor technique or changes in technique leading to joint stress
- strength and flexibility imbalances leading to poor body alignment.

Overuse injuries are a risk in children and young athletes who train frequently during the week and play sports on both days of the weekend. To help avoid the risk of overuse injuries it is suggested that children have days of non-training and monitor the volume and intensity of their exercise activities.

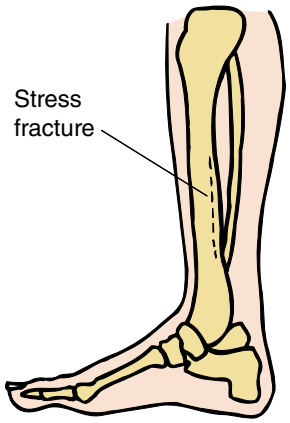


Figure 11.22: Stress fractures most commonly occur on the tibia.

One of the most common forms of overuse injury is the stress fracture. Signs and symptoms of stress fractures include:

- gradual onset of pain, which tends to be localised
- pain increasing if it is not adequately treated
- local swelling and tenderness.

A common type of stress fracture that occurs in the lower leg is shin splints (see figure 11.22).

Adequate treatment of a stress fracture requires:

- immediate rest lasting from four to eight weeks, depending on the severity of the injury
- frequent use of ice to reduce inflammation
- possible use of anti-inflammatory medication
- maintaining physical condition by pursuing activities that do not involve the injured part in pounding movements — for example, swimming
- use of corrective devices and exercises to improve body mechanics if stress fractures were caused by biomechanical factors.

Thermoregulation

Thermoregulation refers to maintenance of a stable internal temperature independent of the temperature of the environment.

Temperature control through balancing heat loss with heat gain is managed through **thermoregulation**. Children are at increased risk from environmental stress when compared to adults. Children do not have the same ability to lose heat through evaporation at the same rate as adults. This is because their sweat glands release fluid more slowly and are less responsive to temperature changes. Children therefore rely more on radiation and convection to lose heat.

Children's acclimatisation to heat is also slower, putting them at greater risk on hot, humid days. They have shorter tolerance time in extreme heat, increasing the possibility of dehydration. Research also suggests that children have a higher chance of developing hypothermia from exposure to cold when compared to adults, placing them at greater risk in these environments.

study on

Concept code: PDH-116

Practice HSC exam questions



Figure 11.23: Children and young athletes need to understand the importance of thermoregulation principles when training.

Appropriateness of resistance training

Most literature supports the use of a safe program incorporating low resistance with high repetitions through the full range of motion. A strength training program for children must be an integral part of an overall program designed to improve skill and fitness. It should not be competitive. It is important that strength specialisation (for example, focusing on power or absolute strength)

be avoided, as this can lead to imbalances between muscle groups and contribute to injury. Overall, there is considerable benefit from well-supervised programs and little risk of injury if guidelines are followed (see table 11.2).

Table 11.2: Basic guidelines for resistance exercise progression in children

Age (years)	Considerations
7 or younger	Introduce child to basic exercises with little or no weight; develop the concept of a training session; teach exercise techniques; progress from body weight calisthenics, partner exercises, and lightly resisted exercises; keep volume low
8–10	Gradually increase the number of exercises; practise exercise technique in all lifts; start gradual progressive loading of exercises; keep exercises simple; gradually increase training volume; carefully monitor toleration to the exercise stress
11–13	Teach all basic exercise techniques; continue progressive loading of each exercise; emphasise exercise techniques; introduce more advanced exercises with little or no resistance
14–15	Progress to more advanced youth programs in resistance exercise; add sport-specific components; emphasise exercise techniques; increase volume
16 or older	Move child to entry-level adult programs after all background knowledge has been mastered and a basic level of training experience has been gained

Note: If a child of any age begins a program with no previous experience, start the child at previous levels and move him or her to more advanced levels as exercise toleration, skill, amount of training time and understanding permit.

Source: WJ Kraemer and SJ Fleck 2005, *Strength Training for Young Athletes: Safe and Effective Exercises for Performance,* 2nd ed., p. 13, table 1.1 © 2005 William J Kraemer and Steven J Fleck. Reprinted with permission from Human Kinetics, Champaign, IL.



INQUIRY

Growth plate injuries

'Of all youth sports, competitive baseball is one of the greatest concerns because of its potential for serious epiphyseal injuries resulting primarily from the pitching motion.'

1. Use your research skills to investigate the nature of the epiphyseal plate and its importance to bone maturation and development. How can fractures affect body growth?
2. Investigate specific sports movements that might contribute to epiphyseal plate damage and suggest how the sport can be modified to prevent this occurring.



INQUIRY

Children and young athletes

Use an enlarged copy of the following chart to help analyse the implications of medical conditions, overuse injuries, thermoregulation and resistance training to young children and athletes playing sport.

Issue for consideration	Implications	How it should be managed
Medical conditions		
Overuse injuries		
Thermoregulation		
Resistance training		

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Practice HSC exam questions

Adult and aged athletes

The most obvious concern for adult and aged athletes is pre-existing health risks. An older person who has a history of involvement in regular aerobic-type activity will probably not be at risk to the same degree as a person who suffers from obesity, hypertension, asthma or emphysema. However, heart conditions and bone and joint mobility problems have a significant effect on the options available to adults and older people.

Heart conditions

People with heart conditions include individuals who suffer from high blood pressure, have experienced a heart attack or other heart problems, or have had bypass surgery. For many years, exercise for these groups was considered dangerous and to be avoided. It is now known that prescribed exercise conveys considerable benefit with little risk to people in these groups. Exercise reduces blood pressure in moderately hypertensive patients by an average of 11 systolic and nine diastolic points. However, to gain the maximum benefit, exercise needs to be combined with a balanced diet with low fat and low salt intake.



People with existing heart conditions should obtain medical clearance before starting an exercise program. Some people may require a stress test to determine the level of intensity their circulatory system will tolerate. Supervision may be required in the early stages, particularly if the person has been sedentary in the past.

Aerobic exercise such as walking, cycling, jogging and swimming present the best options for people who have not been active for a period of time. It is important that they begin slowly and progress gradually, using an exercise program that suits the individual, such as 30 minutes per day, three times a week. The intensity of exercise (how hard you are working) should steadily increase, then level off. This 'steady state' heart rate is considered safe as long as it is 10 or more beats per minute lower than levels that trigger abnormal signs or symptoms (nausea, shortness of breath, dizziness, abnormal heart rhythm and chest pain). This level can be determined by stress tests. It is important that each session begins with a warm-up and that progression is smooth and graded.

The key principles for sports participation for people with heart conditions are:

- initially, they require medical clearance
- exercise must be aerobic
- progress must be gradual
- activity needs to be of moderate intensity

Figure 11.24: People with heart conditions need medical clearance and must begin slowly with exercise programs.

- the program should be tailored to individual tastes
- the program must be sustainable as benefits accrue only after a period of months.

People with heart conditions can also benefit from modified strength training programs. To be safe, the light loads must be used and the program must include the major muscle groups. Heavy weights and pure isometrics are not recommended, as they can raise blood pressure to dangerous levels.

Fractures and bone density

Osteoporosis is a type of musculoskeletal condition in which there is deterioration in the bone structure. The bones become thin and weak, leading to an increased risk of bone fracture.

The most important objective of sports participation programs for people who have **osteoporosis** is to reduce the risk of falls and subsequent fractures.

Physical activity increases bone mass and makes bones stronger. Exercise is particularly important to older women because it contributes significantly to delaying post-menopausal bone density loss. Inactivity should be avoided, as this encourages calcium discharge from bone, making it weaker. Sport and exercise programs need to be safe, beneficial and not cause pain. They should focus on improved physical fitness, particularly in the areas of balance, strength, coordination, aerobic capacity and flexibility. Gains in these areas lessen pain, increase confidence and broaden the range of activities available.

However, before beginning a new activity, the risk of a fall should be noted and the activity avoided if this risk is of concern. Types of exercise and sports options available include:

- endurance activities such as walking, cycling, swimming
- low impact and balance activities such as aerobics
- low range strengthening exercises focusing on the limbs, trunk and back.

High loads must be avoided and resistance developed gradually. The advice of a doctor or physician is encouraged in this area. The aim of these options is to develop postural retraining; that is, to teach safe ways of performing movements such as lifting and to avoid further fractures. People with osteoporosis need to be guided by their physician so that medication, exercise prescription and diet all work to improve safety and bone strength (see also page 417).

study on

Concept code: PDH-118



See more
Fractures and bone density



Practice HSC exam questions

Flexibility and joint mobility

Exercise has a positive effect on flexibility and joint mobility in older people. Arthritis, aching joints and tight muscles, problems often experienced by older people, respond positively to exercise programs that focus on safe stretching and improving the range of motion in joints. Programs should also increase balance and stability and aim to reduce fractures caused by falls.

Programs need to:

- be low impact
- be specific to a person's physical limitations
- consider existing medical conditions that might limit movement.

Generally, options available to this group include activities such as walking, cycling, swimming, flexibility classes and aqua-aerobics. Tai Chi has also gained in popularity because it is safe, controlled, low impact and promotes balance.

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Practice HSC exam questions



INQUIRY

Older people and exercise

Use the **Better Health Channel** weblink in your eBookPLUS. What are the benefits of exercise for older people? Outline five suggestions that would help older people become more active.

INQUIRY

Physical activity planning for older people

eBookplus

Use the **Well for life** weblink in your eBookPLUS. Explain options, considerations and safety issues to consider when developing exercise programs for elderly people.

INQUIRY

Medical conditions and sports participation options

Research sports participation options available for aged people with medical conditions.

1. What types of activity are recommended?
2. Why are they considered safe?

eBookplus

Use the **Medical conditions** weblinks in your eBookPLUS to find information.

Female athletes

Female athletes have special dietary needs, including increased iron and calcium requirements. Iron levels are depleted by physical training and menstruation. Calcium is important in promoting strong bone growth and a sturdy structure for muscle attachments. Eating a wide variety of foods is recommended as no single food contains all the vitamins and minerals required for adequate functioning of essential body processes. Lack of energy and possible harm to the body can be caused by an unbalanced diet.

Eating disorders

Eating disorders are characterised by behaviour such as purging, binge eating and starving. The most common eating disorders are anorexia nervosa and bulimia nervosa.

It has been found that **eating disorders** affect more than half of the athletes who compete in events where low body fat and an idealised body shape and size are expected. Examples of activities where sport-specific physiques are an advantage include gymnastics, synchronised swimming, diving and dance. Running and swimming are also affected, but to a lesser degree.

Female athletes have twice the risk of developing eating disorders, which may result from:

- exposure to peer influence, magazines, television and other forms of media that make athletes susceptible to the pressures of weight loss
- exposure to social expectations to be thin within the athletic subculture; for example, the desire for an 'athletic shape'
- the need to conform to an ideal sporting image that overvalues ideal body shape, size, weight and low body fat.

Female athletes such as gymnasts and divers find themselves pressured to conform to an ideal body size and weight. In these sports, body shape is not mentioned as part of the marking criteria although the body is clearly revealed. Thinness is an advantage to artistic and technical merit, which is considered when arriving at a score. Athletes in these sports can find themselves under significant pressure and even incur serious emotional damage in trying to please coaches and judges. In the 1980s and early 1990s, the importance of having the ideal shape for a particular sport escalated, making the problem of eating disorders of increasing concern. For example, in 1976 the average height of female gymnasts was 1.6 metres and average weight was 47.7 kilograms. In 1992, the average height had dropped to 1.4 metres and average body weight to 40.0 kilograms. Concern for the welfare of very young

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female gymnasts led, in 1996, to an increase in the age at which girls can compete in international gymnastics competitions to 16 years.

To help prevent eating disorders from developing in female athletes, it is important that trainers and coaches:

- expect athletes do their best and not focus solely on winning
- be better educated to detect signs of eating disorders and use nutrition experts and counsellors to program and advise in these areas
- observe training routines and social practices such as eating and take action when suspicious behaviours are disguised or turn into an obsession
- invite parents to training sessions to observe coaches to ensure that excessive pressure is not placed on athletes to meet unreasonable dietary or body size demands.



Figure 11.25: Female athletes often feel pressure to conform to an ideal body shape, size and weight.

Iron deficiency

Anaemia is a condition in which there is an abnormally low level of haemoglobin, resulting in less oxygen being available to tissues.

Although iron is required in only small amounts, many women consume less than the recommended amount. Iron deficiency causes **anaemia**.

If haemoglobin levels drop below 11 grams per 100 mL of blood, the person is considered to be anaemic. Haemoglobin forms the bulk of red blood cells. It binds with oxygen in the lungs and transports it to the muscle tissues. While only small amounts of iron are required in the body, the mineral plays a critical role in oxygen transportation. Without sufficient iron, the number of red blood cells is reduced, limiting the oxygen-carrying capacity of the blood and the degree to which the athlete is able to participate in sport. Iron deficiency contributes to fatigue and loss of energy. The problem is more evident in females

because they usually consume less red meat and can lose from five to 40 mg of iron during menstruation. The recommended daily intake for females is very small (15 mg), but many women do not consume this level of iron.

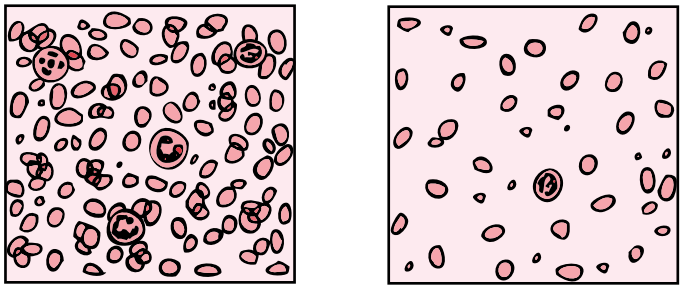


Figure 11.26: A low count in the number of red blood cells is characteristic of anaemia.



Figure 11.27: Iron deficiency may be only one of a number of problems experienced by female athletes.

Exercise-induced anaemia (sports anaemia) is common in female athletes and is believed to be the result of intense training where iron reserves are heavily drained. Some believe this is caused by loss of iron in sweat together with the destruction of red blood cells from body temperature increases. The pounding effect of feet on hard surfaces may be an additional factor. This does not mean that every female athlete needs to take iron supplements. However, it does suggest that iron levels need to be monitored constantly and increased only as required. Supplementation benefits people whose intake is below recommended levels, but is of no benefit to those whose intake is satisfactory. Indiscriminate use of iron tablets can cause iron levels to reach toxic amounts and contribute to liver disease, diabetes, heart problems and joint damage.

Bone density

Bone density is directly related to the quantity of calcium in the bones. Bones that lack calcium are susceptible to fractures and structural weakening. This may happen in the spinal cord for example, which contributes to a hunchback. Calcium is regulated by the parathyroid glands, which control how much calcium is stored in the bones and how much will be released to the body. If the parathyroid glands become overactive, calcium from bone tissue is released to the bloodstream, causing bones to become brittle and contributing to a condition called *osteoporosis*. Bone is strongest when a person is in their twenties, with deterioration beginning in the mid-thirties. Following menopause, women lose calcium faster than men and some may require a form of oestrogen therapy.

The female athlete needs to be aware of how bones will be affected by age, particularly post-menopause. Women beginning sports programs should focus on safety in activity and choose aerobic sports such as swimming, cycling, running and aerobics. Female athletes in continuing programs need to be aware of the effect of age and menopause on bone density. A well-balanced diet with adequate calcium-enriched foods, such as milk and cheese, is recommended. For women with osteoporosis it is important that activity includes a warm-up, progresses to stretching and that ice is used on inflamed or arthritic joints to prevent swelling and soreness.

Pregnancy

For some time it was thought that exercise caused excessive stress to the mother and the foetus. Most research now shows that sustained, moderate exercise

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Figure 11.28: During pregnancy, moderate exercise can help to prevent excessive weight gain and maintain fitness.

creates no more stress to previously active, healthy women than the stress of weight gain. Furthermore, exercise regularly performed improves cardiovascular fitness. Moderation is the key, particularly if there is restricted placental blood flow that could place the foetus at risk. Pregnant women should exercise in the cool of the day and consume adequate water to avoid thermal stress, which can affect foetal development. It is easier to control these factors in self-regulated exercise programs than in competitive sports, which may have regulations regarding participation by pregnant women.

In an uncomplicated pregnancy, regular moderate exercise can have considerable benefits, including:

- maintenance of fitness and general well-being
- weight control in later stages of pregnancy
- improved muscle tone.

INQUIRY

Challenges faced by female athletes

Choose one of the following conditions that may be experienced by female athletes: eating disorders, iron deficiency, decreasing bone density, or pregnancy. Critically analyse how the condition affects sports performance and what can be done to better manage the condition. Discuss your findings with the class.

INQUIRY

Iron — are you getting enough?

eBookplus

Use the **Iron — are you getting enough?** weblink in your eBookPLUS. Investigate why athletes are more at risk and how iron deficiency can be treated.

INQUIRY

Addressing the demands of specific athletes

Draw a web or bubble map to summarise responses to the following critical question: 'How does sports medicine address the demands of specific athletes?'

PREVENTATIVE ACTION — ENHANCING THE WELL-BEING OF THE ATHLETE

CRITICAL QUESTION

What role do preventative actions play in enhancing the well-being of the athlete?

The well-being of an athlete can be enhanced by developing skills that contribute to personal safety and taking preventative action in training and competition environments. While most injuries do not require surgery, some injuries do require hospitalisation (see figures 11.29 and 11.30) and can keep the athlete from training and playing for some time. However, many of these injuries are preventable through preparation.

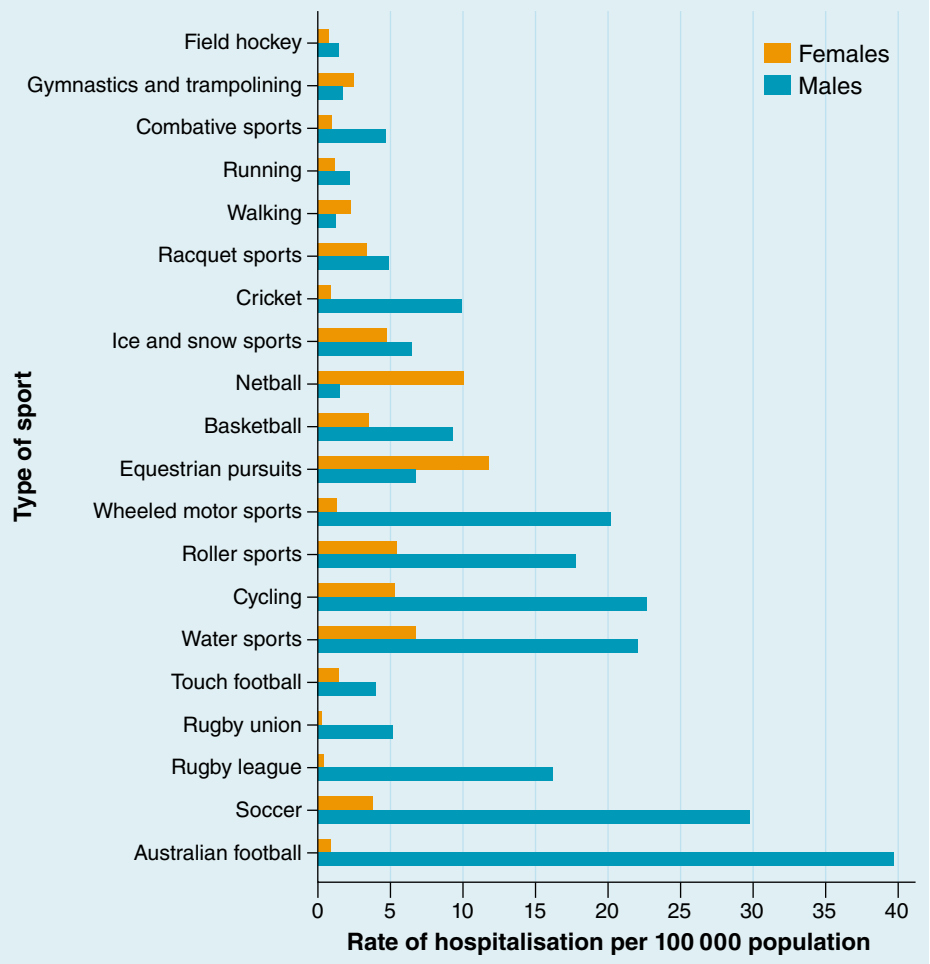


Figure 11.29: Hospitalisation rate per 100 000 population due to sport and recreation injury, by sex, Australia, 2002–03 (*Source: Hospitalised Sports Injury, Australia 2002–03*, cat. no. INJCAT 79, AIHW, Canberra, March 2006, p. 13.)

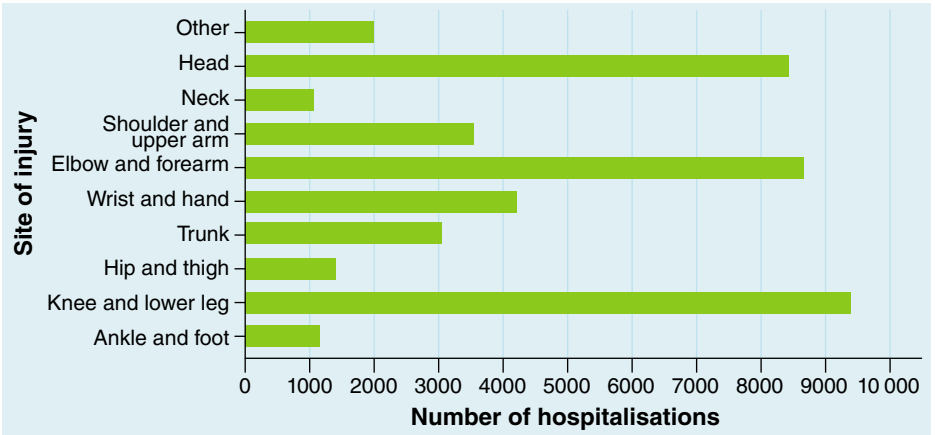


Figure 11.30: Number of hospitalisations due to sport and recreation injury, by principal body region injured, Australia, 2002–03 (*Source: Hospitalised Sports Injury, Australia 2002–03*, cat. no. INJCAT 79, AIHW, Canberra, March 2006, p. 15.)

INQUIRY

Analysing injury statistics

1. Examine the graph in figure 11.29. Choose three sports from the list and, for each sport, comment on:
   (a) the rate of injuries that require hospitalisation
   (b) the rate for females compared with males
   (c) possible reasons for the above.
2. Examine the graph in figure 11.30. Describe the main areas of the body where most injuries occur. Suggest measures that might prevent some of these injuries.

Physical preparation

Physical preparation enables the body to better cope with the demands of the sport or activity. The athlete undertakes training sessions that stress physiological capacities, making them adapt to the pressures required in the competitive environment. This may involve activities such as resistance training, interval training and general conditioning.

Pre-screening

Pre-screening assesses the health status of a person before they become involved in a training program.

Before beginning a training program, it is essential that subjects at risk be **pre-screened**. Age, gender, health status and previous experience are important criteria in the screening process. For example, a person who wishes to begin a program at the age of 40 years and who has a history of active involvement in fun runs and other aerobic activities such as soccer will not have the same elements of risk as an older, obese, unfit person. Pre-screening is especially important for:

- males more than 40 years of age
- females more than 50 years of age
- asthmatics
- people who smoke, are obese or who have high blood pressure
- people with a family history of heart conditions.

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Practice HSC exam questions

An example of a pre-exercise screening questionnaire is given in figure 11.31 (page 421). This example is promoted by Sports Medicine Australia as a tool for:

- identifying people who are at high risk of acute cardiovascular problems (see stage 1). These people must first obtain medical clearance before commencing aerobic exercise or training.
- identifying people at low or moderate risk (see stage 2).

A tailored exercise program, sometimes under medical supervision, can then be devised to suit their needs.

An **exercise prescription** specifies what we need to do to achieve a desired level of fitness.

Pre-screening is also a tool for encouraging people to begin and maintain an exercise program using an **exercise prescription**. By understanding their limitations and with guidance on appropriate levels of exercise, people can avoid muscle soreness and losing motivation, which can occur if they do too much too soon.

An exercise prescription specifies:

1. how often we should work (frequency)
2. how hard we should work (intensity)
3. for how long we should work (time/duration)
4. the kind of work we can do (type).

Stage 1 Questionnaire

Name:	**Age:**	**Gender: M F**	
Address:			
Phone:	**Date:**		
1	Have you ever had a heart attack, coronary revascularisation surgery or a stroke?	No	Yes
2	Has your doctor ever told you that you have heart trouble or vascular disease?	No	Yes
3	Has your doctor ever told you that you have a heart murmur?	No	Yes
4	Do you ever suffer from pains in your chest, especially with exercise?	No	Yes
5	Do you ever get pains in your calves, buttocks or at the back of your legs during exercise which are not due to soreness or stiffness?	No	Yes
6	Do you ever feel faint or have spells of severe dizziness, particularly with exercise?	No	Yes
7	Do you experience swelling or accumulation of fluid about the ankles?	No	Yes
8	Do you ever get the feeling that your heart is suddenly beating faster, racing or skipping beats, either at rest or during exercise?	No	Yes
9	Do you have chronic obstructive pulmonary disease, interstitial lung disease, or cystic fibrosis?	No	Yes
10	Have you ever had an attack of shortness of breath that developed when you were not doing anything strenuous, at any time in the last 12 months?	No	Yes
11	Have you ever had an attack of shortness of breath that developed after you stopped exercising, at any time in the last 12 months?	No	Yes
12	Have you ever been woken at night by an attack of shortness of breath, at any time in the last 12 months?	No	Yes
13	Do you have diabetes (IDDM or NIDDM)? If so, do you have trouble controlling your diabetes?	No	Yes
14	Do you have any ulcerated wounds or cuts on your feet that do not seem to heal?	No	Yes
15	Do you have any liver, kidney or thyroid disorders?	No	Yes
16	Do you experience unusual fatigue or shortness of breath with usual activities?	No	Yes
17	Is there any other physical reason or medical condition, or are you taking any medication(s) which could prevent you from undertaking an exercise program, or that you are concerned about?	No	Yes

Stage 2 Age and Risk Factors

Stage 2A:

- *Is the client in the 'older' age category (45 years and over if male; 55 years and over if female)?*

If 'yes', the client is in a *moderate risk* group due to their age; the client does *not* need medical clearance before beginning a low–moderate intensity exercise program; the client can undertake low–moderate intensity submaximal aerobic fitness testing.

Stage 2B:

- Does the client smoke cigarettes regularly or have they quit smoking in the last 6 months?
- Does the client have a first male relative (father, brother, son) or female relative (mother, sister, daughter) who has had a myocardial infarction, coronary revascularisation, or died suddenly due to a heart attack before the age of 55 years (males) or 65 years (females)?
- Does the client have impaired fasting glucose (equal to or greater than 6.1 $mmol.L^{-1}$ on two separate occasions)?
- Does the client have systolic blood pressure measured greater than or equal to 140 mmHg on two separate occasions, *or* diastolic blood pressure measured at greater than or equal to 90 mmHg on two separate occasions, *or* are they on antihypertensive drugs?
- Does the client have a total serum cholesterol concentration of greater than 5.2 $mmol.L^{-1}$ or HDL less than 0.9 $mmol.L^{-1}$ or is the client on lipid-lowering medication?
- Does the client have an occupation where they are seated for long periods *and* they do no regular exercise, *or* does the client not meet current PA guidelines of 150 min of moderate PA per week?
- Is the client obese (BMI greater than or equal to 30) or do they have a waist girth greater than 100 cm?

If the client has *two or more risk factors* as identified from the questions in Stage 2B, the client is in a *moderate risk* group; the client does *not* need medical clearance before beginning a low–moderate intensity exercise program; the client can undertake low–moderate intensity submaximal aerobic fitness testing; the client *does* need medical clearance before beginning a vigorous exercise program or undertaking aerobic fitness testing to vigorous intensity levels.

Figure 11.31: Pre-exercise screening (*Source:* Adapted from Sports Medicine Australia pre-exercise screening system 2005, www.sma.org.au.)

APPLICATION

Assessing risk factors

1. Complete the questionnaire in figure 11.31, stage 1.
2. From the information in figure 11.31, stage 1, establish if you would need medical clearance before you started an exercise program.

INQUIRY

Using the information in the pre-exercise questionnaire

Many of the conditions mentioned in figure 11.31, stage 2, may not be relevant to you at this point in your life. Suggest those that may be of concern in 20 years time (for example, blood pressure). What could you do to prevent these conditions developing?

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Concept code: PDH-123

Practice HSC exam questions

Skill and technique

Skill and technique relate to the efficiency with which we perform the required activities. Skilful players perform difficult movements with ease and precision. They display a high degree of *temporal patterning* (the smaller parts of the movement are executed in sequence), *pacing* (movements are precisely timed) and *control*. These features are acquired and developed through effort and practice.

Correct skill development is essential to prevent injury. The footballer who is unsure of correct tackling technique is at risk each time they make a tackle. The basketballer who is unable to rebound competently places his or her knees at risk of injury with each landing. Wrestlers who have inferior falling techniques risk injury each time they are thrown on the canvas. Most people appreciate the importance of skill acquisition to improved performance. It is equally important in the prevention of serious injury.

study on

Concept code: PDH-124

Practice HSC exam questions

Physical fitness

A most important preventative action in enhancing the well-being of athletes is to ensure that the level of physical fitness required by the sport is attained before full competition begins. Physical fitness has a range of attributes and the quantity required of each depends on the type of sport or activity. Some sports such as rugby require superior cardio-respiratory fitness together with high levels of strength, power, speed, endurance and agility depending on the position played. Other sports such as gymnastics require less cardiorespiratory fitness but more flexibility, coordination and balance while being aware of body composition.

Lack of development of the appropriate level of fitness for a particular sport is a major contributing factor to injury. A level of physical fitness fitting to the sport ensures that energy supplies are adequate and body systems are able to meet the demands of what is required in the activity.



Figure 11.32: Attaining a physical fitness level appropriate to the sport is important in injury prevention.

study on

Concept code: PDH-125

Do more
Warm-up, stretching and cool-down

Practice HSC exam questions

Warm-up, stretching and cool-down

Adequate warm-up, stretching and cool-down are important in enhancing performance and preventing injury.

Warm-up

Warm-up and cool-down are probably the most important injury prevention features of any training program. It is uncommon to see teams take the field without warming up. However, it is common to see inappropriate warm-ups. Cool-downs are often neglected.

As with all training programs, the warm-up needs to be geared to the demands of the sport. The time taken for warm-up varies depending on the activity. While it is not uncommon for sprinters to warm up for 45 minutes prior to a 10- to 12-second event, 20 to 25 minutes is often enough for sports such as touch football and netball. As a general rule, sports that require explosive movements such as sprinting, discus throwing and gymnastics require a longer warm-up than other activities where the prime demand is endurance (for example, cycling).

Warm-ups cause redistribution in blood flow. When we are not exercising, most of our blood is located in the internal organs where it aids digestion and circulation. However, activity causes blood to be drawn to the skeletal muscles where oxygen and nutrients are needed by the cells to enable muscle contraction. Higher muscle temperatures increase the ability of the muscle to stretch without tearing and improve the time that it takes a muscle to respond to a stimulus (reflexes). This is associated with positive psychological feelings — the knowledge that the muscle will respond at the time because it has already done so. The same responsiveness does not occur in muscles that have not been warmed up.

The phases of the warm-up, suggested activities and benefits are listed in table 11.3.

Table 11.3: Phases of the warm-up and associated benefits

Phase	Nature	Suggested activities	Benefit
1	General body warm-up	Jogging and skipping	• increased blood flow • raised muscle temperature
2	Stretching	Static stretches followed by PNF stretches	• increased elasticity • increased muscle extensibility
3	Callisthenics	Push-ups, abdominal crunches, half squats, star jumps	• strengthens muscle • draws blood from internal organs to skeletal muscle
4	Skill rehearsal	Drills and routines	• increased agility • game readiness • maintenance of body temperature

Stretching

Muscles lose elasticity with age, so everyone should participate in a general stretching program at least four or five times per week. However, sportspeople are unique and require additional, specific flexibility according to the demands of their particular sport. Muscles need to be stretched beyond the



Figure 11.33: A static stretch of the quadriceps muscle group

range required of them in the sport prior to the performance. This is achieved by a safe stretching program using the following types of stretch.

- *Static stretches* — a muscle or group of muscles is gradually stretched beyond their normal range and the stretch held for about 30 seconds (see figure 11.33).
- *Proprioceptive neuromuscular stretching (PNF)* — often performed with a partner, although this is not essential. A static stretch is followed by an isometric contraction and a relaxation phase in the lengthened position (see figure 11.34). The procedure continues until the desired amount of stretch is complete.

Stretching programs must be specific to the needs of the sport. The muscle groups that have greatest demands placed on them during the performance require specific attention. For example, a high jumper will stretch all major muscle groups in preparation for competition, but will give additional and specific attention to the calf and thigh muscle groups as the demands on these is greatest.

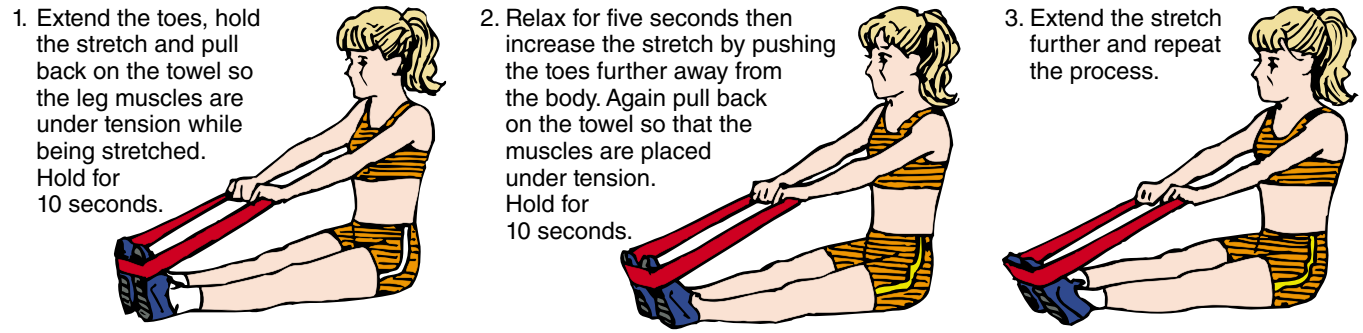


Figure 11.34: Example of PNF stretching: static stretch followed by isometric contraction

Cool-down

The cool-down (recovery) is the period following competition or physical activity where body temperature, circulation and respiratory rates return to their pre-exercise state (or as close to this state as possible). The cool-down is essential to:

- *maintain the stretch in muscle groups* that may have shortened during the activity. For example, the leg muscles of a cyclist may shorten if the legs do not reach full extension during pedalling.
- *disperse lactic acid* that has built up during exercise. Exercise recovery as opposed to rest recovery results in a more effective dispersal of lactate.
- *prevent blood pooling.* A gradual reduction in heart rate reduces vasodilation (supply of blood to the working muscles) and the tendency of blood to 'pool' in muscles that have been heavily worked.

An adequate cool-down involves stretching for approximately 10 minutes, performing callisthenics, and finishing with a gross motor activity such as a light jog or swim. This is the reverse of the warm-up. However, it is not as intense and need not go for the same period of time. To be effective, the cool-down must emphasise stretching (see figure 11.35, page 425), but need not include an extensive range of activities specifically related to the game skills.



INQUIRY

Preventative strategies

Choose three different sports. For each sport, investigate strategies used to enhance physical preparation aimed at injury prevention.

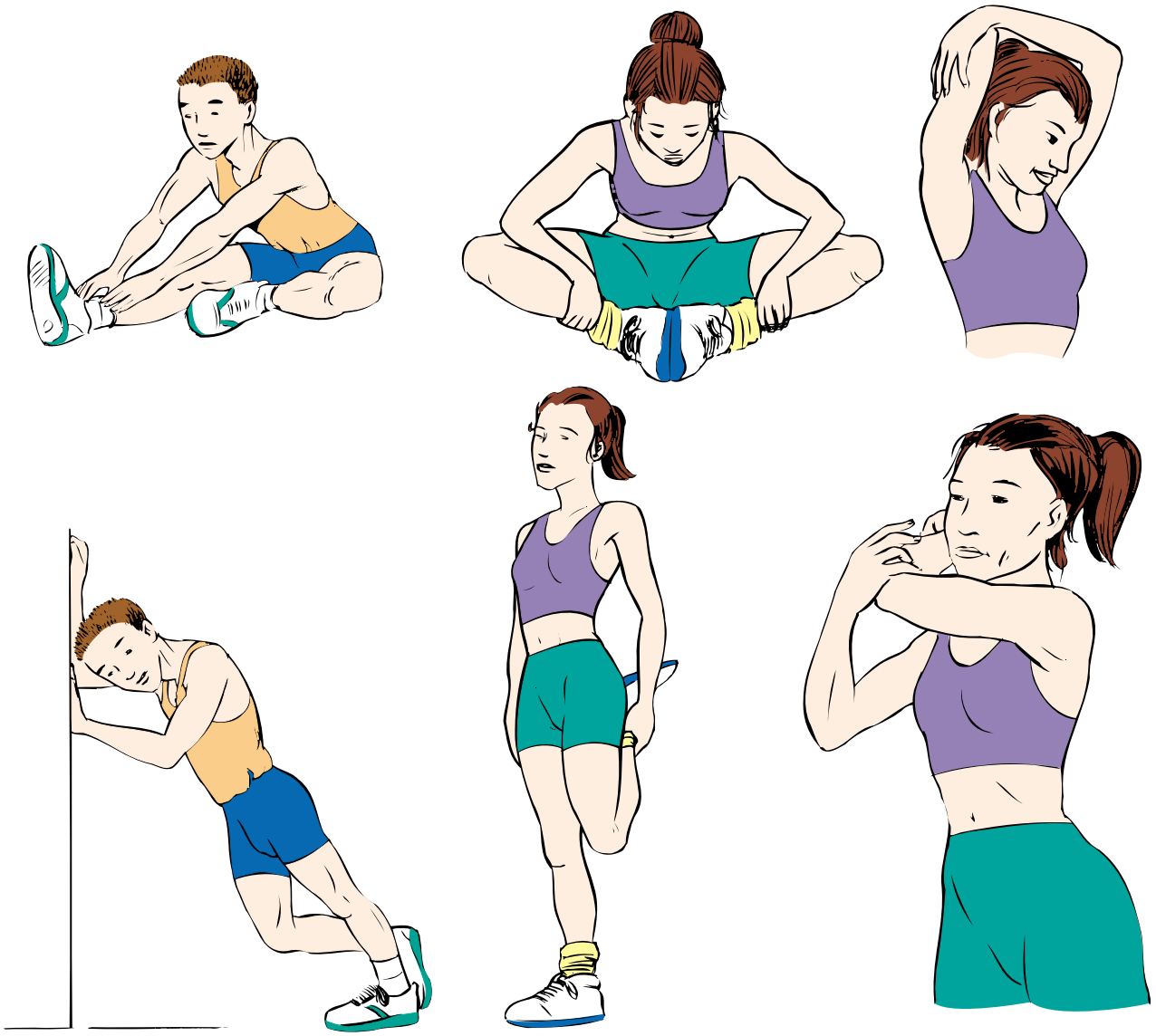


Figure 11.35: Examples of stretches that can be performed as part of a warm-up or cool-down routine

Sports policy and the sports environment

Sports policy, rules of the game and equipment may need to be the subject of discussion and careful review if it is to improve the safety and well-being of athletes.

Rules of sports and activities

The rules of a sport assist the flow of play and protect participants from injury. Rules are enforced on the field by the referee or umpire and promote safety within the game. Injury has the potential to cause temporary and even permanent disability, so rule infringements must be dealt with. In collision sports, such as rugby league and rugby union, there is considerable potential for injury. This potential is significantly increased in the execution of common but illegal movements, such as the head-high tackle. As a result, both codes have well-defined rules stating what constitutes dangerous activity and a range of penalties to punish the offence.

Similar situations exist in other sports and activities. Marathon runners are obliged to consume fluid during their event to prevent heatstroke. Hockey

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Concept code: PDH-126
Practice HSC exam questions



Figure 11.36: Compliance with rules in sporting competitions helps enhance the safety of athletes.

goalkeepers must wear protective gear before being allowed to take the field of play. Softball catchers must wear face masks when they are in the catcher's position behind the batter. There are many other examples of rules that have been established to protect players from injury. It is essential that athlete safety is of the highest priority. Apart from the personal distress to the individual, many clubs have invested a lot of money in their players and do not wish to see them sidelined due to injury that could have been avoided. In rugby league, for example, it is not uncommon for the National Rugby League Judiciary to take legal action against players who cause injury to other players through violence or disregard for the rules.

Modified rules for children

Major modifications have been made to junior sport at most levels to accommodate the specific needs of children. Examples of changes include:

- lowering the backboard and ring in basketball and the ring in netball to enhance the chance of successful shooting
- using T-ball stands in softball to make contact with the ball easier
- modifying equipment and distances in Little Athletics to promote success
- simplifying the rules in most sport, so children require only a basic understanding to participate
- awarding trophies and certificates for achievements other than winning — for example, participation and effort.

Changes such as these are essential to encourage children to take part and continue in the activity. Children should not be seen as little adults, capable of using adult equipment on courts and fields marked for adults. Children, because of their stature and limited capabilities, have very specific needs in terms of equipment size, court dimensions, rules and playing environment. When this is suited to their needs, it adds to their potential to learn skills and enjoy sport as a willing participant. If children see themselves as failures in a particular activity, they will not continue. Both the rules and the environment need to promote enjoyment, involvement, continuity in the sport and safety.

INQUIRY

My experience with modified sports

Discuss the extent to which your school and sports club (if applicable) modified equipment, grounds or facilities to cater for your needs when you were younger.

Matching of opponents

To promote safety, it is desirable to match children with others of comparable size. While the risk is higher in contact sports such as rugby, size variations do make a difference in sports such as hockey and cricket, where larger children may be able to hit harder or bowl faster. The problem is difficult to address because most schools and junior sport controlling bodies match teams on age. This is convenient because birth certificates are readily available. However, there can be vast differences in physical maturity between individuals of the same age.

INQUIRY

Class debate

Debate the merit of selecting junior teams that play contact sports, such as rugby or Australian rules, based on their physical size rather than age.



Figure 11.37: The type of sport played is an important consideration in matching opponents.

Competitions that are even are desirable at all levels of junior sport. Consideration should be given to the size, age, gender, strength, psychological development and skill level of competitors. When competitions are even, skills are matched and interest is heightened. However, if competitions are uneven, non-competitive sides quickly lose interest. In junior sport, it is relatively straightforward to establish an even competition if winning is not the major goal and all players receive the same award at the end of the game. This promotes much more desirable behaviour, as players are able to match their skills against opponents of similar ability and enjoy competition for its own sake, not solely to win.

Use of protective equipment

Protective equipment is essential for players in most team sports. Ground surrounds and equipment must also be safe. Many sports make provision for the use of protective equipment. All protective equipment must:

- adequately protect the wearer and other players
- allow freedom of movement
- allow air flow as required
- be comfortable.

Examples of protective equipment commonly used in games include:

- mouthguards, which are used in sports such as basketball and football
- helmets, such as those used in cricket and cycling
- face masks, such as those used in baseball and softball
- padding (shin, shoulder, chest, thigh) as used in cricket, football and hockey
- wetsuits for surfing
- sunglasses, such as those commonly used in cricket and golf
- hats to protect the face, ears and neck from potentially damaging ultraviolet rays
- gloves for hand protection in cricket and softball.

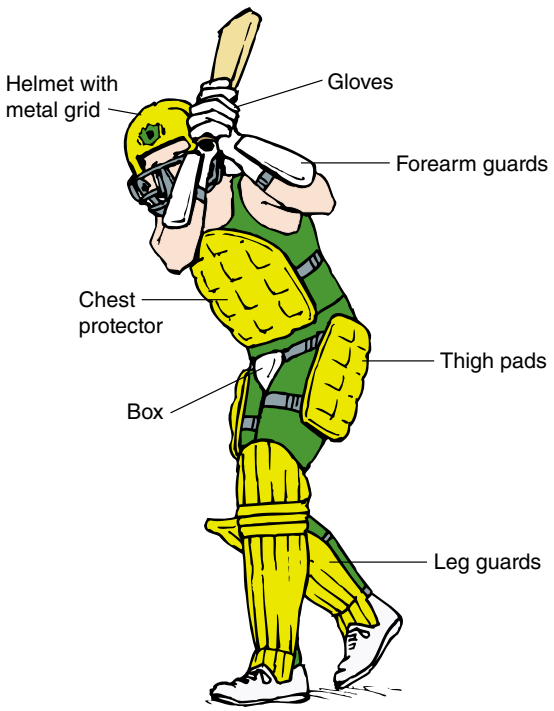


Figure 11.38: Where there is a risk of injury from impact, protective equipment should be worn.

Good quality equipment is important for athlete safety. Equipment that costs more usually has been rigorously tested. The higher the risk of injury from impact in a sport or activity, the more important the need for equipment that is safe and reliable. In cricket, for example, where the ball can be bowled at considerable speed, the helmet is designed to protect the batsman from injury by a high-rising ball (see figure 11.38). The design of the helmet is crucial to the safety of the batsman. A gap that is too big and allows entry of the ball between the mask and metal grid, or a mask frame that breaks or bends on impact would leave the player at considerable risk. In sports and activities where the danger is highest and the risk of injury from equipment failure potentially serious, it is essential to use equipment that is rigid, supportive and reliable.

Footwear is both supportive and protective. Inappropriate footwear can lead to blisters, calluses and even structural deformities. Sports shoes are, and should be, unique to each individual sport. This is because different sports place different stresses on the foot. Football entails a lot of sidestepping on a grass surface, so there is a need for support (in the form of sprigs) to assist changes

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of direction. Basketball places different demands on footwear, requiring shoes that can grip a polished floor while the player performs agility skills and provide cushioned support when the player lands after a rebound.

The most popular sports shoe is that used for cross-training (a general purpose training shoe; see figure 11.39). Comfort is enhanced and injury is most likely to be prevented if the shoe:

- is comfortable but not too tight
- is firm when socks are worn, but does not cramp the toes
- is flexible where the toes bend
- has a high heel to support the Achilles tendon
- has a midsole that is soft but sturdy and is capable of absorbing impact
- has a supportive heel counter that is firmly attached to the sole
- has built-in support for the arch of the foot
- has a quality, non-slip sole.



Figure 11.39: The quality sports shoe has many features that promote safety and ensure comfort.

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Safe grounds, equipment and facilities

Player safety is of paramount concern on all sporting occasions. It is the responsibility of the organising group to ensure that every effort has been made to match facilities to safety expectations. *Safety Guidelines for Children in Sport and Recreation*, by Sports Medicine Australia, recommends that an appropriate club or association official follow these guidelines when preparing for play.

- Ensure the playing surface is in reasonable condition, without holes, exposed sprinkler heads or hard patches.
- Clear away all rubbish, especially broken glass, stones and lids from bottles and cans.
- Check that corner posts and other field posts cannot injure players on contact (these should be made of cardboard or similar material).
- Ensure permanent fixtures such as goal posts are padded.
- Ensure perimeter fences are well back from the playing area.
- Ensure spectators, unnecessary equipment and vehicles are kept well back from the sidelines.
- Ensure lighting is adequate if playing at night.
- Ensure adequate matting where necessary — for example, in gymnastics.

Equipment must be checked each time before being used. According to *Safety Guidelines for Children in Sport and Recreation*, all equipment must be:

- suited to the size and ability of the child
- regularly checked and maintained
- sufficient in number
- padded appropriately
- stable or movable if necessary
- properly erected/constructed.

The design of fields, courts and general playing facilities must contribute to player safety. For example, if goals are in or close to the field of play, they must be padded. Players who go beyond the field of play through movements such as tackles must have enough room to be able to stop safely. Sponsor signs, timing devices, false start equipment and lane markers should not interfere with player movements on or off the field.

INQUIRY

School safety

Independently, conduct a safety review of your school's sporting competitions and facilities. Suggest areas, including procedures, equipment and facilities, that need to improve. Discuss your findings with the class and draft recommendations for improvement. Investigate reasons why some individuals choose not to wear available protective equipment.

INQUIRY

Safe participation in sport

1. Choose *one* contact sport (rugby league, rugby union, Australian Rules football, boxing), *one* endurance sport (cycling, triathlon, marathon running) and *one* bat/ball sport (cricket, hockey, softball).
2. Critically analyse the specific rules in the three chosen sports that relate to safe participation. Report your findings to the class and discuss.
3. Comment on instances when you feel player safety may be exploited at the expense of entertainment or performance.

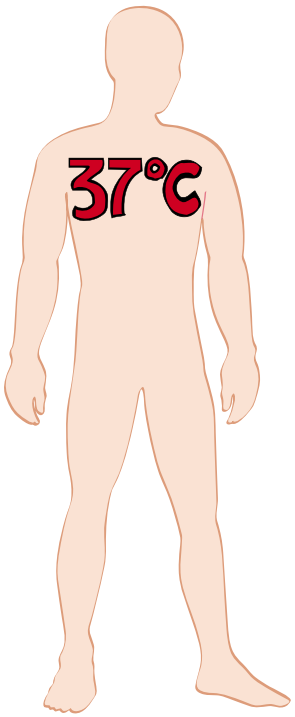


Figure 11.40: Body temperature = core temperature = reference temperature = 37 °C

Environmental considerations

Some environmental conditions, such as excessively high or low temperatures, humidity, wind and cold may place the athlete at risk. In some cases, climatic changes can occur quickly leaving the athlete unprepared. However, in most cases, athletes are aware of impending extremes within particular climatic zones and are able to take necessary precautions.

Appropriate hydration is probably the most important factor that needs to be considered in the case of endurance work. Lack of adequate fluid not only impairs performance but also could lead to serious health consequences. Athletes need to understand the basic principles of how the body regulates temperature and implement strategies for effective temperature control.

Temperature regulation

Our normal body temperature (the reference temperature) is 37 °C. This is the temperature inside the body (the core). It remains at 37 °C because a balance exists between the heat being produced by the body as a result of metabolism

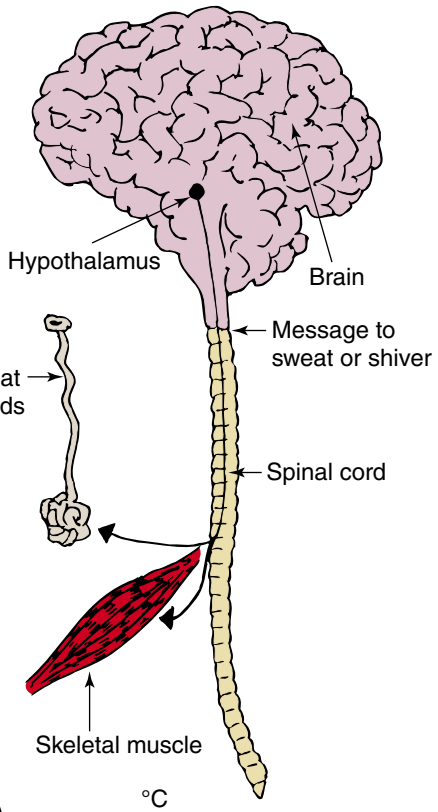


Figure 11.41: The hypothalamus sends messages to the body when the body temperature increases or decreases.

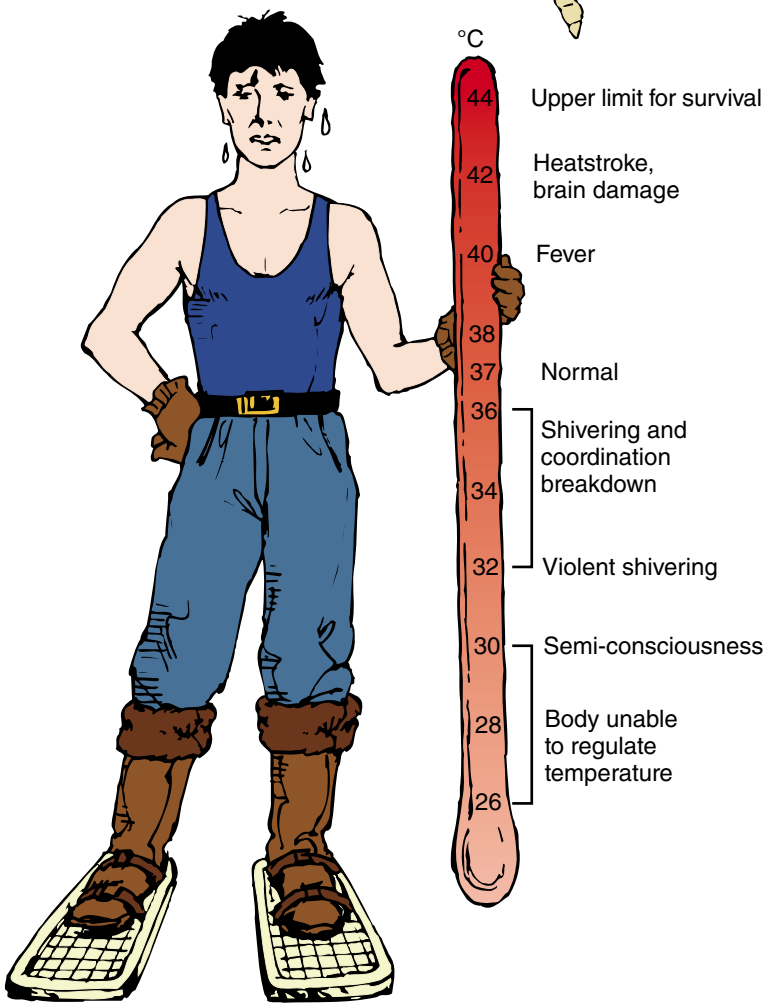


Figure 11.42: Physical reactions to abnormal body temperatures

and muscle action and being dispersed by the body through specialised heat loss mechanisms, namely, *convection*, *radiation*, *conduction* and *evaporation*.

The hypothalamus, which is located in the brain, is the body's thermostat. It reacts when the body's temperature goes above or below its 'set point' of 37 °C (see figure 11.41).

A small drop in body temperature, for example, may cause a person to shiver, which is an involuntary muscle action that raises body temperature. Figure 11.42 illustrates body responses that result from changes in core body temperature.

In healthy individuals, body temperature is kept within a small range despite large fluctuations in atmospheric temperature. The body continually produces and then loses heat. When the amount of heat produced is equal to the amount of heat lost, the body is in a state of heat balance. Figure 11.43 shows how the body maintains this balance.

The body has four mechanisms for losing heat. This is important during exercise as working muscles create considerable heat during contraction, which enables movement.

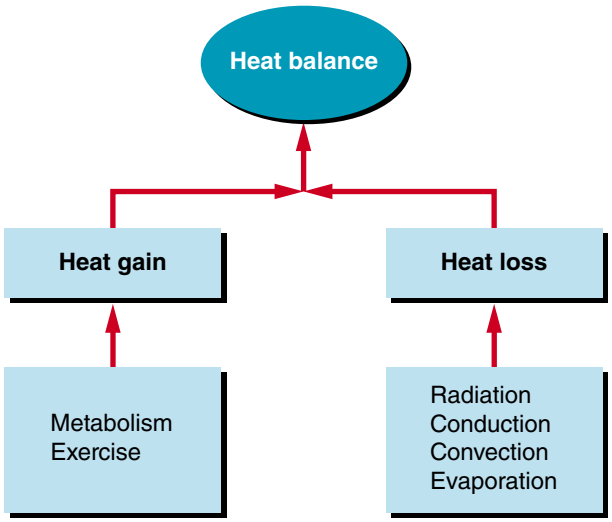


Figure 11.43: The body loses and gains heat to maintain a heat balance.

Convection

Convection is the transfer of heat away from the skin by a moving fluid such as an air current. A runner, for example, loses heat to the surrounding air as he/she moves through it. This accounts for approximately 12 per cent of heat loss at rest.

Radiation

Radiation refers to loss of heat in the form of infrared rays. During activity, our body heats and a

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considerable amount of this heat is radiated to the atmosphere. The bigger the difference between the body's heat and the environment, the greater is the radiated heat loss. At rest, radiation accounts for 60 per cent of heat loss.

Conduction

Conduction is transfer of heat from a body to an object by contact. For example, when playing tennis our feet contact the surface and conduct heat to it during the process. Heat loss occurs because a gradient exists between the body and the part of the environment with which it is in contact. When the environmental temperature is lower than body temperature, heat flows from the body. Conduction accounts for only a small amount of heat loss (approximately three per cent).

Evaporation

Evaporation refers to heat loss through sweating. The process of cooling is only effective if water evaporates. At rest, in a comfortable environment, sweating accounts for up to 25 per cent of heat loss. However, this is the major form of heat loss during endurance events and particularly if the environmental temperature is high, when heat loss through sweating can be up to 80 per cent.

Figure 11.44 illustrates how heat is lost when a person is at rest. Compare this with figure 11.45, which shows major sources of heat loss during exercise.

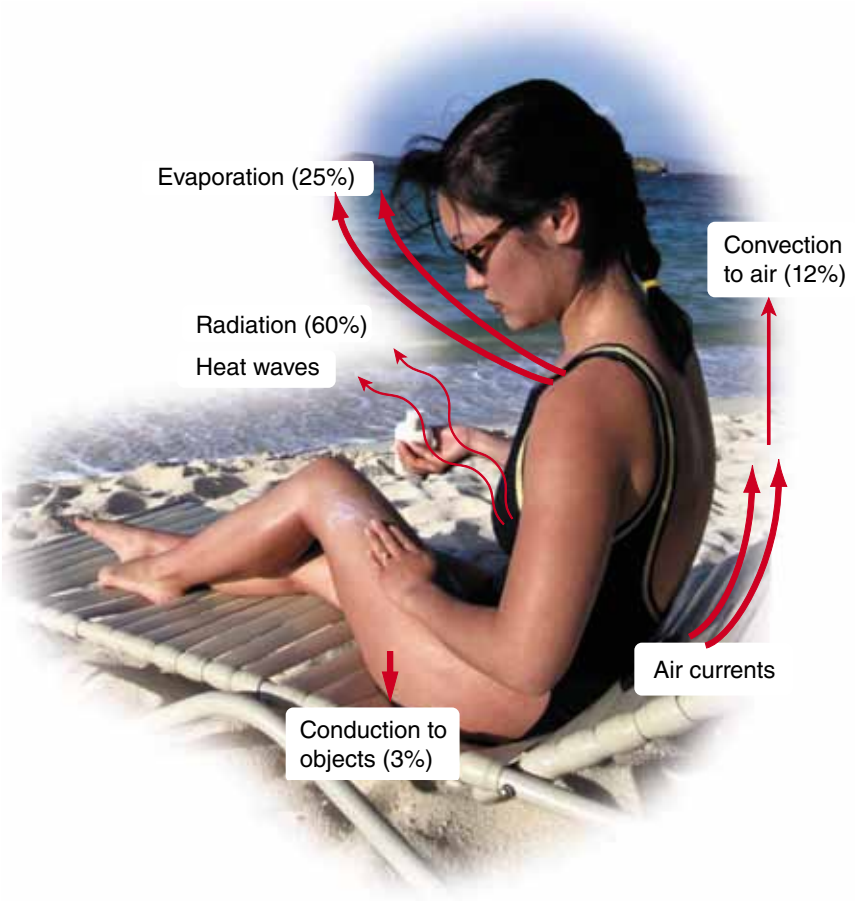


Figure 11.44: How heat is lost from the body at rest

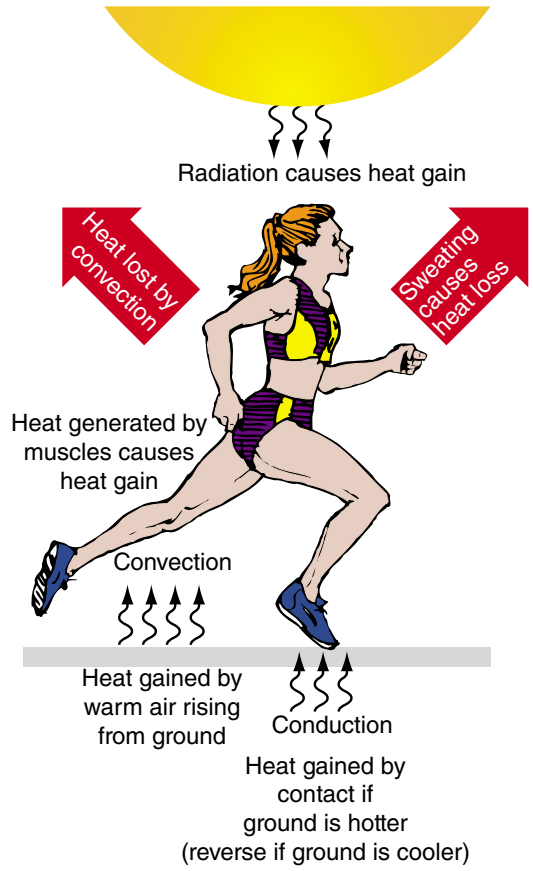


Figure 11.45: Major sources of heat gain and loss while exercising

INQUIRY

Staying cool when your body is hot

eBookplus

Use the **Thermoregulation** weblink in your eBookPLUS. Read the article 'Staying cool when your body is hot'. Evaluate the importance of adequate fluid intake in regulating body temperature during exercise.

Climatic conditions

The effect of climatic conditions, including temperature, humidity, wind, rain, altitude and pollution, need to be understood as they have the potential to affect an athlete's health and well-being.

Temperature

Performances in comfortable environmental temperatures usually do not present a problem for athletes as regular fluid intake is sufficient to avoid heat stress. However, extremes in environmental temperatures, namely excessive heat or cold require specific performance strategies to avoid **hypothermia** or **hyperthermia**.

Hypothermia is a condition characterised by body heat loss that far exceeds body heat gain, resulting in subnormal body temperature.

Hyperthermia is excessively high body temperature that is usually experienced in hot, humid conditions in which evaporation is unable to take place.

The resting body has the capacity to maintain core body temperature at 37 °C, even with an environmental temperature as high as 60 °C. However, exercise in the heat can make it difficult for the body to control its heat balance mechanism, causing the body's water requirement to greatly increase. Sustained performance in high temperatures can lead to heat stroke as increasing blood volume becomes devoted to transporting heat rather than oxygen. Together with this, the body sweats more fluid than it is able to replace through drinking. These factors alone place considerable strain on the heat balance mechanism.

Performances such as skiing, surfing, endurance running, cycling and scuba diving in cold conditions may be equally hazardous. These are conditions that cause loss of body heat to the extent that the ability to maintain heat balance is jeopardised. When the internal body temperature decreases more than one degree Celsius, it results in the activation of heat conservation mechanisms — shivering and peripheral **vasoconstriction**. Shivering increases heat production, while peripheral vasoconstriction decreases blood flow to the skin, slowing heat loss.

Vasoconstriction is a decrease in blood vessel size, causing less blood to be supplied to the area that is serviced by that blood vessel.

Athletes exercising in the cold should be aware of how much clothing is appropriate for the activity. Athletes should not overdress when exercising in cold conditions because excess clothing stimulates sweating and bulkiness can inhibit performance. The moisture quickly evaporates, taking heat with it, causing the body to rapidly cool and chill. In cold environments, athletes with higher amounts of subcutaneous fat have more protection and thereby lose heat more slowly. Children are more susceptible to heat loss than adults.

In water where the temperature is higher than 32 degrees Celsius, core body temperature can usually be maintained if the individual is active. However, in cold water, the body quickly loses the ability to conserve heat, resulting in hypothermia. The heat loss process in cold water is more rapid than when surrounded by air. The combined effect of radiation and convection reduces body temperature four times faster in liquid than in air at the same temperature. For example, in water where the temperature is 15 degrees Celsius, the internal temperature of a body reduces by approximately two degrees per hour. This sudden decline quickly causes hypothermia.

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Do more
Climatic conditions

Practice HSC exam questions



Figure 11.46: In an environment of high humidity, sweat does not evaporate easily from the body and an athlete is at greater risk of overheating.

Humidity

Environmental warmth and humidity limit the body's ability to dissipate heat. While high environmental temperatures impede heat dissipation, humidity prevents evaporation. For this reason, exercise in times of high temperature and humidity is to be avoided because it places the athlete at greatest risk.

Wind

Wind is also a factor to be considered in heat loss. The combined effect of *convection* (air movement around the body) and *conduction* (transfer of heat to objects such as clothing) contribute to wind chill. This burning sensation on the skin can be further accentuated by increased cloud and humidity. Light clothing that covers most surface areas during running and cycling, wetsuits for surfing and full-body ski suits with face goggles are examples of attire used to prevent wind chill.

Rain

While rain might assist body temperature control during performances in warm to hot conditions, it may also adversely affect safety. Rain can affect visibility and this has the potential to impact on safety. This is particularly important in events such as cycling where the combination of speed, lack of traction and poor visibility can contribute to accidents.

Altitude

For most athletes, altitude is not a significant factor in terms of safety. As altitude increases, our ability to perform physical work is affected, particularly in endurance type events. You should expect a general reduction in aerobic capacity of 3–3.5 per cent for every 300 metres you ascend above 1500 metres. However, some performances that are short in duration such as high jump may benefit due to less resistance. At high altitudes, solar radiation is stronger, so the use of sun protection strategies such as sunscreen is necessary.

Pollution

Pollution can pose a safety hazard, particularly for those who train and perform in large cities and those who suffer from asthma and cardiorespiratory problems. Pollution increases airway resistance, causing irritation to the upper respiratory tract and reduced oxygen transport capacity in the blood. The most dangerous pollutant is carbon monoxide, which binds to haemoglobin in preference to oxygen, thereby inhibiting oxygen delivery to muscles. Ozone might also create a health risk as it can cause respiratory discomfort, nausea and eye irritations.

Safety and well-being is best enhanced by avoiding cigarette smoking, avoiding exercise during rush hours in cities and trying not to exercise when humidity, temperature and traffic pollution levels are high.

INQUIRY

Climatic conditions and safe participation

eBookplus

Review the section on climatic conditions. Use the **Sports Medicine Australia** weblink in your eBookPLUS and scroll to the section 'Factors to consider before cancelling or modifying a sporting event or training'. Use the information to evaluate strategies an athlete could employ to ensure safe participation.

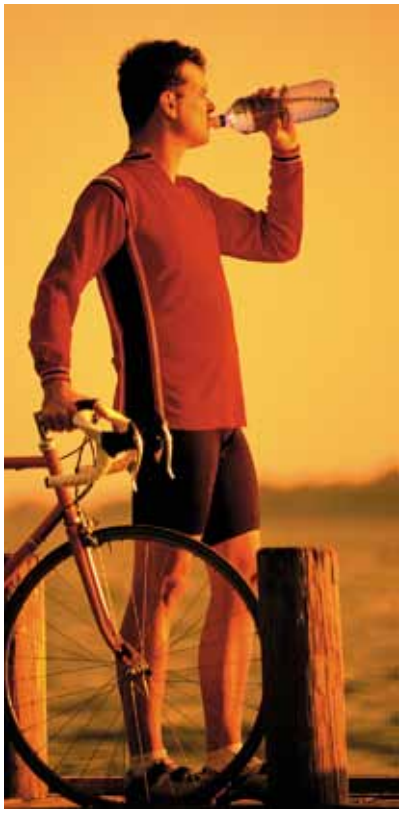


Figure 11.47: Athletes must replace body fluids to prevent dehydration.

Dehydration is an excessive loss of water.

Guidelines for fluid intake

Approximately 57 per cent of the total body weight of the average person is water. However, the loss of even a small amount can affect athletic performance. The most important cooling mechanism during physical activity is the evaporation of sweat from the body. Sweat is transported to the skin from where it evaporates (water changes into vapour), cooling the body.

The role of water in temperature regulation is critical, particularly during exercise. It is important because blood plasma is 90 per cent water. A reduction in water lowers plasma levels and causes blood pressure to decrease. This results in less blood being available to the muscles, particularly to the skin (which is the body's major heat outlet). Reduced plasma volume also affects the body's circulatory function because plasma is the medium for carrying red blood cells, nutrients, carbon dioxide waste and hormones around the body.

The effect of exercise on the body's fluid supply is to accelerate water loss through sweating, causing body temperature to rise. In response, some water is produced as the body metabolises carbohydrates to produce energy. However, local production of water, although valuable, does not keep pace with fluid loss. The loss rate can exceed the metabolic production rate by as much as 10 times. Even minimal fluid loss affects endurance performance. For distance runners, their pace falls by an estimated two per cent for each one per cent of fluid loss during an extended run.

Progressive water loss produces the following symptoms:

- one per cent loss (700 millilitres) — thirst
- five per cent loss — considerable discomfort and a decline in aerobic effort
- 10 per cent loss — a breakdown in coordination, with movements becoming difficult
- 20 per cent loss — is the upper limit of dehydration before death.

Sweating causes some loss of electrolytes, while continued profuse sweating leads to **dehydration**.

Figure 11.48 provides a guideline on the type and quantity of fluid necessary to prevent the onset of dehydration. The information is particularly important for athletes working in hot, humid conditions and for young children.

Event type

- One hour or more of continuous exercise in normal conditions

Before competition

- At least 500 mL, 30 minutes prior to competition

During competition

- Drink 200 mL every 15 minutes, do not wait for thirst to develop
- Drink more in hot conditions
- Replace 80 per cent of fluid loss while still continuing to exercise

What to drink

- Water, if exercise lasts less than one hour
- Diluted carbohydrate/electrolyte drink, if exercise lasts longer than one hour
- No higher than eight per cent carbohydrate solution
- Non-carbonated
- Cold fluid, as this empties from stomach faster
- No alcohol
- Fluid that tastes good to encourage drinking

Following competition

- Use water, then carbohydrate drinks
- Replenish fluid regularly until:
  - body weight returns to normal
  - urine is clear

Figure 11.48: Suggested fluid intake before, during and after competition

INQUIRY

Body temperature regulation

1. Investigate how the four pathways for losing body heat control body temperature during exercise in:
   - high temperatures and high humidity
   - cold, windy conditions.
2. Access the **Preventing heat illness in sport** weblink in your eBookPLUS. Read the information and answer the following questions.
   (a) What is WBGT and what does it measure?
   (b) What factors impair the body's ability to dissipate heat during high intensity sport?
   (c) Summarise in note form the four strategies for reducing the risk of heat illness for children in sport.

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Acclimatisation

Acclimatisation is a training technique where an athlete experiences different climatic stressors, causing physiological adaptations to occur. Where athletes need to compete in a range of climates, such as country New South Wales and Cairns in northern Queensland, acclimatisation assists performance. Footballers from Northern Queensland may find difficulty with breathing and skill execution on cold evenings in Canberra, while Sydney footballers find the humidity of far north Queensland energy sapping.

Acclimatisation is about developing tolerance to expected performance conditions. It applies to heat, cold, humidity, wind and altitude. Acclimatisation is enhanced through exposure and training in the environment or a prefabricated environment providing a similar effect. Generally, acclimatisation to heat and humidity takes about five to seven days, whereas altitude acclimatisation may take two to three weeks depending on elevation differences.

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INQUIRY

Acclimatisation

eBookplus

An important area that concerns acclimatisation for athletes is in regard to *heat*. Click on the **Australian Sports Commission** weblink in your eBookPLUS to investigate heat acclimatisation. Comment on how athletes acclimatise to heat and what benefits are gained.

Taping and bandaging

Taping and bandaging are important safety measures. When used as preventative strapping or for injury rehabilitation, they increase the safety and well-being of the athlete.

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Do more Preventative taping
Practice HSC exam questions

Preventative taping

Taping refers to the application of adhesive or non-adhesive strapping or bandages to a joint area to protect, support or strengthen the joint during movement. Sports that require agility, speed, power and strength can place considerable stress on joints. Examples of such sports are basketball, football, soccer and netball. These sports demand explosive movements and frequent changes of direction, so the joints periodically sustain high levels of stress. Under these circumstances there is considerable potential for injury. Taping in

these situations is a *preventative* or *prophylactic* measure. The general principles of taping are summarised in figure 11.49.

Taping principles

- Use *non-elastic tape* for support. Elastic tape is used mainly for compression bandages.
- Ensure that the joint is placed in a position where it can be stabilised.
- Always begin with anchors.
- To ensure evenness of tension, pull the tape off the roll, then apply.
- Overlap each application by half to two-thirds to ensure strength.
- Maintain even pressure and reapply if circulation is cut.
- Avoid creasing the tape.
- Avoid continuous taping; that is, tear and restart after applying each strip (except when closing down).
- With the exception of eversion (rolling out) sprains, always tape in the direction that will tighten the structures at risk. For example, if the injury is on the lateral side of the ankle, the tape should pull from the lateral side upwards towards the medial side.
- Completely cover skin around the area with tape.
- Always finish with locks.
- Remove tape using blunt-nose scissors to avoid risk of injury from incision.

Figure 11.49: Principles of taping

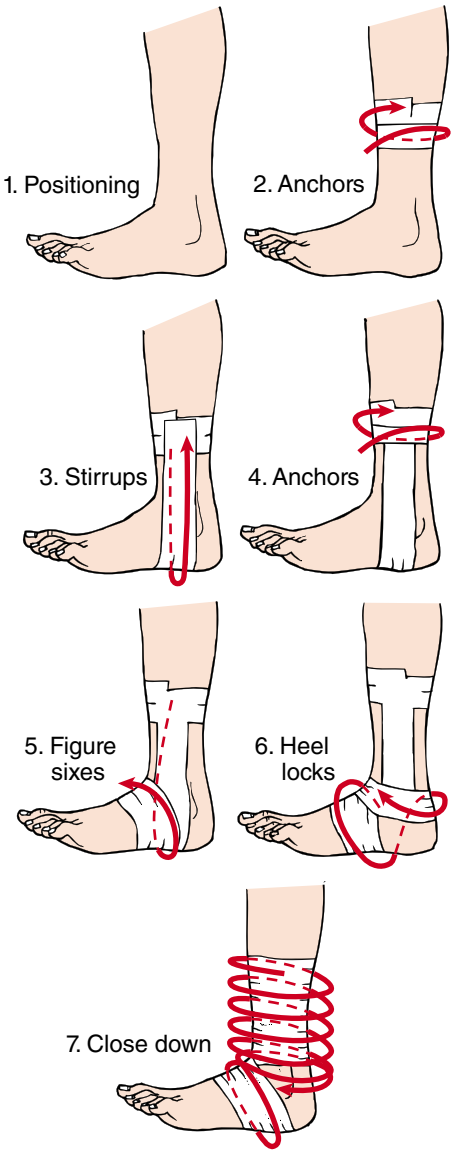


Figure 11.50: Taping the ankle to prevent injury

The following method is prophylactic because it aims at preventing an injury. In this example, taping is used to prevent an inversion sprain, which is the most common form of ankle injury. In this injury, the ankle rolls laterally (to the side), causing a strain to the ligaments surrounding the lateral aspect (away from the body's midline) of the ankle. Taping allows plantar and dorsi flexion (up and down movements), yet restricts inversion (rolling in) and eversion (rolling out) of the foot.

- *Positioning:* stabilise the ankle on a bench or table and shave the area to be taped. Set the ankle in a dorsi flexed position; that is, with the Achilles tendon fully stretched. Slightly evert the foot (roll it outwards) and adjust your height so that you are not bending excessively as you tape.
- *Anchors:* attach the first anchor 15 centimetres above the ankle joint. This should begin at the front of the foot and run obliquely around the lower leg, without creases, and overlap the beginning of the tape. Attach the second anchor below the first, overlapping by half.
- *Stirrups:* each stirrup begins with attachment to the anchor on the medial side (inside) of the leg. It is then taken over the back half of the ankle bone, under the arch of the foot and is joined to the anchor on the lateral side (outside) of the leg. Two stirrups are required. Each should overlap the previous stirrup by half to two-thirds.
- *Extra anchors:* apply two anchor strips to secure the stirrups.
- *Figure sixes:* begin by attaching the tape to the anchor on the inside of the leg and pull it down to the lower foot. Continue applying tape under the sole of the foot and then upwards and across the top of the foot. It will join the original tape, forming a figure six. Apply two or three figure sixes.
- *Heel locks:* begin on the inside of the heel. Apply tape across the top of the foot and underneath the heel. Continue coming up the medial side of the foot and extend around behind the heel, across the lateral ankle bone and

the top of the foot. The tape finishes on the medial side of the foot attached to where it began. Apply a second heel lock in the same manner.

- *Close down:* beginning on the lateral side of the leg and on the lower side of the anchors, wind the tape around the leg, overlapping by one-third each time. Upon reaching the ankle, continue spiralling, but in a figure eight pattern that goes under the foot and around the ankle. Proper closing down ensures that all skin is covered and that the tape underneath is securely attached.

APPLICATION

Taping

Working in pairs, practise taping an injured ankle using the technique illustrated in figure 11.50 and described in the text.

INQUIRY

Learning to tape a specific injury

eBookplus

Choose another type of joint injury other than the ankle, such as the thumb or wrist. Research how to effectively tape this injury. You can find out how to tape a sprained thumb using the **Taping (thumb)** weblink in your eBookPLUS.

Describe the process and use illustrations to help. Share your findings with the class.

Taping for isolation of injury

Taping is often required after an injury has been sustained and may be necessary during the rehabilitation process. For example, an ankle injury may be healed, but requires testing in training. In cases such as this, support should be provided while the injured area becomes accustomed to the demands of full activity. Taping may also be required so that the athlete can participate in body conditioning exercises to maintain fitness as much as possible during recuperation.

Bandaging for immediate treatment of injury

Immediately an injury is sustained, some bandaging is essential. Using the RICER regime means that compression bandages are applied to restrict bleeding into the injured area; however, other bandaging may also be helpful. The type of bandaging necessary varies according to the location and type of injury sustained. However, bandaging at this point serves to limit the motion of the body part, usually by securing it to another body part. For example, a sprained thumb may need to be strapped and supported by the wrist, as illustrated in figure 11.51.

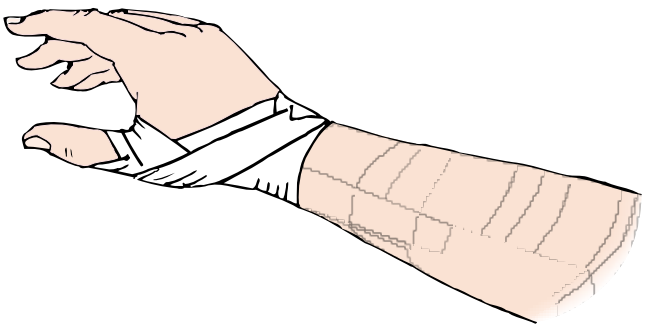


Figure 11.51: Immediate treatment usually requires securing the injured area.

INQUIRY

Taping for prevention and treatment of injury

eBookplus

Evaluate the role of taping in injury treatment and prevention. Use the **Taping** weblinks in your eBookPLUS to access more information that you may be able to include in your answer.

Form groups of three and discuss your findings.

INQUIRY

Actions to prevent injury

Draw a mind map to summarise preventative actions that can be taken to avoid injuries during sport and exercise.



MANAGING INJURY REHABILITATION

CRITICAL QUESTION

How is injury rehabilitation managed?

Following appropriate injury rehabilitation procedures restores the athlete to their pre-injury level of fitness.

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Do more
Rehabilitation procedures

Practice HSC exam questions

Injury management procedures

Rehabilitation is the process of restoring the athlete to the pre-injury level of physical fitness. It involves mobilisation, stretching, conditioning, taping, training and testing as part of the assessment process. It is important that a proper rehabilitation plan is followed through the various stages and that the injury is completely healed before recommencing competition. The time taken for complete recovery varies. However, where immobilisation was necessary or a previous injury has recurred, it is absolutely essential that the full recuperation takes place before recommencing competitive sport.

Progressive mobilisation

Following use of the RICER method (see page 402), it is important that movement be restored to the injury as soon as possible. This is referred to as progressive mobilisation and involves gradually extending the range of movement through which the injured part can be manipulated. This continues until the part is fully functional.

Graduated exercise

Graduated exercise involves:

- stretching
- conditioning
- achieving total body fitness.

Stretching

Stretching the injured area is important to ensure that it heals without scarring. Scarring shortens the muscle and makes it prone to further injury. The most appropriate form of stretching is proprioceptive neuromuscular facilitation (PNF) stretching, where the muscle is stretched and strengthened during safe movements. See pages 423–5 for more information about PNF stretching and appropriate flexibility exercises.

Conditioning

A rehabilitation program needs to be individualised to the needs of the athlete. Because of differences in sex, age, genetics and, in some cases, existing chronic conditions, a conditioning program that is overly aggressive may do more harm than good and serve only to lengthen the recovery process.

Conditioning implies a build-up in fitness as a result of adaptations to gradual increases in physical stress. An effective conditioning process uses the overload principle to ensure that a greater than normal load is placed on the body. Adherence to the principle of progression is also important as this recognises an optimal amount of overload for each individual is achieved over the most advantageous time period. Periods of rest and recovery are followed by gradually increasing periods of work. Correctly used, the principle of progression ensures that the conditioning experience is pain free in the injured area.

The principle of specificity is also important. The conditioning regime needs to target general cardiorespiratory fitness together with increasing the need for strength, power and local muscular endurance around the injured area.

Total body fitness

Total body fitness is regaining the level of mental and physical fitness reached by the athlete before the injury occurred. The training program must progressively and gradually overload the muscle groups and energy systems so that the required adaptations are regained before competition is recommenced. In relation to rehabilitation these adaptations include:

- hypertrophy (increased size) of the muscles
- strengthening of tendons and ligaments
- increased capillarisation and subsequent blood flow to the injured area
- increased elasticity of fibres
- increased joint mobility
- absence of all pain
- full confidence in knowing that the injured area can handle match stress
- fully restored balance and coordination.



Figure 11.52: Using microwaveable heat packs is a form of thermotherapy.

Training

With total body fitness achieved, full training can resume. Here the athlete is expected to participate in the full training program in a pain-free environment. This involves participating in warm-up, conditioning, drills, skills development exercises, tactics and cool-down.

Use of heat and cold

When to use heat and/or cold on injuries has always been controversial. Generally, cold can be applied for anything up to four days following injury and may be required at times following that to reduce inflammation. Heat is not generally used for two or three days after injury, depending on the injury type and extent of damage.

Cold applications

Commonly used cold applications include:

- *ice massage*, where ice is rubbed gently over the injury for up to 15 minutes at a time
- *ice water immersion*, where the injured area is placed in a container of iced water for short periods of time
- *vapocoolant sprays*, which cool affected areas quickly and help prevent muscle spasms.

Heat applications

Thermotherapy is the application of heat in various forms to the injury. When internal bleeding has stopped (about 48 hours after the injury), heat may be used to:

- increase elasticity to the new fibres during the stretching process
- reduce pain
- reduce stiffness
- increase blood flow
- reduce inflammation.

Heat energy is transmitted through radiation, convection and conduction. It may be applied using superficial techniques such as heat packs, or penetrating therapies such as ultrasound. Commonly used methods for heat application include:

- *moist heat* packs containing silicate gel. These are applied to the injury, with towels used as insulators between the packs and the injury.
- *whirlpool baths*, where the injury is immersed in a small spa bath containing water at the desired temperature (may be hot or cold) and the injury massaged by the movement of the fluid
- *contrast baths*, where the water temperature is alternated after five minutes or so between hot and cold. This increases local circulation by causing vasodilation (from hot water) and vasoconstriction (from cold water) of the capillaries in the injured area.
- *microwave diathermy*, which is used to heat deeper tissue, particularly tissue with a higher water content such as muscle and blood. With a towel placed over the skin, the tissue surrounding the injury is heated to approximately 42 °C and this temperature maintained for a period not exceeding 30 minutes.
- *ultrasound therapy*, which uses high frequency sound waves to produce heat energy. This is more effective in denser tissue, such as bone and ligament.

Figure 11.53: Details and examples of heat and cold applications.



Use of heat and cold

Imagine a player has received a sprained ankle in a soccer game. Suggest how heat and cold applications could be used in rehabilitation. Investigate current theories on when these techniques should be used with this type of injury.



Rehabilitation of sports injury

Choose two of the following sports injuries: hamstring tear, shoulder dislocation, knee strain. Outline how you would rehabilitate each injury and justify the procedures you would use.

Return to play

Injured athletes should not return to play until their injury has completely healed. Even then, specific procedures need to be followed and precaution taken to ensure the injury does not recur. In the case of head injuries such as concussion, a medical clearance is essential.

study on

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Do more
Return to play

Practice HSC exam questions

Indicators of readiness to return to play

Effective treatment and rehabilitation ensure that the healing process has resulted in measurable improvements to the injured area. These include:

- *elasticity*. The new tissue has been stretched, promoting lengthways elasticity and resultant flexibility.
- *strength*. The new tissue is strong and able to support the body in stressful movements.
- *mobility*. The athlete has gained full movement, particularly in terms of agility.
- *pain free*. The injury is pain free during both light exercise and strenuous work.
- *balance*. The injured person is able to balance his or her body on the injured limb. Until this function is achieved, the rehabilitation process is not complete.



INQUIRY

Readiness to return to play

eBook plus

Research and evaluate tests that could be used to indicate an athlete's readiness to play following injury. You may find the **Muscle strain** weblink in your eBookPLUS helpful.

Monitoring progress

To monitor progress, results from a pre-test taken before the injury occurred could be compared to those of a post-test taken after the injury was sustained. This establishes if the athlete has lost fitness components such as speed and agility. The tests need to incorporate sport specific movement patterns. For example, if knee ligaments were damaged, an agility test such as the Illinois test (see *Outcomes 1*) would be appropriate, while a grip strength or power test would be inappropriate.

Psychological readiness

Physical readiness is not sufficient in itself to allow an athlete to return to play. Psychological preparedness underpinned by confidence and a positive outlook is also important in preventing recurrence of injury. Determining psychological readiness may be difficult to establish by rehabilitation personnel. Some athletes may want to return to play well before an injury is fully recovered. Others might feel pressure to get back on the field of play even though they do not feel confident that the injury will withstand the pressure of full competition. Both of these situations invite re-injury. A balance between motivation, self-assurance and common sense is fundamental to a safe return to play.

Specific warm-up procedures

Athletes returning from injury must ensure they are fully warmed up and muscle groups have been properly stretched before training or playing a game. When returning from injury, the warm-up may need to be more specific to the injured area. For example, if a sprinter incurred a hamstring injury, additional stretching exercises to both quadriceps and hamstrings are recommended to ensure that muscle groups have been extended in a safe environment beyond what will be demanded of them in competition.

RICER	Stretching	Strengthening	Conditioning	Training	Return to play
Rest Ice Compression Elevation Referral • Up to 72 hours • Light stretching • Within pain free limits after each application of ice	• Pain free limits • No bouncing • Hold 15–20 seconds • Progressively increase range of movement • Injured muscle tissue repairs itself with scar tissue • Scars shorten muscles • Shortened muscles can easily tear again	**A. Isometric exercises** • Pain free limits • Hold 10 seconds • Relax 10 seconds • Repeat 2–3 minutes • Progressively increase muscle length **B. Weights** • Pain free • Light weights • Full range • 10–20 repeats • Rest 2–3 minutes • Repeat 2–3 sets • Progressively increase load	**A. Basic skills** • Full range • Low intensity • Pain free • Running • Hitting • Kicking **B. Game skills** • Full range • Low–medium intensity • Pain free • No pressure/ competition • Twisting • Turning • Preventative taping • Stretching • Strengthening	**A. Game-like situation** • Full skills training • Some pressure • No direct opposition • Re-establish fitness • Increase intensity/ duration **B. Full training** • Simulated match play • Skills under pressure • Competition with opposition • Match duration and intensity • Increase intensity/ duration • Preventative taping • Stretching • Strengthening	**A. Resume lower level** **B. Resume top level competition** • Preventative taping • Stretching • Strengthening

Figure 11.54: The muscle rehabilitation plan *(Source: Sports Injury Prevention Plan*, SIPP, Sport Science and Research Centre of the Cumberland College of Health Sciences, Beiersdorf Australia Ltd., North Ryde, © 1986, p. 18. Reproduced by permission of Beiersdorf Australia Ltd.)



APPLICATION

Designing a skills test

Choose any sport. Design a skills test to assess whether previously injured athletes are ready to return to competitive sport. Share your information with the class. Then select one of the tests and have each class member perform it. Evaluate the test and discuss your findings.



INQUIRY

Return to play

eBook*plus*

Use the **Sports tips** weblink in your eBookPLUS and scroll down to locate the 'Return to play' fact sheet. Read the information then answer the questions below.

1. What is meant by 'return to play'?
2. How can the road to recovery be improved?

Return to play policies and procedures

The decision regarding when a player can return to play varies from one sport to another. In many amateur sports, individuals make a decision in consultation with their doctor, physiotherapist or sports trainer. At the professional level, policies normally exist that suggest a set of procedures be followed to prove

that a player is free of injury. At this level, having players return to play only to suffer a recurrence of the injury can be expensive both monetarily and in terms of team performance.

Typical protocol for professional athletes may involve consultation, review of x-rays, discussion regarding the use of strapping/bracing, fitness assessment, specific test results and participation in a range of sport specific movements within a return from injury skills test. Even then, coaches and trainers use their own criteria to establish when the athlete is ready and the level of competition most suitable in consideration of the type of injury. However, this varies from one sport to another and depends on the type of sport and professionalism of the organisation.



INQUIRY

Return to play policies and procedures

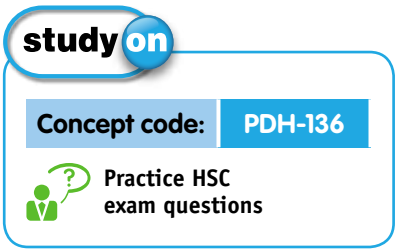
Divide the class into small groups along the lines of sporting interests. Have each group choose one major sport such as rugby league, soccer or basketball. Investigate policies and procedures that regulate the timing of return to play at the various levels of the sport; that is, amateur through to professional and children through to adults. Choose one person to report to the class.

Based on the information provided in the reports, conduct a class discussion relating to issues surrounding the policies and procedures. Focus questions should be:

1. Why aren't these policies applied to all sports?
2. Where should ultimate responsibility lie in deciding when an athlete is allowed to return to playing sport?
3. Should athletes be allowed to use painkillers to allow them to compete when injured?

Ethical considerations

Pressure to participate in sporting events comes from a number of sources including team-mates and coaches. Some individuals feel the need to get back to the field of play quickly for financial reasons. Even when injuries have not fully healed, some athletes choose to take painkillers to allow them to play. Ethical questions need to be explored fully as poor decision making can have consequences that may impact on performance for a long time to come.



Pressure to participate

Often, and particularly in elite sports, the services of talented players are required before injuries have fully healed. Some players may have injuries heavily strapped, while others are given injections to prevent pain from pressure or impact on the injured area. Many coaches see players as commodities, the products of lucrative contracts, who need to be on the field of play to gain value for cost. Irrespective of financial binds, it is unwise and dangerous to insist on or pressure players to resume competitive sport before injuries have fully healed. Pain in an injury indicates tissue damage and is a warning that rehabilitation is necessary for further healing.

Use of painkillers

The use of painkillers to enable athletes to play important sporting matches is, unfortunately, a reality in many sporting competitions. While some painkillers such as paracetamol might be taken to address headache or soreness

around bruises, the use of prescription painkillers by way of injection is an area of real concern.

Prescription painkillers are taken to mask pain that would normally be present during the activity. Pain is the body's response to tissue or organ damage. It tells us that what is happening is causing harm and should be stopped. Painkilling injections desensitise injured tissue and set an environment for further damage without the athlete being aware of what is happening. This prolongs the healing process. If further rupturing occurs, permanent mutilation of fibres will occur.

While some athletes have a higher tolerance of pain than others, pain that causes us to moderate or alter movements that provoke the pain need to be addressed. Similarly, if pain becomes so intense that it becomes a focus at the expense of other thoughts, such as beating an opponent, movement should be stopped. Failure to do so will result in further injury and a much longer than expected rehabilitation program.

Choices about use of painkillers affect elite sportspeople more than everyday athletes. Key players in football matches and particularly grand finals have often been cited as using painkillers to 'get through the match'. The decision usually rests with the individual in consultation with the team doctor, trainer and coach. But ultimately, it is the player whose future is at risk.



INQUIRY

Prescription medications and athletic performance

eBookplus

Use the **FIFA** weblink in your eBookPLUS and the information in the preceding 'Ethical considerations' section to answer the following questions.

1. What health problems are associated with use of painkillers in sport?
2. Why might there be pressure on team doctors of elite sport teams to get their players back on the field as soon as possible?
3. It was found that almost 40 per cent of players at the 2010 World Cup were taking pain medication prior to every game. Why might some players take pain killers as a preventative measure?
4. Discuss how players get away with taking pain killers, yet be banned for taking performance enhancing drugs?
5. Discuss the legal implications for a player who incurred a lifetime injury while using prescribed pain-masking drugs during a game.
6. Debate the suggestion that painkillers enhance performance by simply allowing a person to play when they would otherwise be sidelined.



INQUIRY

Resumption with injury

A coach wants a player to compete in an Olympic selection trial because this is the only way of gaining a place on the team. If the player misses the selection he or she will have to wait four years for the same opportunity. However, the sports first aider says it is too early because the player was not able to complete the skill test. Debate the issues at stake.

SUMMARY

- Sports injuries can be classified as direct, indirect, overuse, soft tissue and hard tissue, depending on the way the injury was caused and the type of tissue damaged.
- There are a number of different types of soft tissue injury including tears, sprains and contusions. The RICER method is recommended as the preferred form of treatment for soft tissue injuries.
- Skin injuries include skin abrasions, lacerations and blisters. These may require cleaning, use of disinfectant and possibly bandaging.
- The healing process of a soft tissue injury involves three phases — the inflammatory stage, repair and regenerative stage, and remodelling stage. The RICER method is the most appropriate way of managing the injury in the early stages.
- The two most common hard tissue injuries are fractures and dislocations. These injuries require immobilisation and medical treatment.
- The TOTAPS (talk, observe, touch, active movement, passive movement, skills test) regime is recommended in assessment of injury.
- Some children have special medical needs. Referees, coaches and supervisors should have knowledge of conditions such as asthma, diabetes, epilepsy, overuse injuries and heat stress conditions.
- Children can benefit from some forms of weight training. However, strict supervision and adherence to guidelines such as focusing on high repetitions with low resistance must be applied to reduce the risk of injury.
- Adult and aged athletes may require sports medicine if an injury occurs during a performance. Aged athletes need to have medical clearances and be aware of their options and limitations, particularly those relating to heart conditions, joint mobility and fractures.
- Female athletes have special requirements. Sports medicine requires knowledge of the effect of performance on eating disorders, iron deficiency, bone density and pregnancy.
- Preventative actions play an important role in enhancing the well-being of athletes. Attention to pre-screening, skill, technique, fitness and general procedures such as warm-up, stretching and cool-down assist in injury prevention.
- Sports policy and the sports environment need to support the well-being of athletes. Issues of importance that need to be addressed include rules for both adults and children, matching of opponents, protective equipment and the provision of safe grounds, equipment and facilities.
- Body temperature regulation is maintained by the body continually producing and losing heat. Heat loss mechanisms include convection, radiation, conduction and evaporation.
- Climatic conditions including temperature, humidity, wind, rain, altitude and pollution need to be considered prior to performance. The combination of high temperature and high humidity increase the level of risk, particularly in relation to endurance performances.
- Fluid intake needs to be substantially increased before, during and after performance where the sweat rate is high.
- A period of acclimatisation assists in adjusting to a new environment by improving tolerance to the expected conditions.

- Effective sports medicine requires that injuries are handled correctly by using the appropriate procedures. Taping may be required. It is important that injuries are managed correctly, rehabilitated and tested fully before return to play.
- Players should not return to play until their injury is fully healed, as further injury will make the healing process more difficult and protracted.
- Many things should be considered before returning to play following injury. Being pain free, having full mobility, being able to perform sport specific movement patterns and being psychologically ready are the most important factors.
- Return to play policies and procedures need to be developed and followed by sporting organisations in general.
- Ethical considerations such as pressure to participate and use of painkillers need to be thoughtfully considered by athletes as recurrent damage to injured areas can cause long-term problems.

QUESTIONS

Revision

1. Explain the difference between direct and indirect injuries. (H8) (2 marks)
2. Explain the difference between a sprain and a strain. (H8) (2 marks)
3. Describe how the inflammatory response would function if a person incurred a contusion. (H8) (3 marks)
4. Complete the following table summarising common forms of skin trauma. (H13) (3 marks)

Skin trauma	Definition	Treatment
Abrasions		
Lacerations		
Blisters		

5. Outline the advantages of rest, ice, compression, elevation and referral in assisting recovery from soft tissue injury. (H8) (2 marks)
6. Explain the difference between soft tissue and hard tissue injuries. Using an example from both, discuss how each is managed. (H8) (3 marks)
7. Outline the signs and symptoms you would need to be aware of when diagnosing a suspected simple fracture. (H16) (2 marks)
8. Explain the difference between a dislocation and a subluxation. (H8) (2 marks)
9. Explain how the TOTAPS regime would be used in the assessment of a player whose ankle rolled outwards (suspected sprain) during a game of touch football. (H16) (4 marks)
10. Discuss three specific medical conditions that relate to children. Outline how each can be managed to promote safety and well-being in sport. (H8) (6 marks)
11. Outline the nature of overuse injuries. (H8) (1 mark)
12. Discuss the appropriateness of resistance training for young children. (H13) (3 marks)
13. Recent information suggests that physical activity together with resistance training is both safe and beneficial for adults with heart conditions. Access the **Physical activity and healthy ageing** weblink in your eBookPLUS and use the information to comment on the suggestion. (H17) (3 marks)



14. Provide advice about the sports participation options available for aged athletes with heart conditions. (H17) (3 marks)
15. Discuss how eating disorders and iron deficiency would each impact on the well-being of a female athlete. Suggest strategies to address each problem. (H17) (5 marks)
16. Explain why pre-screening is an important preventative action in the physical preparation of athletes. (H8) (2 marks)
17. Discuss how warm-up, stretching and cool-down assist in prevention of sports injury. (H17) (5 marks)
18. Provide examples of how rules and equipment can be used to promote safe participation. (H8) (2 marks)

19. Investigate the degree to which protective equipment is used in your favourite sport. Discuss the barriers that exist that prevent full and proper use of protective equipment. Suggest interventions that will enhance safety. (H17) (5 marks)
20. Choose a sport or activity. Explain the changes that have been made to enhance the safety of children who play this sport. (H17) (3 marks)
21. Investigate the role of temperature regulation in enhancing safe participation in physical activity on hot days. (H16) (5 marks)
22. Discuss the impact of climatic conditions on safe participation in sport. (6 marks)
23. Explain the role of taping in the prevention of injury. (H13) (3 marks)
24. Investigate current theories on the use of heat in injury management. Briefly outline your findings. (H16) (5 marks)
25. Explain the benefits of stretching and strengthening as part of a muscle rehabilitation plan. (H8) (3 marks)
26. Outline the indicators of readiness for return to play following injury. (H17) (2 marks)
27. Discuss the problems that might be caused by playing with injury. (H17) (5 marks)
28. Discuss the ethics of using painkillers to enable a person to participate in sport. (H17) (6 marks)
29. Choose a sport. Describe a physical test that could be used to indicate readiness to return to play. (H13) (3 marks)

Extension

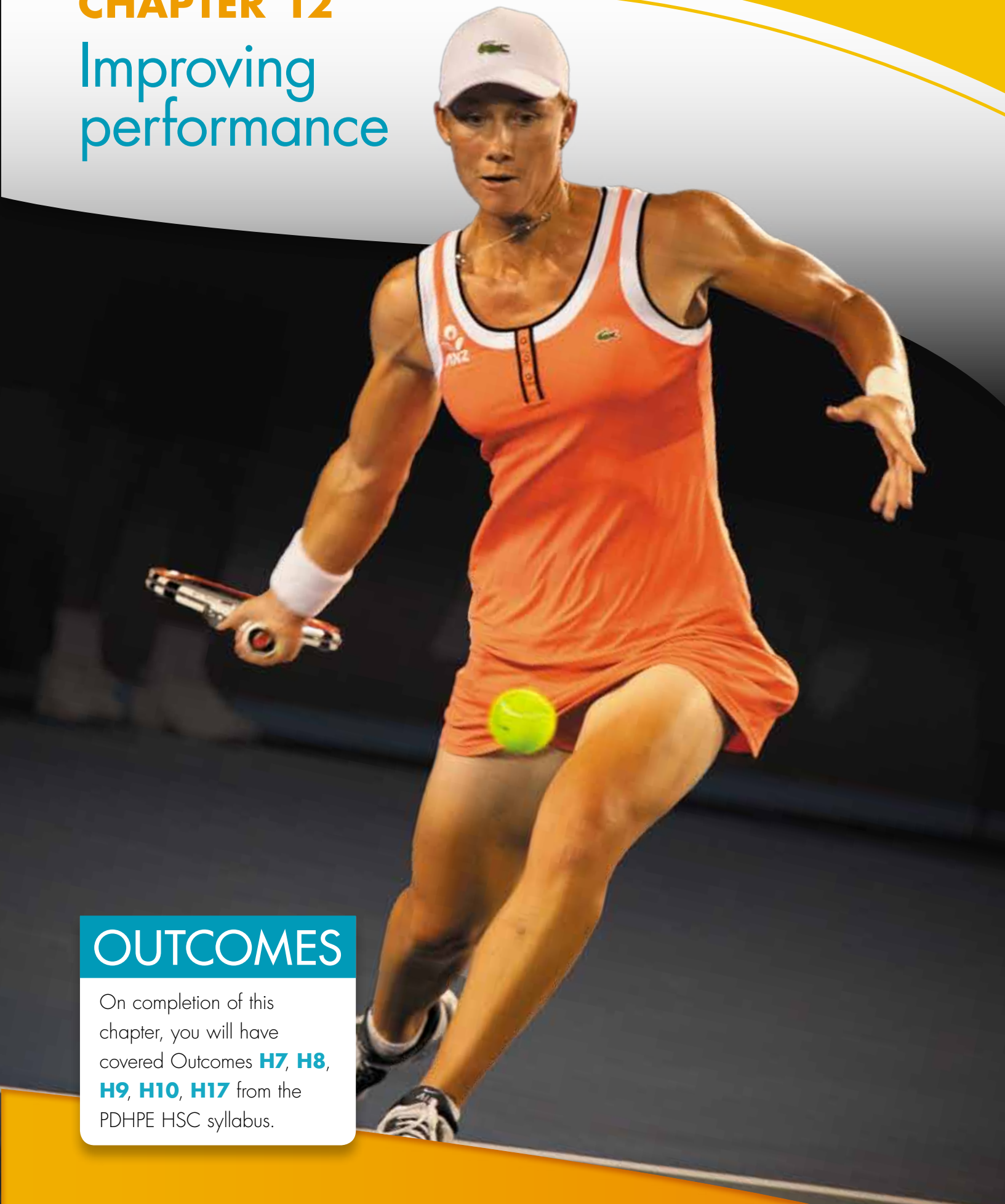
Investigate and explain appropriate methods of taping for the following injuries: a dislocated finger, stretched lateral knee ligaments, tennis elbow. (H13) (9 marks)

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

CHAPTER 12

Improving performance



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H7**, **H8**, **H9**, **H10**, **H17** from the PDHPE HSC syllabus.



TRAINING FOR IMPROVED PERFORMANCE

CRITICAL QUESTION

How do athletes train for improved performance?

Training is the fundamental ingredient that sustains physical performance because it improves energy production, skill execution and muscle stress tolerance. Effective training programs target the needs of each individual in terms of work volume and intensity. A training program should seek overall improvement in skill, flexibility, strength, speed, endurance and power. It should also address the athlete's nutritional needs and develop his or her psychological capacities.

Strength training

Strength is the ability of a muscle or muscle group to exert a force against a resistance.

Strength training is a general term that encompasses all types of exercise designed to improve strength and increase muscle size.

Strength is the ability of a muscle or muscle group to exert a force against a resistance. Strength is improved through use of strength training programs. **Strength training** is a general term that encompasses all types of exercise designed to improve strength and increase muscle size. Strength training is different to body building and weight-lifting, but strength development through training is an integral part of both these activities.

Strength training can be applied to a range of programs, including the development of muscular endurance, general strength, power, body bulk and muscle tone. However, to maximise results, programs need to address individual differences. This is achieved by manipulating program variables and making each program component personalised to suit individual needs. For example, the number of repetitions made in lifting a precise load differs between athletes who wish to develop muscle size and muscle endurance.

Strength program variables include:

- *repetitions* — the number of times an exercise is repeated without rest
- *repetitions maximum* — the maximum weight that can be lifted a specified number of times. For example, 1 RM equals the maximum weight that can be lifted only once; 8 RM equals the maximum weight that can be lifted eight times.
- *set* — a number of repetitions done in succession; for example, one set equals 10 repetitions
- *resistance* — the weight or load
- *rest* — the period of time between exercises, sets or sessions
- *periodisation* — the process of varying the training load over discrete periods of time.

An **adaptation** refers to a change in form or structure to suit new conditions or a new environment.

Strength increases are made possible through **adaptations**. This means that a muscle becomes accustomed to a specific load through exposure to stress created by it. For example, a person who is just able to lift 20 kilograms during a biceps curl gradually becomes more comfortable in lifting that load following repeated training sessions. This is because that muscle group has made adaptations (hypertrophy, increased motor units engaged) and is ready to take on a higher level of resistance. The general adaptation syndrome is illustrated in figure 12.1.

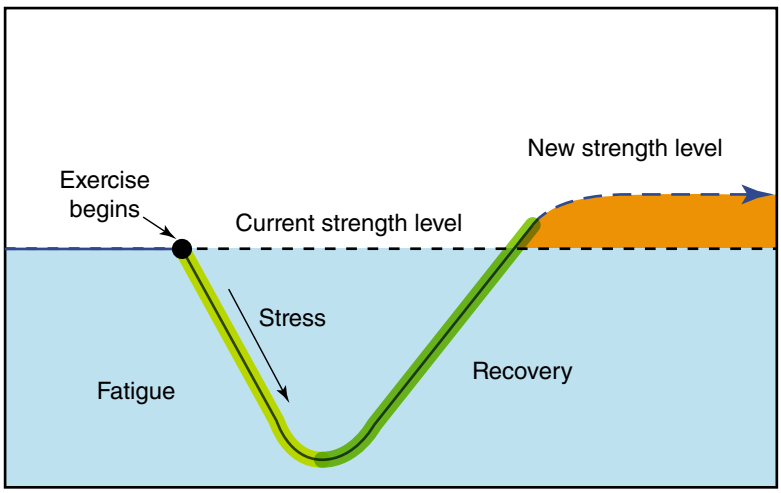


Figure 12.1: The general adaptation syndrome shows how the cycle of stress, fatigue and recovery leads to increases in strength.

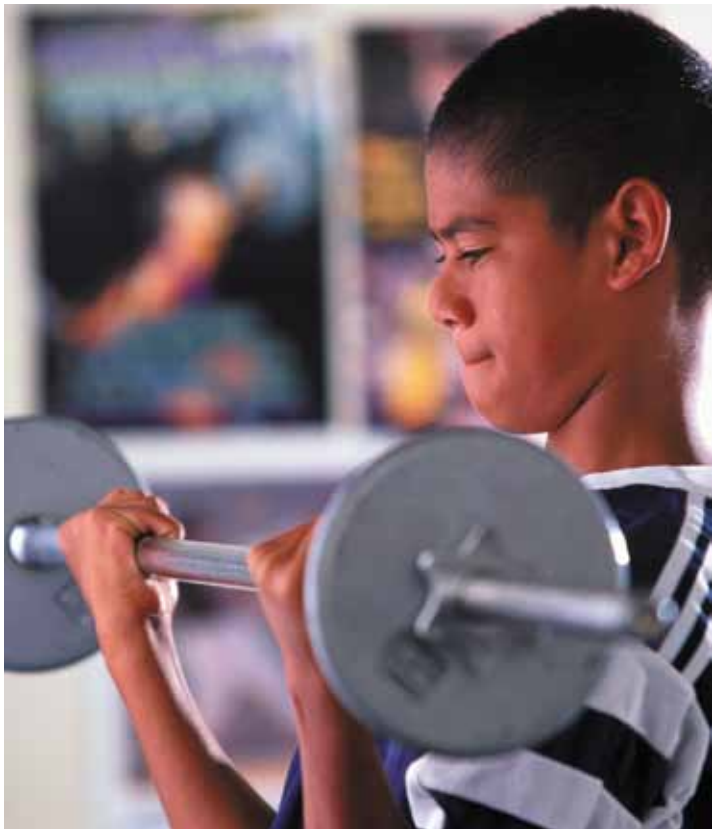


Figure 12.2: Strength training must be appropriate to the individual.



Figure 12.3: Using spotters and good technique contributes to enhancing safety in strength training programs.

A strength training program will not be effective, nor will appropriate strength gains be made, unless the training program:

- *is exercise specific;* that is, adaptations will occur only in the parts of the body that are stressed by the exercise. Weight training is highly specific. For example, biceps development will generally have little effect on an athlete's running ability.
- *employs the overload principle;* that is, the individual is loaded beyond normal requirements
- *uses progressive resistance;* that is, resistance is increased as adaptations occur.

Using safe procedures is of paramount importance when using strength training programs. Muscle and ligament damage, back pain and joint injury can all result from not being aware of how to use strength training equipment safely or trying to progress too quickly to higher levels of resistance. Safe performance of strength training movements requires:

- a level that is appropriate to each individual, with competition being discouraged
- adequate warm-up and cool-down phases, including considerable emphasis on stretching
- focus on major muscle groups
- concentration on developing correct technique to avoid injury
- establishing 'good form' as opposed to 'cheating'. 'Cheating' implies transferring part of the load to other muscle groups, thereby enabling a greater weight to be lifted.
- using high repetitions and moderate loads early in the program and not increasing resistance increments too quickly
- checking that equipment is suitable and is adequately maintained
- ensuring that bouncing movements are avoided
- insisting that spotters (partners who assist in guiding a weight lift) are used, particularly while lifting heavy free weights.

While there are a number of different types of strength training, resistance, weight and isometric training regimes are the focus of this section.

Resistance training

Please review chapter 5, pages 157–161 for foundation information on this section.

Resistance training is a form of strength training where each muscular effort is opposed by a specific resistance. The resistance or opposing force can be generated in a number of ways, but

Isotonic movements are characterised by muscle shortening and lengthening against resistance.

application of isotonic measures such as use of hydraulic or elastic forces are the two most popular.

Isotonic movements are characterised by muscle shortening and lengthening against resistance. Muscle strength develops through programs that progressively increase the resistance, with adaptations taking place through adjusting to gradually increasing demands. Whereas hydraulic techniques provide fixed resistance throughout performance of the entire exercise, elastic bands offer most resistance towards the end of the movement.



Elastic resistance training

Elastic resistance using bands improves strength because resistance that is generated by tension increases as the band is stretched. Exposure to a progressively increasing stimulus ensures that muscle is strengthened through the full range, particularly at the end of the movement.

Bands are usually coloured to indicate different levels of resistance. An important feature of elastics is their versatility, portability and adaptability to a range of movements. Using a small number of bands, an extensive range of exercises can be performed working single or multiple joints simultaneously. However, bands are the least durable of all strength training types of equipment. They need to be regularly inspected and discarded if frayed, worn or have small tears.

Figure 12.4: An example of exercise using coloured bands for elastic resistance

INQUIRY

Strength training with elastic resistance

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Use the **Elastic resistance** weblink in your eBookPLUS. Read the information about elastic resistance and then answer the following questions.

1. What are the advantages of using elastic resistance when compared to other forms of strength training?
2. What strength benefits can be gained by using ERT (elastic resistance training)?

Hydraulic resistance training

Hydraulic resistance equipment is designed to generate resistance both through cylinder adjustments and in response to speed of movement. The faster the movement is executed, the greater is the resistance that will develop. Hydraulics has the advantage of providing resistance in both phases of a movement; that is, the pushing and then pulling, the lifting and lowering or whatever the specific action may be. Hydraulic equipment can be used to enhance strength development in a range of programs such as circuits, cardiorespiratory fitness and anaerobic training programs.

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Practice HSC exam questions



Figure 12.5: A gym with some examples of hydraulic exercise equipment



Figure 12.6: Weight training using free weights

Concentric contractions occur when a muscle shortens, causing movement at a joint.

Eccentric contractions occur when the muscle lengthens while under tension. The action often happens with the assistance of gravity.

Specialised equipment is not necessarily required to create hydraulic resistance. Pool water can also be used to create resistance using a range of exercises that require the body to move forcefully through it. Movements such as jumping, striding and pushing are opposed by water, the resistance growing as the force exerted by the body against the water increases.

Weight training

Please review chapter 5, pages 157–61 for foundation information on this section.

Weight training is a form of strength training that uses set repetitions and specific units of weight to create progressive resistance, ultimately strengthening muscles. Free weights (barbells and dumbbells) or weight training machines (for example, Nautilus) are used coupled with a range of specialised techniques and unique exercises designed to overload muscles and enhance adaptations. The body's own weight can also be used as a form of weight training, such as in push-ups and pull-ups on a high bar.

Weight training is the preferred form of strength training to develop absolute strength, body building and lean muscle tissue.

Weight training uses both **concentric** and **eccentric contractions** to stress muscle fibres. During these types of contraction, muscles continually shorten and lengthen while opposed by gravity assisted forces. With increasing loads, more motor units (and hence, more muscle fibres) are recruited to perform muscle actions. This causes significant hypertrophy in the muscle fibres involved. Through manipulation to the number of sets, repetitions, rest between sets and speed of movements, weight training can be varied to address specific requirements such as body building and the development of power. Heavier weights are used for programs that aim to increase muscle size, whereas lighter weights are used in muscular endurance type programs.

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Weight training
Do more
Strength training
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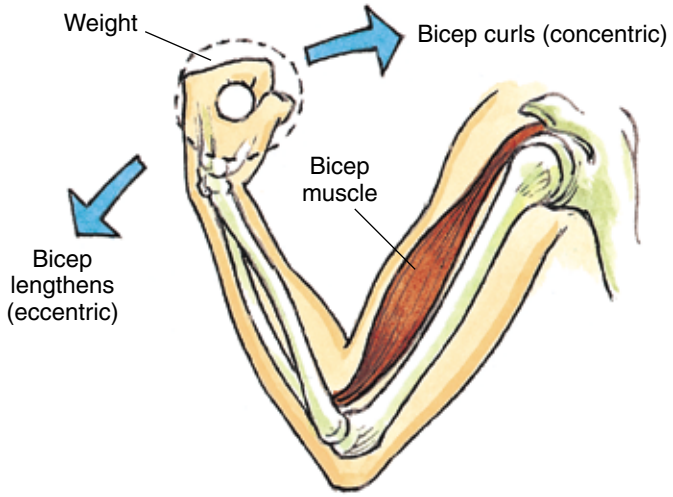


Figure 12.7: Concentric and eccentric contractions against a resistance improve strength development.

Table 12.1 shows how the variables can be altered to meet different needs of athletes. For example, strength gains require few repetitions with heavy weights, while the development of strength endurance requires the opposite.

Table 12.1: Prescription for a weight training program for trained athletes

Purpose	Weight resistance	Repetitions	Sets	Exercise speed	Time between sets (mins)
Strength 	Very heavy 80–100% RM*	4–6	5–6	Slow	Long 3–5
	Best results are achieved at 4–6 RM. Note that 100% = 1 repetition, 90% = 5 repetitions and 80% = 8 repetitions. Train on 3 days per week with a day's rest between each session.				
Lean body mass 	Heavy 70–90% RM	6–12	3–6	Slow to medium	Short 1–3
	The aim here is to increase muscle bulk (muscle hypertrophy) and decrease relative fat mass. This will provide better muscle definition. Needs to be combined with a nutrition program. Train on 3–5 days per week.				
Strength endurance 	Light–medium 40–60% RM	20–30	3–6	High	Short 1–3
	Strength endurance is developed using low-intensity resistance combined with high repetitions — that is, about 20–30 repetitions per minute. Training needs to take place on 3–4 days per week.				

* RM = repetition maximum = the maximum weight a person can lift a specific number of times (e.g. 8 RM is the maximum weight that can be lifted eight times).

Plates

Weight discs or plates anchored to barbells comprise free weights. The weight of the barbell can be set at the exact load required, ensuring that the overload principle is implemented and resistance is gradual and progressive. This

means that as a muscle performing a specific exercise adapts to that level of resistance, additional plates can be added to marginally increase the resistance. As weights become heavy, athletes using this form of weight training engage spotters to guide each lift during both the concentric and eccentric phase. It is important that when performing an exercise such as a curl, the weight is lifted through the full range to ensure that motor unit recruitment is maximised.



Figure 12.8: Strength training using barbells



Resistance training



Use the **Resistance training** weblink in your eBookPLUS. Read the information on advanced resistance training, then answer the following questions.

1. How is progressive overload achieved in resistance training programs?
2. How can variety be achieved in a strength program?
3. What safety procedures do we need to be aware of when lifting heavy weights?

Dumbbells

A dumbbell is a weight consisting of two discs attached to a short bar and made for lifting with one hand. Dumbbells come with attached weights or can be loaded and secured with spin locks to provide the required resistance. Dumbbells provide versatility in weight training programs. They are used extensively in exercises that develop small muscle groups, such as those in the wrist, or to isolate specific muscles for development, such as the biceps.

Dumbbells are also important in injury rehabilitation where a specific joint or muscle needs to be strengthened using concentric/eccentric movements, as may be required in tennis elbow recovery. It is important in using dumbbells (and barbells) to ensure that elbows and knees are not fully locked at the end of each movement as this places stress on joints and can cause injury.



Figure 12.9: Dumbbells of different weights (left) and weights on a barbell (right)

APPLICATION

Weight training with dumbbells

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You will need a couple of sets of dumbbells for this application. Use the **Dumbbells** weblink in your eBookPLUS. Choose four exercises that you might be interested in. Read the information about how to perform the exercise correctly. Following a warm-up, complete the exercise using the dumbbells.

INQUIRY

Weight training with dumbbells

Answer the following questions arising from the application 'Weight training with dumbbells'.

1. List and briefly describe the four exercises you chose.
2. What muscle groups were targeted?
3. What level of resistance did you have? Were you able to alter this if too light or too heavy?
4. How many repetitions did you do with each?
5. What steps did you take to address safety concerns?

INQUIRY

Identifying strength training exercises and equipment

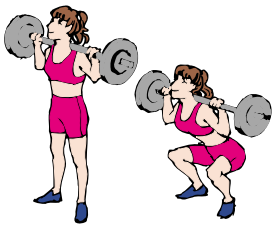
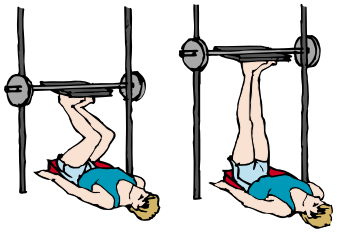
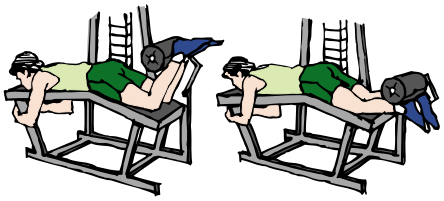
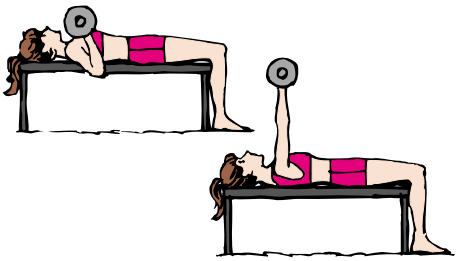
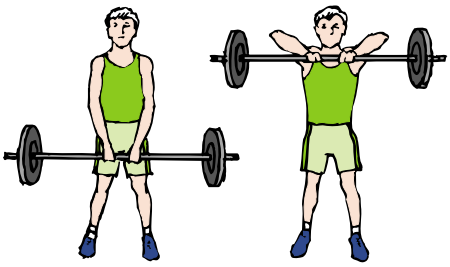
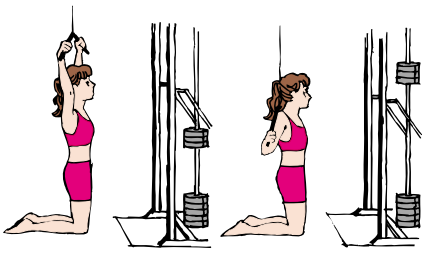
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Use the **Chest exercise** weblink in your eBookPLUS and watch the five minute video on exercises to develop the chest. Be prepared to answer the following questions as you watch the video.

1. What were the names of the exercises used?
2. What type of strength training equipment was used for each exercise?
3. What safety precaution did you observe?

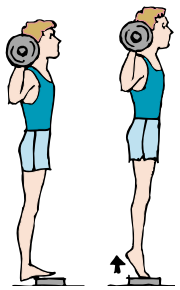
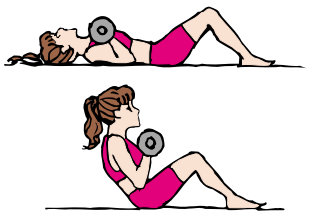
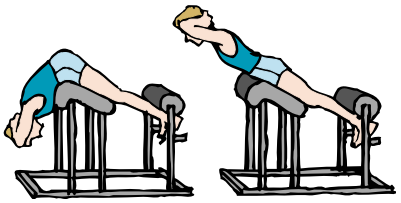
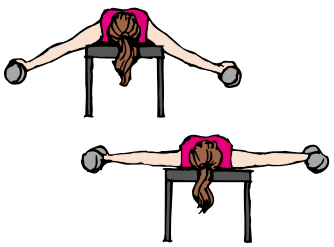
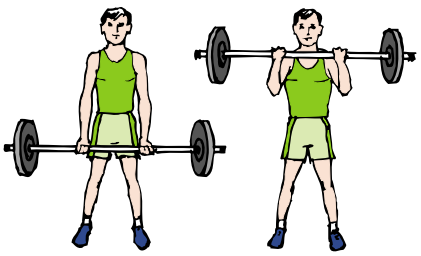
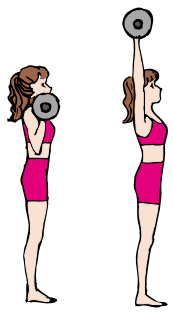
Discuss your findings with the class.

Table 12.2: Some exercises commonly used in weight training programs

Exercise	Muscle group	Description	Illustration
Squats	Legs	Use an overgrip (knuckles up). Keep head up and back flat. Squat until the thighs are parallel to the floor.	
Leg press	Legs	Lie under the press-bar with feet extended to make contact with a fastened bar or platform. Extend knees, hold and return.	
Leg curl	Hamstrings	With body lying face down on the bench, lock heels over rollers. Grasp front of bench and bring heels over until rollers touch back of thigh.	
Bench press	Chest, arms and shoulders	Lying face up on bench, hold bar with overgrip (palms forward) and with hands slightly wider than shoulders. Push bar up and then lower until it touches the chest.	
Upright rowing	Upper arms and shoulders	Using an overgrip (knuckles on top) hold bar in front of body with hands five centimetres apart. Lift the bar to the chin, keeping the elbows higher than the bar and then return.	
Lats pull-down	Back	Space hands widely apart on the bar. While kneeling, pull the bar until it touches the back of the neck.	

(continued)

Table 12.2 *(continued)*

Exercise	Muscle group	Description	Illustration
Heel raise	Calf muscles	With bar across shoulders and back straight, place balls of feet on a board. Keeping the body erect, rise on toes as high as possible and lower until heels touch the floor.	
Crunches	Abdominals	Hold a weight on the chest. Lie with the hips flexed. Sit up with curling action, taking shoulders as far off the ground as possible, then return to the floor.	
Back extensions	Lower back	Lie across a bench with heels hooked under a roller. Place hands behind head and bend forward until trunk is at right angles to the legs. Raise body to straight position.	
Lateral raises	Deltoids	From a prone position on a bench, grasp dumbbells. Raise sideways to a horizontal position. Return to start. Do not lock elbow joint during the movement.	
Barbell curls	Arms (biceps)	With arms shoulder width apart, hold bar at thigh height, palms facing out. Lift bar to shoulders and return in a smooth continuous movement keeping the back straight.	
Military press	Arms and shoulders	Standing erect and using an overgrip, extend the arms vertically, hold and return to the bent arm position in front of the chest.	

APPLICATION

Designing a strength development program

Use the exercises shown in table 12.2 (pages 457–58) and the prescription in table 12.1 (page 454) to develop a strength program for a sport of your choice. Other exercises such as those using elastics or hydraulics may also be included. Ensure that all major muscle groups are addressed, particularly those specific to your sport.

Compare your program with others in the class.

Isometric training

During **isometric training** (or static training), muscles develop tension but do not change in length.

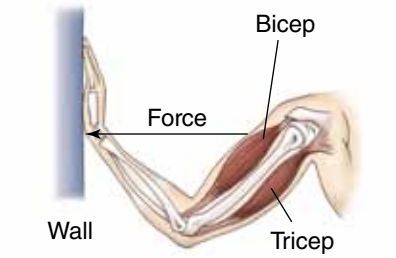


Figure 12.10: An example of an isometric exercise where force is exerted and tension in the muscles is increased, but muscle length remains the same

Isometric training programs are not as popular as isotonic programs, although they do have value. In isometric training, the resistance is fixed and remains so regardless of the amount of effort. A typical isometric exercise is pushing against a wall (as shown in figure 12.10) or pulling against an immovable object. Tension develops in the muscle because there is resistance, but the muscle does not shorten since the object will not move. A difficulty with isometric training programs is that isometric gains cannot be measured using isometric equipment, so there is a need for alternative programs, such as free weights, to gauge success.

The best strength gains through isometric training programs are made using six to eight repetitions, each lasting six seconds. Training should occur on four to five days each week. Isometric exercises must be performed at the joint angles where the strength is needed; for example, at the beginning, middle, or end of the contraction. Therefore, the full development of a muscle could require the application of an isometric force at four or five different angles through the range of motion of the joint.

The advantages of isometric training are that:

- equipment needs are minimal
- it is helpful to overcome weaker points ('sticking points') in the muscle
- it takes little time, is simple to learn and easy to perform
- it is valuable in rehabilitating an injury, such as a muscle tear
- much can be performed in a variety of places — for example, kitchen or office.

Disadvantages of isometric training are that:

- it does not increase strength through the full range of motion of the joint unless applied at all the respective angles
- it causes a rise in blood pressure
- speed is reduced through strengthening in a static position
- other methods, such as isotonic testing, must be used to measure progress
- it does not produce muscular endurance
- most benefits occur early in training.

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See more
Isometric training
Practice HSC exam questions

Measuring and monitoring strength training adaptations

As a result of participating in a strength training program, a number of adaptations should be evident. These include:

- an increase in general strength, power and local muscle endurance
- increased core strength
- a specific strength increase in targeted muscle groups
- neural adaptations, for example, greater motor unit recruitment

- muscle hypertrophy, particularly in fast twitch muscle fibres, leading to increased force and power capability
- increased strength in supporting ligaments and tendons
- increased stores of creatine phosphate
- increased bone mineral density
- changed body composition including decreased percentage of body fat.

There are a number of ways of measuring and monitoring strength improvements using recognised tests. All strength tests aims to assess the initial level of strength and then monitor changes through regular assessment. The selected test should target the body area that is the main focus of the training program, for example, leg power for high jumpers. While there are a number of tests to choose from, the selected test needs to be valid, reliable, safe and simple to administer.

Popular strength measurement tests include:



- use of dynamometers or tensiometers in a laboratory, such as the push-and-pull test using a strength meter dynamometer. For more information about this type of testing, use the **Fitness testing** weblink in your eBookPLUS.
- selected 1 RM test. These tests assess the maximum weight that can be lifted once. They can be applied to most parts of the body, for example, a squat to measure leg strength or a bicep curl to measure arm strength.



Measuring and monitoring strength



Use the weblinks in your eBookPLUS to locate any two of the strength tests listed below. Read the procedures for each. Describe a test that would be suitable to monitor strength gains made by athletes in a rowing program.

- A **general body 1 RM test**
- The **1 RM bench press test**
- An **isometric leg strength test**
- An **isometric back strength test**

Safe and potentially harmful strength training procedures

There is potentially a high risk of injury when executing strength training programs if certain procedures are not followed. Below is a list of safety practices that relate to most forms of strength training. Participants should be aware of these before beginning a strength training program as incorrect form and execution of lifts can result in injury.

- Use only safe and well maintained equipment.
- Precede specific strength training programs with a general program focussing on core and total body strength.
- Warm up before beginning any strength training program.
- Choose exercises where the level of skill is appropriate to the user.
- Begin with big muscle multi-joint exercises.
- Use spotters on difficult lifts.
- Ensure controlled execution (as opposed to jerkiness) of movement regardless of the speed at which the exercise needs to be performed.
- Focus on development of core strength, balance and stability during lifts. Avoid cheating or the urge to use other muscles to assist with the lift, for example, engaging the back muscles to assist in execution of a biceps curl.



Figure 12.11: There are many forms of continuous training but they are all characteristically of low to moderate intensity and long duration.

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Practice HSC exam questions

- Don't hold your breath but rather exhale at the point of greatest exertion.
- Ensure exercises are balanced so that opposing muscle groups are loaded equally with the target muscle groups.
- Progressively overload muscles, but only in small increments. Never use weights that are too heavy as this practice will cause injury.
- Perform single-joint and isolation exercises towards the later part of each session.
- Allow appropriate recovery between exercise sets and sessions.
- Cool down upon concluding each session.
- Avoid overtraining by allowing rest days between sessions.

Aerobic training

Please review chapter 5, pages 149–52 for foundation information on this section.
Aerobic training engages and develops the aerobic system of energy supply. Training, whether it is continuous, Fartlek or long interval, will be sustained, of moderate intensity and address the overload principle.

Continuous/uniform training

Continuous training provides a foundation for most other methods of training including anaerobic training. Because it is sustained, enduring and, in most cases, of low to moderate intensity, continuous training provides the groundwork for other forms of fitness. Generally, continuous training is used to improve cardiorespiratory endurance, local muscular endurance and overall aerobic capacity. However, elite athletes intermittently use high-intensity continuous training to develop leg speed prior to competition.

Continuous training requires working at a level of intensity appropriate to one's fitness level and performance needs. Joggers need to work at only 50–60 per cent of their maximal heart rate. However, athletes in marathons, triathlons and five to 10 kilometre races need to work at higher levels of intensity. This is illustrated in table 12.3.

Table 12.3: Ways of adapting continuous training to performance needs

Intensity (% maximal heart rate)	Pace/ predominant energy pathway	Duration	Performance needs
50–60	Easy Aerobic	60 minutes +	Joggers Ultra distance runners
60–70	Moderate Aerobic	45–90 minutes	Marathon runners
70–80	Slightly faster Aerobic	35–40 minutes	Marathon runners 10 km runners
80–90	Fast Anaerobic	10–20 minutes	Marathon 5 km runners
90–100	Very fast Anaerobic	1–5 minutes	800 m runners 1500 m runners

Source: Based on http://www.brianmac.co.uk/conintrn.htm.

Aerobic, continuous training develops both glycogen and fat utilisation in the provision of energy. It improves cardiorespiratory efficiency, particularly stroke volume, contributing to significant reduction of heart rate both during work and at rest. The prinicple of overload is important in continuous training both to instigate adaptations and maintain the higher level of fitness achieved.

The most effective way of doing this is to increase duration, which in turn increases work volume. Three to four times per week is generally sufficient to satisfy frequency requirements, although elite athletes will train on five to six days per week. Intensity can be increased up to a point. Once a person trains at 80–90 maximal heart rate, the anaerobic pathway gains greater benefits than the aerobic system.

High-intensity continuous training is performed at intensities between 80 and 100 per cent of maximal heart rate. This form of training is exceedingly strenuous and demands a lot of the athlete physically and psychologically. High-intensity continuous training can significantly deplete energy stores and contribute to muscle fatigue. For this reason, it is generally used on an occasional basis or when specifically required to improve leg speed or to develop the anaerobic pathway as might be required towards the conclusion of a marathon.

Athletes who typically benefit from continuous training are runners, cross-country skiers, joggers, cyclists, triathletes, footballers of all codes (particularly during pre-season) and graded tennis players. For some, continuous training is their predominant form of training. For others, continuous training provides the aerobic base on which to build many other fitness components.

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Fartlek training

Like continuous training, Fartlek is also a beneficial form of aerobic training and can provide substantial cardiorespiratory benefits. Pace and terrain variations employed with Fartlek training mean that some thought and planning needs to be given to enable full benefits from this training technique.

There are many different types of Fartlek training. Elite athletes vary the type of Fartlek to suit their individual needs. For example, Watson Fartlek is used in preparation for cross-country. Whistle Fartlek may be used where motivation has waned or there is a need for variety. Types of Fartlek training and their specific features are summarised in table 12.4.

Table 12.4: Types of Fartlek training

Fartlek type	Target activity	Warm-up/ cool-down	Specific features
Watson Fartlek	3 km, 5 km, 10 km and cross-country	10 minutes warm-up 10 minutes cool-down	Stride hard for 4 minutes with 1 minute jog recovery Repeat 8 times
Saltin Fartlek	3 km, 5 km, 1500 m	10 minutes warm-up 10 minutes cool-down	Stride hard for 3 minutes with 1 minute jog–run recovery Repeat 6 times
Astrand Fartlek	800 m	10 minutes warm-up 10 minutes cool-down	Maximum effort for 75 seconds followed by 150 seconds jog–run Maximum effort for 60 seconds followed by 120 seconds jog–run Repeat 3 times
Gerschler Fartlek	General fitness Steady state running	10 minutes warm-up 10 minutes cool-down	Stride hard for 30 seconds, jog 90 seconds Repeat with 15 second decreases in recovery jog; for example, 30–90, 30–75, 30–60, 30–45, 30–30, 30–15 Repeat 3 times
Whistle Fartlek	General Provides variety	10 minutes warm-up 10 minutes cool-down	Run hard between whistle blasts. Pyramid session of 4 minutes, 3 minutes, 2 minutes, 1 minute, 2 minutes, 3 minutes, 4 minutes with a 60 second jog–run recovery between each run
Fartlek for games players	Games General fitness	10 minutes warm-up 10 minutes cool-down	Incorporate running, jogging, walking, change of direction, backward running, sprinting into creative patterns and movements

Source: Based on http://www.brianmac.co.uk/fartlek.htm.

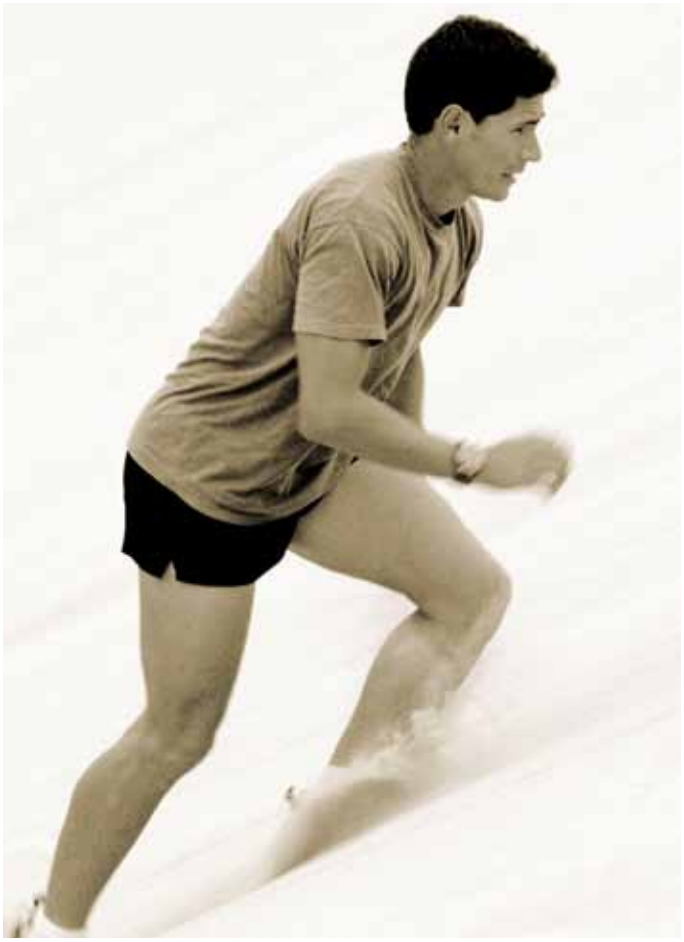


Figure 12.12: Fartlek training utilises speed play over a variety of terrain.

An all-purpose program for Fartlek training requires general running interspersed with periods of higher paced running over varying terrain. These short bursts may continue for 100–200 metres or so followed by recovery jogging. During the recovery period, ventilation rate should come back to where it was before intensity was increased and the jogger should feel that energy stores have been replenished. This period is then followed by another burst. However, the intensity level is marginally increased, challenging the overload principle. This cycle is repeated for the duration of the session. It is important that athletes learn to monitor their feelings and be aware of physiological responses, such as heightened levels of lactic acid, and modify effort appropriately.

A typical all-purpose session might include the following:

- warm-up: five to 10 minute jog
- steady run for 1.5–2 kilometres
- recovery: walking/jogging for five minutes
- speed work: periods of low-paced running followed by short sprints
- easy running incorporating three or four 'quick steps'. Follow this by quick acceleration/deceleration running.
- easy running for five minutes
- speed play: uphill/downhill for 100–200 metres
- easy running
- high-intensity running for two minutes
- repeat the program twice
- cool-down following final session.

For elite athletes, Fartlek training incorporates the same principles, but overload is increased and speed over short distances targeted for specific development. At this level, there is a strong resemblance between Fartlek and interval training. However, the biggest difference is that Fartlek training covers diverse terrain, uses variable interval distances and encourages pace judgement based on feelings rather than specific time requirements.

APPLICATION

Fartlek training session

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Use the **Fartlek training** weblink in your eBookPLUS. Use the information as a basis for construction of a sample Fartlek training session relevant to a sport or activity of your choice. Compare your session with those in the class.

Long interval

Long interval training uses repetitions of high speed intensity work followed by periods of recovery to develop aerobic fitness. Like resistance training, interval training has specific terminology. Intervals when repeated are called repetitions and a group of repetitions is called a set. Pace refers to the time taken

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to run an interval. While this training method is commonly used to enhance anaerobic capacity, it has proved excellent in developing aerobic fitness.

Long interval training is a preferred form of training by distance runners, triathletes and footballers in preparation for competition. Unlike Fartlek training, long distance interval training is practised on athletics tracks or flat grounds. The principles are the same as for anaerobic interval training, except that the interval distances are considerably longer, the type of activity may vary within the interval and the rest period is shorter.

Work phases in long interval training usually range from two to five minutes and these are followed by rest phases that may be only 30 seconds. Variety can be added by changing the work–rest ratio each time an interval is run. For example, an interval with a work–rest ratio of five minutes:30 seconds could be followed by a five minute:45 second interval. Mixed intervals are then repeated for 30–40 minutes, ensuring that the aerobic system is progressively challenged.

There are a number of ways of organising long interval training. One method is to specify a set distance, say 400 metres, and run at a predetermined speed over the distance, reaching the finish within the allocated time period. This is followed by walk recovery and a repetition of the run until the required number of intervals has been completed. An alternative method is to vary the activity within the interval between jog, walk, run and rest. The interval distance can be set at, say, 600 metres, or varied as in a 'ladder' workout where interval distances could change from anywhere between 400 and 1600 metres or more, depending on which interval was being run. This latter method provides a lot more variety and suits athletes whose competition demands require work over multiple distances.

Interval training has the advantage of being able to be tightly monitored while providing variety within the workout. It can even be performed at fitness centres using stationary bikes and rowing machines. Near maximal workouts over pre-established time periods are followed by rest recovery or low-intensity recovery, effectively mimicking an outside workout.

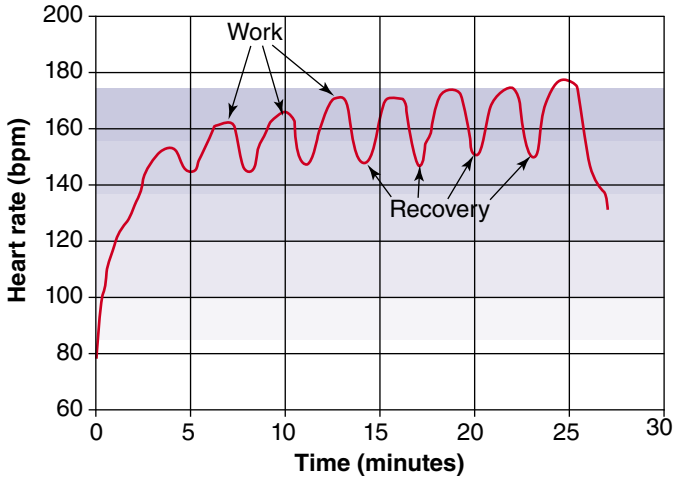


Figure 12.13: A typical graph showing heart rate response to work–recovery intervals over a period of time

Aerobic training improves energy supply and performance of the aerobic system. The effects of training on the aerobic system are summarised in table 12.5.

Table 12.5: The effects of training on the aerobic energy system

Area	Effect	How this improves training
Fuel storage and utilisation	Increased haemoglobin	More oxygen is carried to the working muscles.
	Increased myoglobin	More oxygen is delivered from the cell membrane to the mitochondria where fuel is burnt.
	Increased ability to use fat	The reserve fuel can be used earlier in endurance events.
	Increased storage of ATP and CP	Immediate fuel storage is increased up to 25 per cent.
	Increased glycogen storage	Fuel for lactic acid and aerobic systems is increased.
	Increased ability to use glucose	Increased enzyme activity enables faster breakdown of glycogen.
Oxygen transport system at rest	Increased heart size	This is particularly evident in size of left ventricle, making more blood available per beat.
	Decreased heart rate	This is a sign of increased heart efficiency, as it is able to supply the required blood with less beats/minute.
	Increased stroke volume	More blood is available per stroke.
	Increased cardiac output	More blood is available to tissues.
Oxygen transport system at maximal exercise	Increased oxygen uptake	There is an increased ability of muscles to extract and use the oxygen being delivered in the blood.
	Increased cardiac output	More blood is available to tissues.
	Increased stroke volume	More blood is available per stroke.
Respiration	Increased efficiency	More oxygen is extracted from air to alveoli and delivered to muscles.
Other	Increased muscle size	This produces more strength.
	Decreased body fat	There is less excess to carry in endurance events.
	Increased strength and power	Produces faster, more forceful movements.
	Increased muscle elasticity	There is increased muscle power and less likelihood of injury.
	Increased mitochondria	There are more sites on muscle fibre for burning fuel.

Measuring and monitoring aerobic training adaptations

Aerobic training changes the way the body functions, particularly in regard to heart rate, energy supply, metabolism and breathing. Some of these adaptations include:

- improved heart strength and efficiency resulting in an improved ability to pump blood
- decreased resting and sub-maximal exercise heart rate
- improved lung ventilation and increased ability to extract oxygen from the lungs
- improved glycogen storage, increasing the ability to perform longer before exhaustion
- increased number of red blood cells resulting in a greater ability to transport oxygen
- increased capillary density making more oxygen available in the muscle cells
- strengthening and enlargement of skeletal muscle
- increased size and efficiency of slow-twitch fibres

- improved body composition, general health and fitness such as confidence, posture and alertness.

There is a range of test protocols used to measure and monitor training adaptations that occur in response to an aerobic training program. Field tests such as the multi-stage fitness test are popular because they are reasonably accurate and easy to administer. Other tests such as VO_2 max tests and body composition tests are performed in the laboratory. More sophisticated testing may involve blood sampling. Ultimately, the best measure of training adaptations in response to an aerobic training program will be gradual improvement in performance in the distance or event that is the target of the training program.



Measuring and monitoring aerobic training adaptations

eBookplus

Use the weblinks in your eBookPLUS to find a range of tests that could be used to measure and monitor aerobic training adaptations. Choose a test which could be used for an elite rugby league player and another for a marathon runner. Justify your choice for each.

- The **multi-stage fitness test**
- The **2.4 km run test**
- A **body fat percentage test**
- A **VO_2 max step test**
- The **Astrand 6-minute cycle test**

Safe and potentially harmful aerobic training procedures

Although the level of intensity is not usually high, the duration and repetitive nature of aerobic training can lead to injury. Some safe practices include:

- get medical clearance before beginning a program
- learn the correct technique for all training exercises
- set goals that are within your ability
- ensure an effective warm-up and cool-down
- progressively overload in a slow, controlled manner, for example, increase intensity and duration but not both at the same time
- let adaptations take place before moving to the next level
- avoid overtraining by varying the type of training and taking rest days
- incorporate cross-training to provide variety and load different muscle groups.



Aerobic training

Choose a sport or activity where aerobic fitness predominates. Construct a list of activities that would be useful in developing aerobic fitness relevant to your selection. Include continuous, Fartlek and long interval components. Arrange the activities into a program that could be used over a one week period. Ensure that issues related to frequency, intensity, duration and variety are addressed together with ways of measuring improvement.

Discuss your program with the class.

Anaerobic training

The **anaerobic system** functions to enable energy production during the absence of oxygen.

Training for improvement in speed and power relates specifically to the **anaerobic system**. Development in this area helps athletes to hit harder, jump higher, run faster and throw further. These attributes are required in a range of games, individual sports and all athletic events.

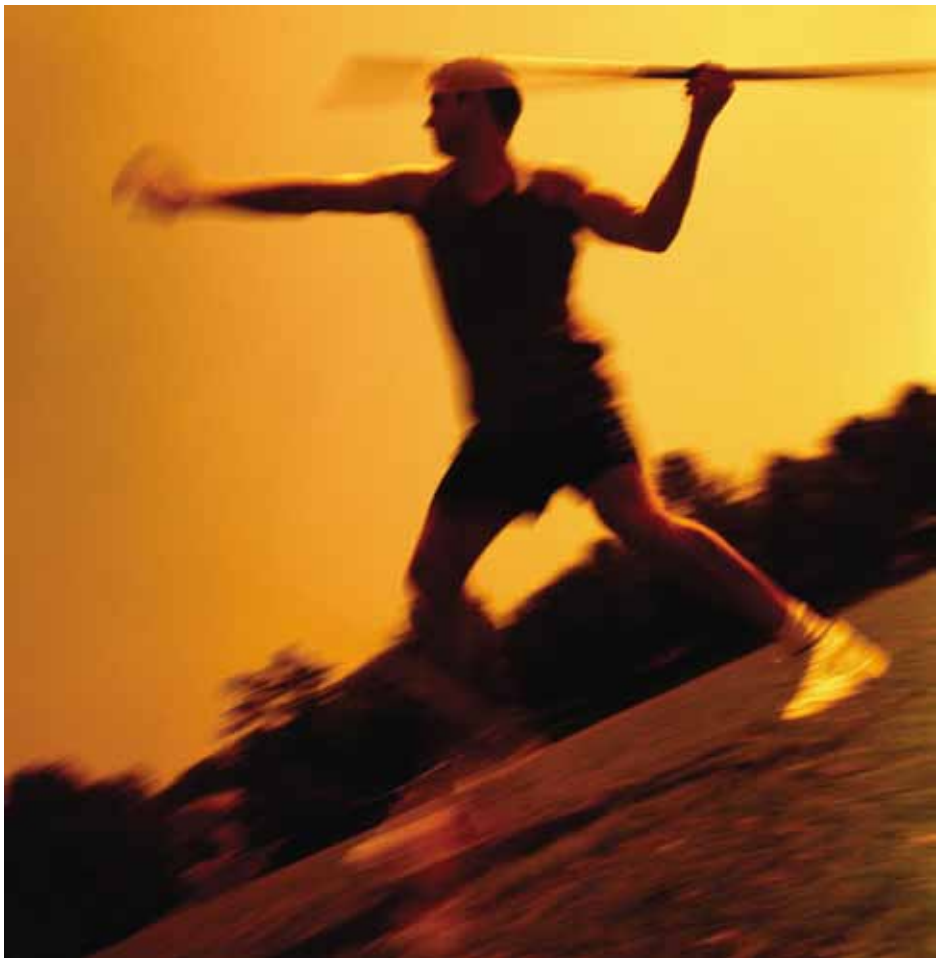


Figure 12.14: Anaerobic training targets explosive type movements and activities.

Developing power through resistance/weight training

The anaerobic system is the dominant pathway for energy supply during explosive activities such as weight-lifting, throwing and sprinting. An athlete who trains for anaerobic events using exercises and practices that simulate what is required in the game or activity will further develop the capacity of the fast-twitch fibres.

Power is the rate at which force is produced per unit of time.

Resistance training builds **power** through recruiting and enlarging muscle fibres. Power equals force multiplied by distance divided by time and, as such, can be increased by manipulating any one of the three variables — force, distance or time — while keeping the other two constant. For example, power is increased by decreasing the length of time a movement is performed while keeping force (resistance) and distance constant. This equates to performing a movement explosively. Therefore, to increase power using resistance training, movements need to be performed quickly, causing preferential recruitment of fast-twitch fibres.

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Figure 12.15: There are many ways of creating resistance to increase power.

Starting strength is the ability to 'turn on' as many muscle fibres as possible in the performance of a movement.

Explosive strength is the ability to extend the 'turned on' period of explosiveness.

Strength is a major component of power. This gives rise to the term 'strength dominated power', which refers to power in which strength is the dominant ingredient. **Starting strength** and **explosive strength** are two important components that influence power development.

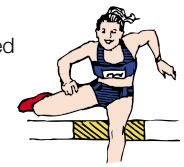
Starting strength is very important in movements such as power lifting, where inertia must be overcome and momentum generated before residual ATP supplies are depleted. Remember that we have sufficient ATP for a short explosive movement lasting a second or so. Following that, we rely on resynthesis of ATP by the reserve energy substance, creatine phosphate, to enable us to continue the movement. 'Turning on' high numbers of motor units energises athletic movements, making them characteristically explosive.

The explosive strength phase is characterised by the application of force at a rapid rate and seen in acceleration of the body or object. The muscle fibres contract quickly as creatine phosphate works rapidly and repeatedly, resynthesising ADP back to ATP. Explosive strength is important in activities such as shot-put, javelin throwing and high jump. The development of strength to improve power is crucial. However, emphasis on strength development at the expense of explosiveness results in strength production but with an inability to make the movement powerful. The resultant action has a low rate of utilisation of fast-twitch fibres, preventing a quick contraction of muscle fibres.

Resistance training programs designed to develop power and speed seek to enhance fast-twitch fibres involved in the activity. These are recruited when exercises are performed at speed and closely resemble the movement required in the sport. If the resistance (weight) is too heavy, the exercise will necessarily be performed slowly, leading to recruitment of slow-twitch fibres. A power-dominated resistance training program for a high jumper would address general strength throughout the body, but give particular attention to leg flexion and extension exercises in accordance with the power prescription.

An exercise prescription for the development of power is illustrated in table 12.6.

Table 12.6: Prescription for developing power in a resistance training program

Purpose	Weight resistance	Repetitions	Sets	Exercise speed	Time between sets (mins)
Power (beginners/ non-competitive adults) 	Medium–heavy 60–75% RM	5–10	3–5	Fast	Medium 2–3
	Caution needs to be heeded with power programs as heavy weights lifted quickly can cause injury. Beginners should use medium weights and focus on correct technique. Train on 3 days per week.				
Power (experienced athlete) 	Heavy 75–85% RM	3–8	3–5	Fast	Medium 2–3
	Weight chosen must allow a fast action. If the weight is too heavy, endurance will develop at the expense of power. At least 2 minutes between sets is essential to enable sufficient phosphate recovery in the muscle to power another explosive action. Train on 3–4 days per week.				

* RM = repetition maximum = the maximum weight a person can lift a specific number of times (e.g. 8 RM is the maximum weight that can be lifted eight times).

To develop speed, the resistance is medium to high and the contractions are executed quickly. Movements, although fast, must be rhythmical. By commencing slowly when beginning a program and working on technique, speed techniques can be developed in a smooth, sustainable manner. The principle of specificity to the activity is important. Activities requiring application of explosive forces to propel implements (discus, javelin and shot) require higher resistances and fewer repetitions during resistance training. Programs designed to develop power and endurance (for sports such as basketball and soccer) require use of moderate resistance, with more repetitions than required for explosive activities. However, there still needs to be emphasis on speed during execution of the movements to ensure appropriate power development.



Resistance training program

eBookplus

Use the **Resistance training** weblink in your eBookPLUS. Use information at the site together with what you have read to design a resistance training program that develops power/speed for a specific sport. Detail your exercise prescription.

Plyometrics

Plyometrics refers to a special range of exercises in which a muscle is lengthened using an eccentric contraction and this is rapidly followed by a shortening or concentric contraction.

Gains in strength can be converted to power only by the use of specific training approaches that 'program' the muscle fibres to contract quickly. One of the most widely used practices for doing this is **plyometrics**.

Plyometrics has considerable value in power development because it has been demonstrated that if a muscle is stretched (preloaded) before it is shortened, it will contract more forcefully. The elastic recoil of muscle fibres results in a more powerful movement. In other words, a muscle has the potential to develop maximum tension if it is stretched rapidly. The faster it is forced to stretch, the greater will be the tension that can be applied.

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See more Plyometrics

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Plyometrics has been used for a number of decades to improve performances in sports such as athletics, basketball, Australian rules and weightlifting, where the development of reactive power is critical. Exercises that use plyometrics type movements use body weight and gravity to instigate the eccentric contraction or 'cocking' phase that energises the muscle's recoil ability.

Instinctive use of plyometric principles is seen in athletes such as high jumpers, who lower their centre of gravity immediately prior to the jump. Also, a person performing a vertical jump is always observed bending knees and dropping their arms to their sides just prior to the jump. Typical movements used in what is commonly called explosive jump training are standing jumps, multiple jumps, depth jumps and bounding. Many of these are illustrated in figure 12.16 below.

APPLICATION

Developing a plyometrics program

Develop a series of plyometric exercises that might be suitable for a sport you play or a sport you like. A range of plyometric exercises is available at the **Plyometrics** weblinks in your eBookPLUS.

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As a class choose the 12 best and have students whose exercises have been selected demonstrate that exercise to the class. Compile the exercises and elect one student to run the class through the program.

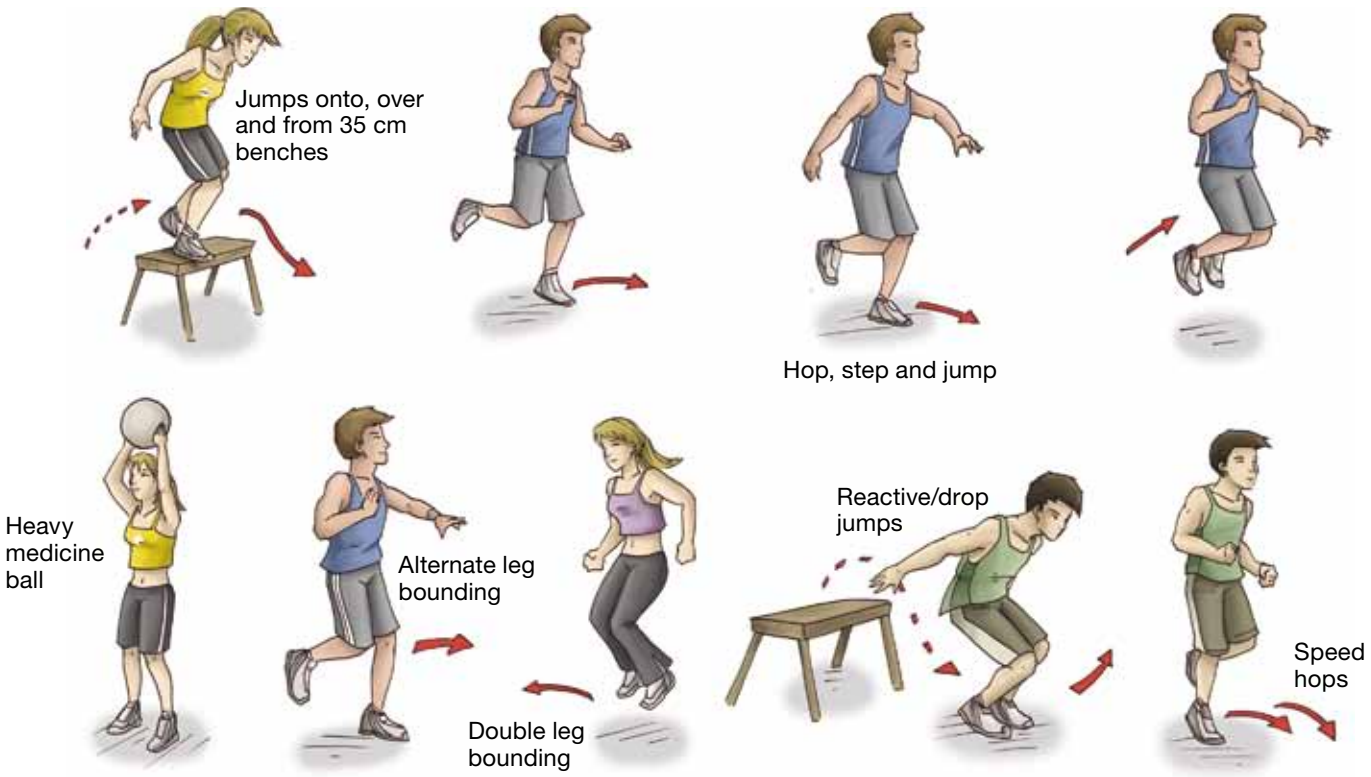


Figure 12.16: Examples of high-impact plyometric drills

INQUIRY

Using power programs safely

Outline the potential dangers of resistance training programs for power and plyometric training. What precautions need to be taken before commencing power programs?

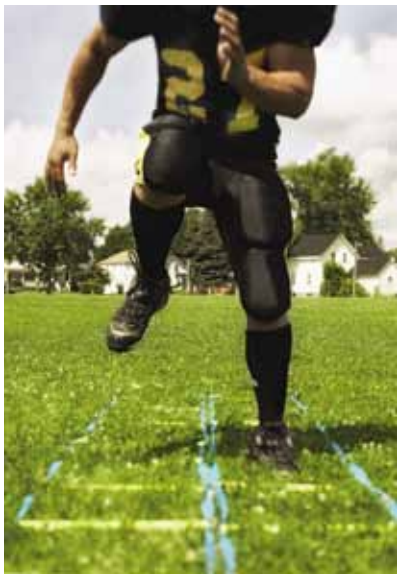


Figure 12.17: Short interval training increases the capacity of the anaerobic system.

Short interval

Short interval training is similar to long interval training except that the intervals are brief and recovery longer to enable restoration of ATP stores. Once again, the method involves alternating short bursts of intense activity with periods of rest or recovery. Initially, low intensity intervals supported by sufficient recovery should dominate the training program. However, as fitness improves, progressive adjustments to variables (rest, intensity, distance, repetitions) must ensure that the program addresses the overload principle. Ultimately, short interval training aims to raise the anaerobic threshold.

Interval training should be adapted to meet the specific needs of the sport, activity or fitness goals. If short interval training is aimed at improving performance in games, work intervals should mimic patterns and directions that will feature in the game. This may require short runs with sidesteps, swerves and/or pivots and an acceleration/deceleration phase to follow.

Short interval training improves the ability of the muscles to tolerate lactic acid. Work that is of very high intensity and of short duration engages the anaerobic system. An ATP-PC target interval program might require the athlete to work at 95 per cent intensity for 15 seconds and follow this with a one minute recovery. This will allow almost complete resynthesis of creatine phosphate stores. Fifteen to 20 repetitions would then be required to complete the set.

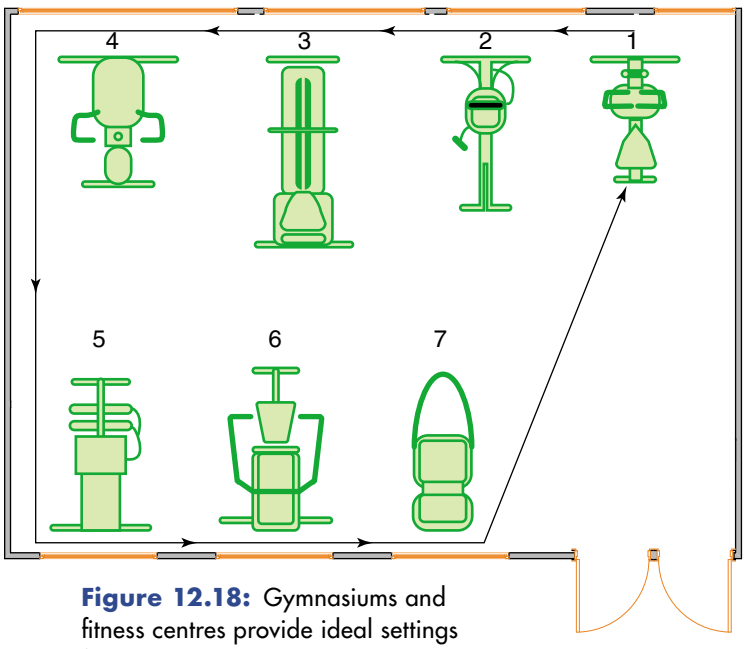


Figure 12.18: Gymnasiums and fitness centres provide ideal settings for short interval anaerobic training using machines and utilising a circuit format.

In contrast, a short interval program that targets lactic acid system enhancement would require less intensity (75–85 per cent) but a longer distance, taking around 30–45 seconds to complete each repetition. This effort produces lactate as the anaerobic threshold is approached and possibly exceeded. Increased tolerance to lactate is a reward for training at this level of intensity. This type of interval training requires the athlete to use active recovery such as walking or a slow jog to assist dispersal of lactic acid.

Short interval training can also be performed utilising a circuit format. This may have stations where short sprints are required, but other stations where resistance training exercises such as push-ups, together with other activities such as skipping, plyometrics and agility drills, are incorporated. Each specific exercise is the work component while the rest interval is taken while moving to the next station. Short interval programs can also be developed using stationary cycles in fitness centres and using the same technique for work:rest periods as just mentioned.

Following is an example of how short interval training can be applied to a games program.

1. Warm-up: three to five minutes
2. Two minutes moderate or high-intensity sprints
3. Two minutes low-intensity jogs, forward, backward and sideways
4. Repeat steps 2 and 3
5. One minute high-intensity agility sprints
6. One minute moderate-intensity recovery runs
7. 30 seconds high-intensity bursts through markers, simulating evading opponents

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8. 30 second low-intensity recovery jog
9. Repeat steps 7 and 8 four times
10. Six, 50 metre sprints followed by one minute recovery
11. Five minute cool-down.

Measuring and monitoring anaerobic training adaptations

Anaerobic training is characterised by movements such as accelerating, heavy weight lifting, jumping and throwing. These involve maximal effort through rapid muscular contractions. When subjected to activities of this nature, the body adapts in specific ways, many of which are measurable.

Some adaptations that become apparent as a result of anaerobic training include:

- increased speed
- increased power
- ability to perform high-energy exercise for longer periods of time
- increased tolerance to lactic acid
- increased energy substrate levels, namely ATP, creatine phosphate and glycogen
- greater muscle hypertrophy and improved recruitment of fast-twitch muscle fibres
- reduced fat
- increased bone strength
- increased lean body mass.

Some of these adaptations can be monitored though testing. Tests need to specifically address the area of anaerobic capacity for which the training program has been designed. For example, if improved strength is the focus of the program, a specific strength test needs to be used to monitor improvements.



INQUIRY

Measuring and monitoring anaerobic training adaptations

Use the weblinks in your eBookPLUS to read about the following tests of anaerobic capacity. Choose an appropriate test for athletes training for sprint cycling and track sprinting. Justify your choice.

- The **30 second Wingate test**
- The **Running-based anaerobic sprint test**
- The **30 m acceleration test**
- The **PWC-170 cycle test**
- The **Bench press test**

Safe and potentially harmful anaerobic training procedures

High-intensity activity — whether it is in short bursts or involves high resistance — has the potential to be dangerous. They cause quick rises in lactate leading to muscle fatigue. Observance of the following safety guidelines will assist in preventing injury:

- Have a medical clearance before beginning the program.
- Always warm-up and cool-down.
- Use a longer warm-up than you would use with aerobic training because anaerobic work will place more stress on muscles and joints.

- Build a base for anaerobic training by beginning with low-intensity aerobic work.
- Avoid high-intensity work if pregnant.
- Learn to do exercises correctly, particularly with plyometric-type exercises.
- Use correct form and technique when lifting weights.



Short interval training

Choose any sport. Investigate and develop a short interval training program suitable for that sport. Conduct a selection of your programs with the class.

Flexibility training

Flexibility is the range through which joints and body parts are able to move.

Flexibility training requires that muscles stretch or lengthen safely. Muscle strength and muscle length are both directly related to the number of muscle fibres engaged. Just as muscle contraction is more forceful if many fibres are engaged, the total length of a stretched muscle is proportional to the number of fibres stretched. When a muscle is stretched, some fibres lengthen while others remain at rest. The more muscle fibres that are stretched, the more length is developed by the muscle for a given stretch.

Stretching and improved flexibility are important for a number of reasons, including:

- injury prevention
- injury rehabilitation through stretching scar and surrounding tissue, making it more functional
- improved skill execution
- minimising post-exercise muscle soreness, particularly through use of static stretching
- reducing musculoskeletal discomfort through postural improvement.

All stretching movements need to be safe. The body has an in-built safety mechanism called the *stretch reflex* to warn about elongating fibres beyond safe limits. When the muscle is stretched, so is the muscle spindle, which then acts to register changes in length of the fibre. The message is sent to the central nervous system (CNS), which activates the stretch reflex. This unit responds by causing the stretched muscle to contract.

The more abrupt the change in muscle length, the more forceful will be the muscle contraction. This mechanism helps to protect the body from injury. Safe flexibility exercises require stretches to be slow, controlled and sustained for periods of time. This allows the muscle spindle to become accustomed to the new length and, as a result, reduces its signalling to the central nervous system. Stretching on a regular basis is advocated to progressively teach stretch receptors to allow greater lengthening of the stretched muscles.

Flexibility is affected by a number of factors including:

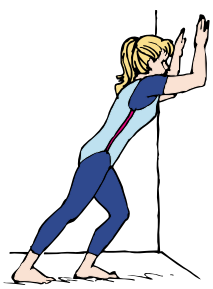
- *age* — muscles shorten and tighten with age
- *gender* — generally speaking, females are more flexible than males
- *temperature* — increased temperature, both atmospheric and body, improves flexibility
- *exercise* — people who are frequently involved in exercise are usually more flexible than sedentary people
- *specificity* — flexibility is joint specific. The fact that a person is flexible in the shoulders does not automatically mean similar flexibility exists in the hips.

A flexibility training program needs to be conducted with certain guidelines in mind. These include:

- performance of a safe stretch program on at least three to four occasions per week
- ensuring muscles are warmed up before stretching
- stretching no further than the muscles will go without pain
- not aiming at excessive flexibility, as this causes joint instability and increased risk of injury.

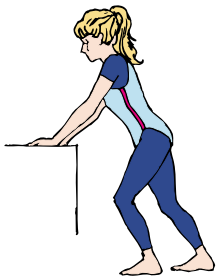
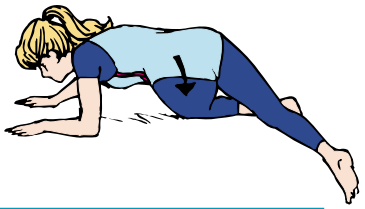
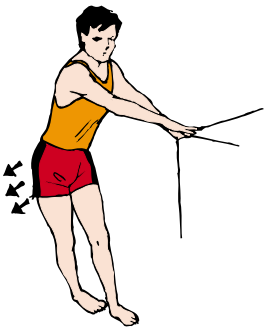
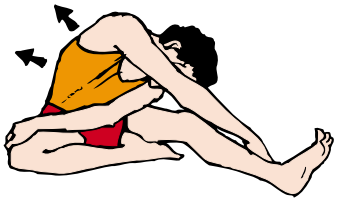
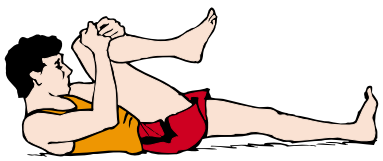
Team sports such as football, basketball, netball and hockey can cause muscle tightness and shortening because the muscles do not experience the full range of movement. Stretching during the warm-up and cool-down phases can promote the flexibility that will assist these activities. The overload principle applies equally to flexibility training. In other words, the muscle must be stretched beyond its normal length (by approximately 10 per cent) to cause changes to take place; that is, to increase flexibility. Table 12.7 illustrates some stretching exercises that could comprise a flexibility program for sprinting.

Table 12.7: Stretching exercises for a sprint training program

Stretch	How performed	Illustration
Quadriceps stretch	Clasp the foot first with one hand and pull the foot towards the buttocks. Keep knees close together. Do not arch the back or flex the hip. Tilt the pelvis posteriorly and shift the front of the thigh forward. Do not flex at the hip. Repeat with other foot.	
Hamstring stretch	Standing, let the knees bend as you touch your toes. Now straighten one, then the other. Do not bounce. Now cross the legs and repeat to stretch both hamstrings.	
Adductor stretch — sitting	Sit with soles of feet together and with the elbows resting on the inside of the knees. Gently counter-resist on the knees, then relax and let the legs stretch closer to the floor.	
Calf stretch	Leaning against a wall, lift the arch of the foot slightly. Keep the hip and the knee in a straight line and lean forward. Stretch each leg separately. Do not let the arch collapse to a flat-footed position as you do this stretch, as this may cause overstretching of ligaments in the foot.	

(continued)

Table 12.7 *(continued)*

Stretch	How performed	Illustration
Achilles and soleus stretch	Leaning against a table, lift the arch of the foot slightly. Keep the hip and the knee in a straight line and lean forward. Now bend the knee to stretch the Achilles tendon and soleus.	
Advanced hip stretch	In the cat stretch position, place one leg at 45 degrees to the body over and behind the other leg. Place the top of this foot to the floor. Let body weight gently stretch into the hip of the bent leg. Do not collapse to the floor.	
Hip abductor stretch	Place the leg to be stretched behind the toes eight to 10 centimetres away from the opposite heel. Turn the toes of the behind leg inwards 30 degrees and let body weight fall into this hip. You may need to rest on heels to get a more effective stretch.	
Latissimus dorsi stretch	Sit with one leg bent and the foot just resting against the inside of the opposite thigh. Place the opposite hand on this leg then bring the other hand over and reach towards the outstretched leg. Clasp the outside of the ankle, look under the elbow and pull up to stretch the side of the trunk.	
Triceps stretch	Put one hand up and behind the neck and resist against the other hand which is placed on the back of the wrist. Point the elbow to the ceiling.	
Knee hug stretch	This is for the hip, gluteus maximus and lower back. Pull one knee up on to the chest. Progress to bringing the forehead to the knee. Advance by keeping the outstretched leg off the ground as you stretch each leg. This will strengthen the abdominals as you stretch the hip extensors.	

Source: Adapted from F. St George, *The Muscle Fitness Book*, Simon & Schuster, Sydney, p. 219.

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See more
Static flexibility training

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Static flexibility

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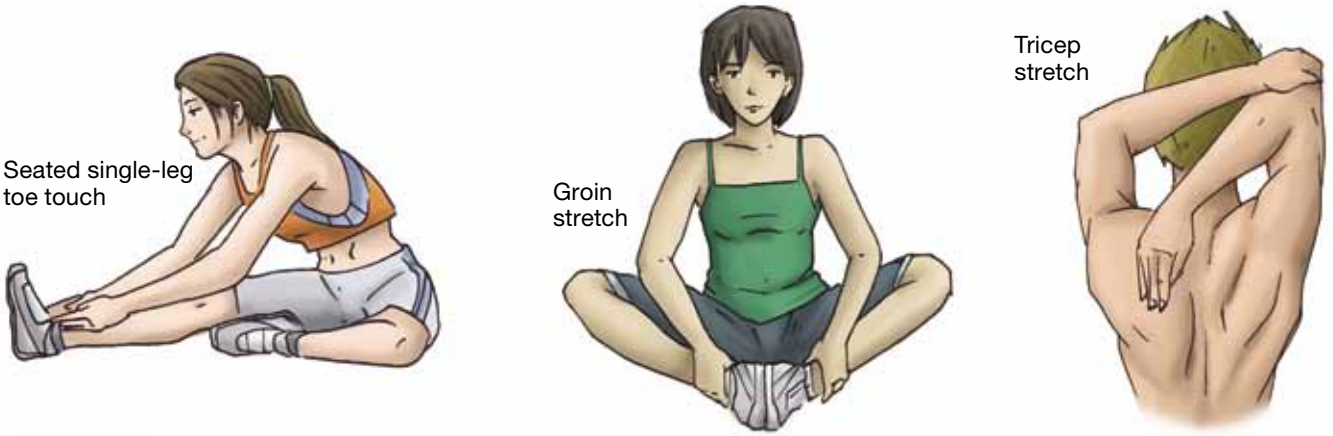
Static, dynamic and ballistic stretching are three forms of flexibility training commonly used by athletes as part of training routines and prior to performance. Many athletes use two or three forms of stretching depending upon the demands of the competition. The principle of specificity when applied to stretching programs suggests that static flexibility is improved by static stretching, while dynamic flexibility is improved by dynamic type movements. Additionally, it should be noted that flexibility is speed specific; that is, the type of movements following stretching that benefit most are those performed closest to the speed developed during warm-up stretching. Some evidence suggests that dynamic stretching is best for the warm-up and static stretching for the cool-down, although a combination of both is preferred for games-based activity.

Static flexibility

Static stretching is a technique whereby a muscle is gradually lengthened and held in that position for a period of 10–30 seconds. Static stretching is commonly used because it is safe and does not require the use of equipment. The movement is smooth and is performed slowly, taking the muscle to a point where there is stretch without discomfort. Static stretching is used extensively in the rehabilitation of injury and the warm-up and cool-down phases of training. An example of a static stretch is sitting down with legs extended and gently reaching forward to hold the toes (without bouncing).

Static stretching is a safe form of stretching in which the stretch is held for a period of 10–30 seconds.

Figure 12.19: Examples of static stretches



APPLICATION

Static flexibility

Brainstorm the class for a range of 10 static flexibility exercises. Have one student organise a warm-up and run the class through the exercises. Choose the best five and list them in your workbook for reference.

Dynamic flexibility

Dynamic flexibility training involves making slow controlled movements through the full range of motion. During dynamic flexibility movements, specific parts of the body such as the arms are moved (for example, circling) in a gradual, controlled manner while reach and speed is gradually increased. There are no jerky movements. The stretch reflex is important in establishing the safe limit to the range of motion.

Dynamic flexibility is the ability to perform extensive muscular movements causing joints to go through a full range of motion.

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Dynamic stretching is a lot safer than ballistic stretching. It is more effective in raising muscle temperature and core body temperature, effectively decreasing the risk of injury. Where activities or sports require slow controlled movements, such as in balance beam routines and ice skating, static stretching is the preferred form of flexibility training. However, where muscles need to be stretched in preparation for forceful movements such as kicking, dynamic stretching is the preferred flexibility method.

Figure 12.20: Dynamic flexibility exercises aim to mimic movements required in the sport or activity.

Ballistic flexibility

Ballistic stretching involves repeated movements such as punching and bouncing to gain extra stretch. It should be practised only by elite athletes, and with care.

Ballistic stretching is used in preparation for athletic events in which explosive movements are required. This type of stretching involves forcing parts of the body beyond the normal range of motion. Ballistic tasks involve activities such as hurdles, boxing, high kicks in aerobic competitions and certain movements in gymnastic routines.

Ballistic stretching is potentially dangerous as it activates the stretch reflex that prevents muscle fibre damage through overstretching. For this reason, ballistic stretching should be used only by advanced athletes and even then should follow a thorough warm-up and another form of stretching. The movements must be controlled and executed rhythmically to avoid jerky actions and excessive momentum at the end point of the stretch. Violent ballistic stretching causes micro-tears in muscle fibres, weakening the tissue or even rupturing the muscle or tendon. An example of ballistic stretching is touching toes using a bouncing motion, as illustrated in figure 12.21.

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Figure 12.21: Touching toes using a bouncing motion is an example of ballistic stretching. It should be used only by elite athletes under supervision as it can damage muscles through overstretching.

Measuring and monitoring flexibility training adaptations

Adaptations that will be evident as a result of a flexibility training program include:

- increased range of movement in joints
- reduced muscle tension
- increased muscle elasticity, resulting in less risk of injury
- improved posture
- enhanced performance in most physical activity
- delayed onset of muscle fatigue and muscle soreness following exercise.

Training adaptations can be measured using specific flexibility tests. While the most popular is the sit-and-reach test for hamstring and lower back flexibility, there are other tests that target different areas of the body.



INQUIRY

Measuring and monitoring flexibility training adaptations

Use the weblinks in your eBookPLUS to read about the following flexibility tests. Choose one test and assess it in terms of the adaptations you would expect to find as a result of participation in a 12-week flexibility program.

- **Sit and reach test**
- **Trunk rotation test**
- **Shoulder reach flexibility test**
- **Static flexibility test — ankle**

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Safe and potentially harmful flexibility training procedures

While flexibility programs aim to safely stretch muscles and make them less prone to injury, athletes need to be careful and mindful of the following:

- Choose exercises that are appropriate to each individual rather than on the basis of whether the exercises are considered good or bad.
- Warm up to reduce the risk of microtears to muscle fibres.
- Cool down at the end of sessions.
- Use correct technique for all exercises.
- Stretch slowly and with control.
- Use safe stretching or PNF stretching exercises when possible.
- Avoid contra-indicated movements such as bouncing during leg stretching.
- Listen to your body — avoid stretching to the point of pain.
- Don't lock joints when stretching but rather bend slightly to prevent unnecessary strain.
- Breathe normally during each stretch.
- If ballistic movements are necessary, precede them with static stretching.

Skill training

Skills are the fundamental components of games and sporting activities. They represent the building blocks for better movement execution and the basis on which to assemble advanced techniques. Once taught, skills are practised in



Figure 12.22: Skill building involves an interaction of cognitive and movement processes.

drills and applied in games. The process of skill development and refinement is continuous, with even the most elite players spending considerable time cultivating mechanical and technical efficiency.

Quality skill training stems from effective coaching. Skill development relies on correct analysis and the provision of feedback. This entails knowledge of technique, observation, teaching skills, provision of suitable skill-building drills and advice regarding performance. Aids such as demonstrations and videos may also be useful in identifying strengths, faults and deficiencies in the performance. When observing skill in action, it is important to initially concentrate on large, slow movements, then on the smaller, faster movements.

The focus of skill training is technique development and correction. Coaches need to be aware that all players will not necessarily perform a skill in exactly the same manner. One has only to observe elite sportspeople to see a range of techniques applied to serving a tennis ball, swinging a golf club or swimming. These occur because of differences in player height, weight and mechanics. However, corrections are essential if the manner in which the skill is being executed can be improved or if the current technique is undermining performance.

Skill building through drills is the backbone of any games based training session. Once players are warmed up and conditioned, coaches need to spend the majority of the remaining time on skills practices. These need to specifically target:

- improvement in the fundamentals of the game
- individual needs in specific areas — for example, ball handling
- performance under gradually increasing pressure
- provision of enjoyment through competitive situations
- an increase in knowledge of the game
- development of cognitive or thinking abilities
- development of communication via skills practices.

Subroutines are the individual components that collectively comprise a skill.

Many skills are difficult for young players to learn and need to be broken down into **subroutines**. For example, the subroutines in the layup in basketball for a right-handed player consist of catching the ball in the air, landing on the right foot, stepping onto the left foot, driving towards the basket, releasing the ball and landing. This is called the part method of teaching. However, as the movement is learned, the skill can be incorporated into a skills practice situation such as continuous layups from one side of the court. As **temporal patterning** develops, the challenging nature of skill learning can be increased by adding to the range of skills that needs to be mastered to complete a movement.

Temporal patterning refers to the ability to execute the subroutines in correct sequence.

Drills practice

Players learn physical skills through repetition of movements in what are called *skills practices* or *drills*. The players need to grasp a mental picture of the skill through demonstration/video and be made aware of the important points in learning the skill (teaching points). During a drills practice, the player focuses on executing the selected skill as correctly as possible. There will be errors in the initial stages but, with practice, feedback and refinement, the player will gradually improve.

It is important to have a variety of drills for teaching a particular skill or combination of skills. Skills taught repeatedly under the same conditions and using the same situations do not challenge players and lead to loss of interest

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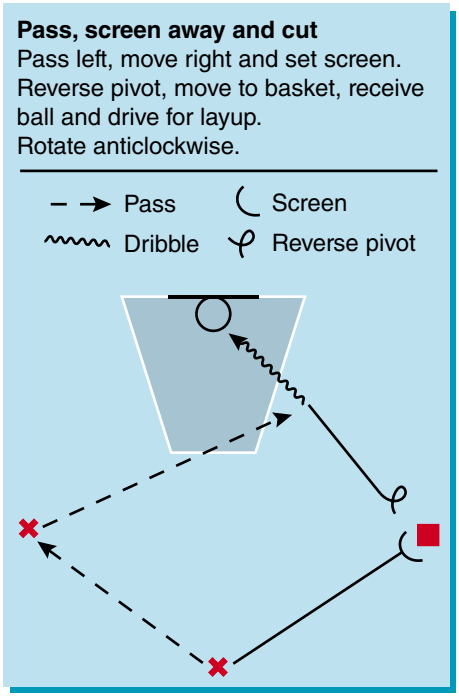


Figure 12.23: A drill commonly used in basketball



Figure 12.24: Small-sided games such as three-on-three basketball can help athletes to train in the use of specific skills.

and motivation. Effective coaches plan their drills and illustrate them on paper for quick reference. An example is shown in figure 12.23. Drills can be varied by changing the complexity of the activity, concentrating on one or more skills, using a real game or small-side games and by changing group organisation (for example, individual, pair, grid work).

Modified and small-sided games

These are fun games often organised on smaller modified areas of play, but requiring the use of the same skills as the real game. These games can be used to focus on particular skills and provide the opportunity for players to apply newly learned techniques. Minor games add fun and enjoyment to a training session. Examples include end ball and corner ball for basketball and netball.

Small games are an important part of skill training because they mimic the major game but have fewer players — for example, three-on-three basketball or five-a-side hockey. They are played under game conditions and provide the opportunity for all players to be involved continuously. Small-sided games cater for skill development, fitness, decision making and tactical awareness opportunities. Small games can also be used to impose certain conditions (conditional games) on the play in order to practise a particular skill; it might require, for example, that all shots at the basket must be jump shots.

Games for specific outcomes

Small games can often be created to achieve a specific outcome. Examples of specific outcomes might be to improve:

- defensive skills
- attacking ability
- ability to create space
- ability to find and utilise support
- ability to target an opposition weakness
- decision making and tactical awareness.

Small games such as these provide opportunity for concentrated practice and decision making within structures that closely resemble the game situation. It is similar to taking a small part out of a big game, analysing it, developing options and rehearsing these in preparation for the main event.

Some games target specific outcomes such as improved decision making or the development of tactical awareness. For junior players, initiative games that focus on solving problems in a movement context may be used as a lead up to more complex situations. With older players, *phase practice* is often used to achieve this outcome. Phase practice involves the repetitive practice of a specific part of the game under competitive game conditions — for example, passing into the circle in netball and positioning for a corner in hockey. The emphasis is on repetition, improved skill execution and decision making. This practice may be performed with or without opposition — for example, a three-on-one drill.

In certain situations, *functional practice* may be necessary to address a specific element in a game that is causing concern. Functional practice involves use of small games or drills that directly target the skill of a particular player or group of players who have a special function in the game — for example, the forwards in rugby union or shooters in netball. These games are designed specifically to make use of particular players' strengths or improve weaknesses, and be practised with or without opposition.

study on

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Practice HSC exam questions

An example of how functional practice improves the attacking ability of forwards and the defensive ability of guards is playing two-on-one half-court basketball. In this game there are two offensive players (forwards) against one defensive opponent. Offensive players need to decide how to draw an opponent to them and offload the ball to their team-mate who has moved to a more favourable scoring position. Meanwhile, the defensive player needs to think how to best prevent a basket being scored by using position, skill, anticipation and knowledge of where to move to minimise the imbalance.

Measuring and monitoring skill training adaptations

Adaptations that will be evident as a result of a skill training program include:

- improved fitness
- improved speed, agility and coordination
- improved flexibility
- power and strength improvement according to the specific need
- improved technique in skill execution
- improved ability to focus on the requirements of tasks
- improved positional and game sense.

Because skill training is quite diverse and covers many sports and activities, measurement of adaptations needs to focus on using tests that address skill development that is specific to the sport or activity. For example, if the athlete were training for basketball, skills tests would focus on measuring improvement in areas like ball control, coordination, dribbling, shooting, power and agility. A range of commonly used skills tests can be accessed through the following Inquiry.



INQUIRY

Measuring and monitoring skill training adaptations

eBookplus

Choose a team sport such as basketball, hockey or rugby league. Use the weblinks in your eBookPLUS to select and describe two tests that you would use to measure skills that are important in your chosen team sport.

- The **Quadrathlon**
- The **Side-step test**
- The **Arrowhead agility test**
- The **3-cone shuttle drill test**
- Cricket ball or baseball **Throw test**
- The **40 metre sprint test**
- **Rugby League fitness tests**

Safe and potentially harmful skill training procedures

Athletes engaged in skill training programs can be at risk of injury as many movements involve contact and require considerable explosiveness and agility. If pre-season resistance training programs are utilised, precautions outlined in the strength training section (pages 450–61) need to be followed. Additionally, athletes need to be aware of the following:

- Spend time understanding, developing and using correct technique in all skill execution.

- Athletes who throw should alternate between heavy and light equipment.
- Use resistance training programs to address areas of weakness.
- Make adequate fitness for your sport or activity a prerequisite.
- If contact is involved, use appropriate protection equipment such as using pads or mouthguards.
- Spend additional time further developing important components such as speed.
- Ensure sufficient recovery following training sessions and games.
- Wear appropriate clothing and footwear.
- Train for anticipated climatic conditions, for example, games where high temperatures and humidity may be experienced.
- Drink adequate fluid.



Developing a skills practice

Using a game of your choice, develop a drill that can be used for learning a particular movement such as a layup in basketball or tackling in football. List teaching points and illustrate player movements using a legend, like the one shown in figure 12.23. Present your skills practice in small groups.



Training to improve performance

Draw and complete a web or bubble map to summarise responses to the critical question 'How do athletes train to improve performance?'



Analysing training types

Choose one of the following training types:

1. strength
2. aerobic
3. anaerobic
4. flexibility
5. skill.

Develop a PowerPoint presentation that:

- briefly describes the features of that training type
- explains how that training type best suits specific performance requirements, such as flexibility training for gymnastics
- illustrates a relevant training program
- identifies how training adaptations can be measured and monitored
- recommends safe training procedures
- identifies potentially harmful training procedures.

Take turns to show your PowerPoint to the class. Discuss each PowerPoint and, in particular, how well it addresses the areas of concern.

Use your PowerPoint structure and information you have gained from others to investigate and analyse *one* of the remaining four training types. Draw up a table that shows a comparison of the two types you have investigated.

PLANNING CONSIDERATIONS FOR IMPROVING PERFORMANCE

CRITICAL QUESTION

What are the planning considerations for improving performance?

Success in any competition requires careful planning, organisation and commitment. Lack of effective planning leads to frustration and failure. Effective planning encompasses a range of challenges including considerations that relate to individual needs, team goals, events, environments, skills and fitness.

Initial planning considerations

Training programs need to be thoroughly planned if the potential of players and the performance of teams are to be optimised. Short-term training sessions need to be linked to long-term training plans that measure improvement against established goals.

Performance and fitness needs

Effective programs are developed based on data gained from previous seasons and current performances. Data are gathered in the form of tests, standards, statistical information, equipment needs, social interactions and performance records. This information becomes the basis of planning that will address both individual and team considerations. Performance and fitness elements need to be considered in terms of both individual and team requirements. For example, some individuals may have maintained a high level of fitness during the off-season; the team's performance during the last season was poorer than expected due mainly to fitness concerns. Some of these considerations are listed in table 12.8.

study on

Concept code: PDH-151

Practice HSC exam questions

Table 12.8: Individual and team planning considerations

Individual	Team
• physical fitness • physical attributes such as strength, power, endurance and flexibility • skills such as running and batting • development of game sense and tactics • psychological considerations such as arousal and motivation • social considerations such as friendships and support	• establishment of team goals • development of tactics and strategies that involve groups of players such as line-outs for rugby forwards • organisational considerations such as training days and venues • leadership issues such as captaincy • allocation of support roles such as managers and equipment personnel



Figure 12.25: Individual fitness needs to be addressed early so that team performance goals can materialise. If individual members of a rugby forwards pack have not attained full fitness, the team's performance in the scrums will be poor.



Figure 12.26: Proper planning requires an overview of all major events and competitions.

Schedule of events/competitions

Planning must address the competition period to ensure that players are fit and game strategies are in place. In games competitions where players usually compete weekly, but over a long period of time, players need to peak regularly and be prepared for training one or two days after. In the long term players need to have an elevated level of preparedness for finals. Training plans need to reflect schedules and ensure that players are not underloaded or overloaded in terms of training volume. Intervals of training and rest need to be scheduled so that games players are able to rise to competition needs on a cyclic basis.



Track athletes and swimmers usually have totally different schedules, with big events occurring periodically throughout the year. Once again, training programs must address schedules to ensure that peaking occurs at competition time, which means that training volume must be effectively managed.

Figure 12.27: Planning for training, safety and protection of athletes needs to consider both the climate and season. For example, fluid is essential in hot conditions to help avoid heat stress.

Climate and season

Initial planning needs to consider seasonal variations together with climatic influences. It is important that athletes are fully prepared in terms of attire both for training and during competition. Heat, wind, rain, cold, fog and humidity are examples of climatic influences that require the implementation of specific strategies. For example, protective/reflective clothing, sunscreens and fluid may need to be provided to athletes to prevent heat stress during hot weather.

INQUIRY

Planning for performance

1. Describe specific considerations that should be addressed in planning for performance in events and competitions.
2. Copy and complete a table like the one below to summarise the specific considerations for an elite athlete and an amateur participant planning to perform in events and competitions.

Elite athlete	Recreational/amateur participant

Planning a training year

Periodisation is the process of structuring training into manageable phases.

Effective planning requires that the training year be divided into manageable areas, making establishing and measuring targets and goals a realistic proposition. The process of structuring training into phases or periods that can be managed independently of other periods is called **periodisation**. Periodisation has a number of purposes:

- training volume and intensity can be monitored and adjusted where necessary
- time periods to allow adaptations to take place are programmed
- overtraining and undertraining problems should not occur.

INQUIRY

eBookplus

Periodisation

Use the **Periodisation** weblink in your eBookPLUS and read the information about traditional and block periodisation methods. Briefly summarise how to use the traditional periodisation method in structuring training for an individual sport.



Figure 12.28: Developing fitness is a major aim of pre-season training.

Phases of competition

There are three distinct phases of competition: pre-season, in-season and off-season. Each of these phases has specific demands in terms of goals, needs, and training and performance requirements.

Pre-season (preparation phase)

This phase might last from six to 12 weeks or longer, depending on the type of competition. It requires a high volume of training at moderate levels of intensity. The training needs to target the appropriate energy system. As a result, training sessions are longer in an effort to increase stamina together with mental aspects, such as increasing drive and commitment. The basic aims of the pre-season phase are to:

- improve all aspects of fitness, such as strength and flexibility, and particularly those specifically required in the sport
- develop technique
- improve performance biomechanics
- introduce strategies and familiarise players with them
- teach appropriate mental skills.

These aims are best achieved through programs that focus on endurance, strength and skill in a variety of environments. Examples of commonly used methods include:

- continuous training
- Fartlek training
- interval training
- circuits
- resistance work
- variations of long slow work with short fast work.

Important fitness components such as speed, strength and flexibility need to receive specific attention. Towards the end of the pre-season phase, physical condition and quality of skill performance (for example, technique, biomechanics and strategies) should have reached the targeted level.

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In-season (competition phase)

The competition phase varies in duration, depending on the sport. During this phase, maintaining fitness developed in the pre-season phase is continued. However, a general increase in intensity is matched by a corresponding decrease in volume. In other words, less time is spent on continuous repetitive work, but the effort put into training escalates. The aim during this period is to:

- maintain stamina
- practise and improve tactics and strategies
- perfect skill execution
- gain competitive experience
- continue work on developing appropriate mental skills.

This is best achieved through:

- supplementary work on required fitness components, including strength, power, agility, flexibility and speed
- use of highly specific skills practices (drills)
- continuation of conditioning training
- use of small games, grids and resistance work to increase intensity and provide relief.

The principle of specificity needs to be applied more rigidly during the competition phase. The gradual increase in intensity should be matched by focus on activities that relate directly to competition requirements. Specificity needs also to be applied to the mix of volume and intensity. For instance, in power sports requiring explosive actions such as sprinting and high jump, some volume is sacrificed at the expense of increased intensity. However, in endurance activities such as cross-country running and triathlons, the volume remains steady.

The number of training sessions required varies in accordance with the type of activity. This relates to the athlete's ability to *load* (train) and *unload* (regenerate). Excessive emphasis on work without ample time for restoration leads to development of a state known as *overtraining*. The competitive phase has many periods in which volume and intensity are manipulated to provide the greatest gain. However, it is important that the athlete peaks for each competition and particularly for major events within the season.

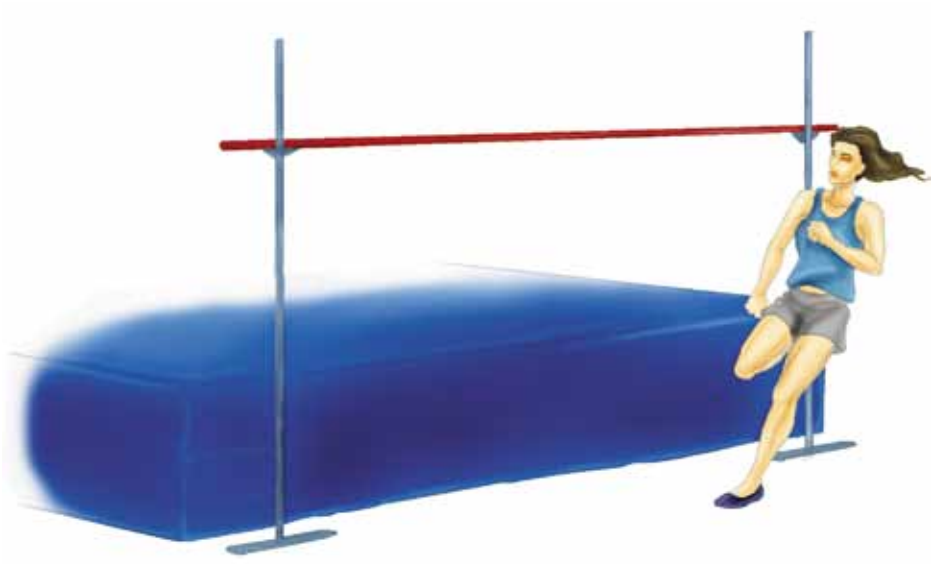


Figure 12.29: The in-season phase is characterised by an increase in intensity together with emphasis on technique, strategies and tactics.

Off-season (transition phase)

This phase is one of physical and mental recovery from training and competition. It provides time for general refreshment, allowing both mental and physical abilities to recuperate. It is sometimes thought that off-season training means absence of all activity. This is incorrect, as a complete lay-off leads to a loss of the immense gains made during training and makes the pre-season preparation more difficult and protracted.

The off-season phase is characterised by:

- one week of total rest
- remaining weeks consisting of active rest, with training sessions being reduced to a couple of times per week and a corresponding reduction in both volume and intensity
- a change in environment, such as outdoors to indoors or use of swimming for runners and cyclists
- diet modification to reflect the decreased workload
- maintenance of strength and flexibility
- work on weaknesses, such as injuries, or perhaps on specific technical skills.

The value of the off-season phase should not be underestimated in terms of refreshing the athlete. Although it is generally a short period lasting a month or so, it provides the opportunity to restore mental and physical energy and prevent the onset of staleness in the coming competitive season. A plan for development and maintenance of strength, endurance and speed is illustrated in figure 12.30.

<table>
<tr><th></th><th colspan="2">PRE-SEASON</th><th colspan="2">IN-SEASON</th><th>OFF-SEASON</th></tr>
<tr><td></td><td>General preparatory</td><td>Specific preparatory</td><td>Pre-competitive</td><td>Main competitions</td><td>Transition</td></tr>
<tr><td>Strength</td><td>Anatomical adaptation</td><td>Maximum strength</td><td>Conversion:
• power
• muscular endurance
• or both</td><td>Maintenance</td><td>Regeneration</td></tr>
<tr><td>Endurance</td><td colspan="2">Aerobic endurance</td><td>Develop the foundation of specific endurance</td><td colspan="2">Specific endurance</td><td>Aerobic endurance</td></tr>
<tr><td>Speed</td><td>Aerobic and anaerobic endurance</td><td colspan="2">Develop the foundation of speed</td><td colspan="2">Specific speed, agility and reaction time</td><td></td></tr>
</table>

Figure 12.30: The development of specific attributes during the phases of competition (*Source:* TO Bompa, *Theory and Methodology of Training,* 3rd edn, Kendall Hunt, 1994, Dubuque, Iowa, p. 251.)

Macrocycles are long-term planning periods or overviews.

Microcycles are short training cycles containing specific details and usually cover a period of about 7–10 days.

Subphases

Preparation for competition can be divided into manageable blocks called **macrocycles** and **microcycles**. Macrocycles are long-term planning frameworks and may represent an entire planning program, sometimes called an annual plan. The macrocycle encompasses the available preparation time preceding

a major competition and identifies all lead up competitions and major events along the way. The macrocycle plan provides an overview of what is to happen in terms of long-term training and preparation. While noting competition dates, it also references training specifics such as volume and intensity over a period of time and maintenance or increase of fitness components such as strength and endurance. An example of a macrocycle is shown in table 12.9.

Table 12.9: Example of a macrocycle

	January	February	March	April	May	June	July	August	September	October	Nov–Dec
Cycle	Pre-season	General	Specific		Competition						Transition
Competition			6 1	2	6 6	3 6	6	4	6 6	5	
Strength	Introduce	Volume		Intensity		Maintain					
Speed	None	Introduce		Volume		Intensity		Maintain			
Flexibility	Introduce	Develop		Maintain							
Endurance	Introduce	Volume		Intensity		Maintain					
Technique	Introduce	Develop		Maintain							
Plyometrics	None	Introduce	Develop	Maintain		None		Maintain			
Psychology	Introduce	Develop	Monitor								
Evaluation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	

Key	1	2	3	4	5	6
	School	Zone	Regional	State	National	Other

While macrocycles represent an overview, more specific detail is contained in mesocycles and microcycles. Mesocycles are periods of four to eight weeks, while microcycles are much shorter, usually seven to 10 days. This allows for detailed planning and specific objectives to be achieved. The microcycle includes detailed information about frequency of training, intensity, duration and volume together with skills, activities, resistance training, plyometrics and specific session organisation. Table 12.10 is an example of a microcycle.

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Table 12.10: An example of a microcycle

Day	Date	AM Session	PM Session
Monday	9/3	Strength training	Warm-up Circuit Skill development Technique Cool-down
Tuesday	10/3	Plyometrics	Warm-up Long interval Technique Cool-down
Wednesday	11/3	Strength training	Warm-up Speed/short interval Skill development Cool-down

(continued)

Table 12.10 *(continued)*

Day	Date	AM Session	PM Session
Thursday	12/3	Pilates	Warm-up Circuit Technique Cool-down
Friday	13/3	Strength training	Warm-up Skill development Speed drills Cool-down
Saturday	14/3	Competition	
Sunday	15/3	Rest	Rest

Objectives	To maintain strength, speed and power. Continue to develop technique through specific exercises. Maintain and develop core strength, flexibility and cardiorespiratory fitness.
Warm-up	Detail exercises for duration, repetitions and recovery. Example: legs, shoulders, abdominals, 10 minutes, 10–15 repetitions, 1 minute recovery.
Cool-down	Detail exercises and duration. Example: light jog (5 minutes), stretching (10 minutes).
Strength	Detail each session for sets, repetitions, resistance, speed, rest between sets and recovery. Example: biceps curl, 60% of 1 RM, 2 sets × 15 reps, moderate speed, 3 minute rests between sets.
Endurance	Detail activities to maintain cardiorespiratory endurance. Example: circuit training × 2, long interval training × 2.
Speed and agility	Detail activities to maintain speed. Example: short interval × 2, agility sprints, grid work.
Flexibility	Detail exercises to maintain flexibility and improve core stability. Example: core session at fitness centre, general stretching program, Pilates.
Technique	Detail how to continue development on technique improvement. Example: focus on biomechanics and good form, organise session with guest coach to examine technique, video aspects of technique.
Plyometrics	Detail each session for sets, repetitions, recovery. Example: jumps, reactive drop jumps, speed hops, alternate leg bounding — 2 sets × 10 reps with 3 minute rest.
Psychology	Detail and be alert for signs of overtraining. Example: lack of motivation, tiredness. Discuss motivation strategies with athletes.



Develop a periodisation chart

Choose a sport with which you are familiar. Using the example in table 12.9 (page 488), develop a periodisation chart for the fitness and skill requirements for your chosen sport. Justify why specific information has been included.

Peaking

Peaking is the phase of training in which performance is optimised to meet the demands of a race, competition or series.

Tapering is the period immediately before competition when the volume and intensity of training is reduced.

To arrive at a point at which an athlete **peaks** usually involves months of preparation, gradual increases in volume and intensity of training and a short **tapering** period (see below) just prior to performance. For example, a marathon runner trains for four to six months, and this involves periods of base building (no speed work), sharpening (which requires specific endurance), speed work and finally a tapering phase approaching the peak. The training program needs to be organised so that physical and mental functioning is optimised at the right time. The peaking period is actually a temporary state that is reached only during the competitive phase of training. When this occurs, a number of physiological indicators are apparent, including:

- a state of excellent health
- heightened rate of recovery from training
- body systems, particularly the circulatory, respiratory, muscular and energy systems, tuned for optimal functioning
- adjustments to technical and tactical preparation completed
- superior neuromuscular coordination.

During the peaking phase the athlete experiences a number of social and psychological indicators including:

- heightened self-confidence and motivation
- an ability to tolerate higher levels of frustration and react positively to practices that simulate the competition environment
- a state of mental alertness and readiness for action.

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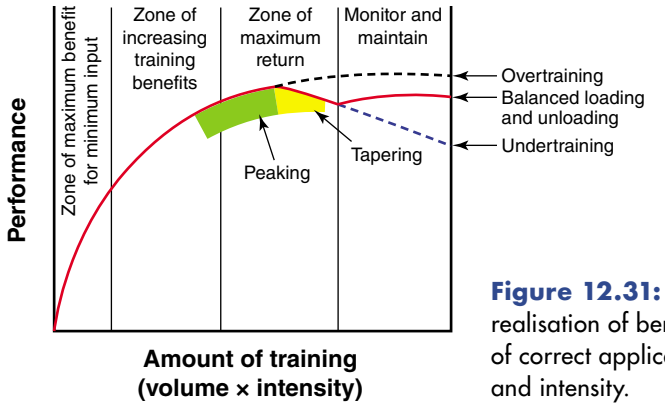


Figure 12.31: Peaking is the realisation of benefits accrued as a result of correct application of training volume and intensity.

Tapering

Concentrated training with increasing volume and intensity reduces strength and subsequently impacts on performance. A tapering period is fundamental for allowing tissue to rebuild and for the full replacement of energy stores.

Tapering is essential because intense training, while having numerous positive benefits, has an adverse effect on some aspects of performance. While the manner in which athletes taper varies from one sport to another, it must involve a reduction in volume and intensity to be effective. It is now known that the tapering period that follows a quality preparation brings about an increase in the strength and power of the athlete. However, this is more pronounced in swimmers and less obvious in runners. Research shows that runners and swimmers who reduce training by 60 per cent for a 15- to 21-day period show no loss in maximal aerobic capacity. More importantly, swimmers tested experienced a 3.1 per cent improvement in performance as a result of reduced training and demonstrated a 17.7–24.6 per cent increase in arm strength and power.

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INQUIRY

Tapering

eBookplus

Use the **Ausport** weblink in your eBookPLUS to read the information on tapering. The summary at the end of the article lists 7 characteristics that seem common to successful tapering techniques. List the points and provide 3 examples of how these characteristics might apply to an elite swimmer.

INQUIRY

Elite athlete training programs

eBookplus

Use the **Olympic triathlon training** weblink in your eBookPLUS to respond to the following:

- Provide a brief overview of an elite training program.
- What is a training plan?
- What are phases?
- Provide five examples of activities that could be used as part of a training program.

Sport specific subphases

Subphases provide an opportunity to target specific areas that require further development. For example, one athlete in a group may need additional work on technique while another may benefit more from improved fitness. There are many areas that could be the subject of specific examination and additional work, including testing, monitoring, evaluation, specialisation, loading, unloading, volume, intensity or whatever is required depending on the individual's needs. This is covered in more detail in the next section.

Elements to be considered when designing a training session

When designing a training session, a number of elements need to be considered as part of the planning process. Adherence to these elements ensures that sessions are challenging, productive and within health and safety guidelines.

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See more
Health and safety considerations

Practice HSC exam questions

Health and safety considerations

Disregard for health and safety can lead to injury, illness and poor performance. Important considerations include:

- *injury prevention*. Activities such as warm-up/cool-down and stretching are safety prerequisites for all physical activity. Athletes need knowledge of how to safely use specialised equipment such as strength training machines. Spotting and supervision is required in many gymnastic and weight-lifting activities.
- *protective equipment*. Essential protective equipment such as mouthguards, helmets, face guards, padding, wetsuits and gloves need to be worn both during practice and games.
- *general equipment*. Bats, clubs, javelins, poles for pole vault, springboards, climbing frames and the like need to be regularly checked for safety. Cracked, worn or suspect equipment needs to be repaired or discarded.
- *apparel*. Clothing such as shorts, tops, jumpers and ski suits needs to be comfortable while providing protection, and allowing freedom of movement

and airflow. Good footwear must be supportive and protective. Poor footwear contributes to blisters, calluses and even structural deformities.

- *environmental hazards.* Depending on the sport, sunglasses, sunscreens, protective suits, hats and caps may be needed to protect the body from potentially damaging ultraviolet rays.
- *illnesses.* The risk of illnesses such as colds and influenza can be minimised through use of safe health practices and awareness of modes of viral transfer.

Providing an overview of the session to athletes



Figure 12.32: A session overview provides an opportunity to outline goals and make clear the immediate performance objectives.

At the beginning of a training session and particularly where teams are involved, it is common for coaches to provide a brief overview of what will be expected during the session. This ensures that the intentions of the coach and expectations of players are channelled in the same direction. It also has the advantage of gathering the players in a forum situation, where specific issues can be addressed. Some of these may include:

- recording of player presence or absence
- assessment of injuries
- discussion of previous performance
- an outline of specific goals
- special tactics suggestions that might need to be considered.

Warm-up and cool-down

An effective warm-up consists of the following phases.

- *Phase 1: general body warm-up until the body begins to sweat*. Some suggested activities are jogging and skipping.
- *Phase 2: stretching*. This is important in ensuring that the required muscle groups are extended beyond the range that is required of them in the sport itself. In addition, stretching promotes blood circulation, increases muscle relaxation and improves performance. Stretching exercises need to be safe. Sports Medicine Australia has issued a brochure that contains an extensive range of warm-up exercises, some of which are illustrated in figure 12.33.
- *Phase 3: callisthenics*. These are general body exercises, such as push-ups and abdominal crunches, that involve large muscle groups (see figure 12.34). These exercises should be specific to the game; that is, they should work the muscle groups used in the game or activity. For this reason, the exercises should not be exhausting.
- *Phase 4: Skill rehearsal*. In this phase, the athlete performs some routines required later in the game. Team game players such as soccer players and basketballers participate in patterns (for example, dribbling in basketball) that increase agility and replicate movements required in the game. There is an emphasis on maintaining the body temperature established through previous physical work.

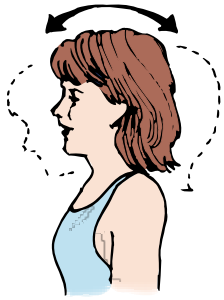
The practical part of a training session is concluded with a **cool-down**. The procedure here is virtually the reverse of the warm-up. However, it is not as intense and need not extend for the same period of time.

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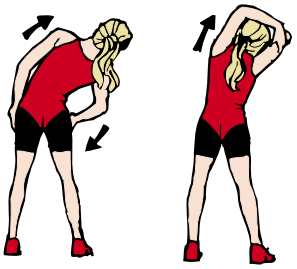
The **cool-down** is the period of time following physical activity where the body temperature, circulation and respiratory rates are returned to their pre-exercise state (or as close to this state as possible).

Skill instruction and practice

Instruction at a training session refers to delivery of a body of knowledge by a coach (or coaches and trainers) to the players. Good instruction requires prior organisation and effective communication skills. All coaching sessions need to be well planned, provide guidance on how to perform the fundamental skills,



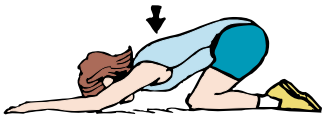
Neck flexion/extension stretch — move head forward then back.



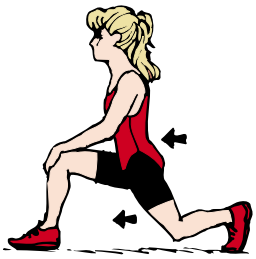
Lateral flexion stretch — one side then the other; push pelvis across as you bend.



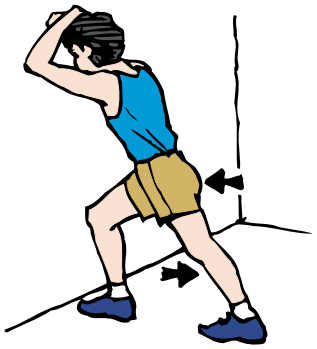
Superaspinatus stretch — keep elbow parallel to the ground.



Thoracic extension stretch — reach forward with arms, push chest towards floor, arch back down, bottom behind knees.



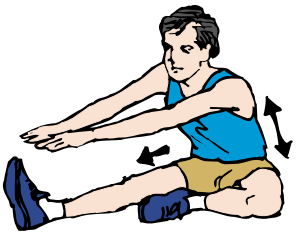
Hip flexor stretch — keep back straight, tuck bottom under, lunge forward on front leg.



Gastrocnemius stretch — keep your knee straight and heel on ground, and face feet forward.



Shoulder rotator stretch — use towel, pull it up with upper arm and then down with lower one.



Hamstring stretch — start with knee bent a little, then push knee straight as tension allows, and push chest towards foot.



Quadriceps stretch — keep pelvis on floor.

Figure 12.33: Some general stretching exercises appropriate for warm-ups (*Source:* Adapted from Sports Medicine Australia.)

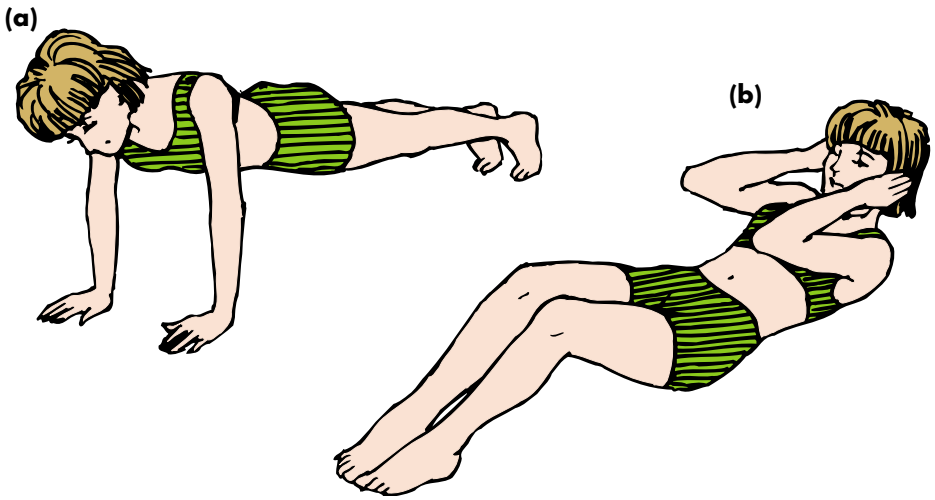


Figure 12.34: Callisthenics such as **(a)** push-ups and **(b)** abdominal crunches help strengthen muscle and prepare it for use.

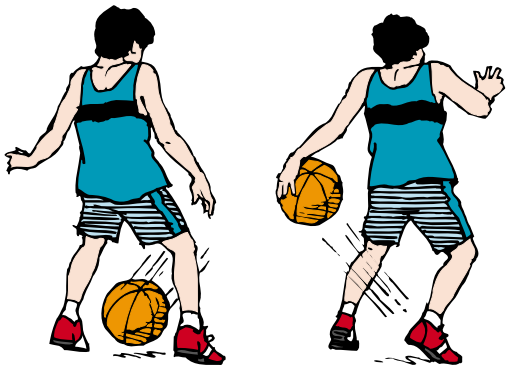


Figure 12.35: During skill rehearsal, players practise many of the moves required in the game.

and should allow these to be practised in related drills and movements. There should also be instruction on the other related aspects of the session including warm-up and cool-down, stretching and flexibility, strategies and tactics, game plans and, finally, procedural details such as the time and venue for the next game. Effective instruction is:

- *brief* — it is important that instruction is concise and factual to allow maximal practice time
- *well timed* — use words when their impact will be greatest
- *specific* — instruction needs to be specific to the skill, game and situation; it should not be general
- *constructive* — focus on the positive points for improvement, not on how poorly the skill is being performed
- *clear* — there should be no misunderstanding about the information communicated by the coach. Questions should be encouraged if the message is not understood.
- *informative* — all instruction should relate specifically to information that the players need to know. Additional, unrelated material is confusing and can actually hinder the learning process.
- *demonstrable* — effective instruction is supported by visual aids such as demonstrations to provide clear pictures of skills and techniques.



Figure 12.36: Effective instruction requires prior knowledge and good communication skills.

Conditioning

Fitness training is an integral part of every training session. Most sports have a short fitness session immediately following the warm-up. Supplementary fitness in the form of circuits, interval training, continuous training and callisthenics usually takes place following a session of individual and team play. Work on fitness should not be overemphasised in the first session, as this will fatigue players and adversely affect concentration and performance in the skills and team play session. It is essential that during the fitness session heart rate reaches *training zone intensity* (70 to 85 per cent maximal heart rate) and remains there for at least 20 minutes.

While the fitness session needs to be thorough and challenging, it does not need to be totally exhausting, which would lead to an excessive build-up of lactic acid. Effective coaches are able to continue to address fitness needs through skills practices. Most drills requiring agility, speed, endurance, power and coordination help the development of fitness components. Coaches need to be aware of the element of fatigue in skill learning. While fitness can be addressed in some skill-learning situations, it is important not to fatigue players unduly, as concentration and interest will suffer. It is particularly important to make regular testing part of the fitness program in order to provide feedback and to be a source of motivation.



Figure 12.37: Conditioning is an integral part of every training session.

Evaluation

Evaluation is an appraisal of performances after the training session. It is normally carried out during and after the cool-down and involves coaches and players reporting on the value of the session. An evaluation should address performance outcomes; that is, it should address the performance goals for the session (for example, learning the serve in tennis) and how well the goals were achieved. Evaluation also needs to address behavioural outcomes such as punctuality. Players should be given the chance to express opinions on issues that may have arisen from the training session.

Evaluation of the coaching session is followed by a brief reminder of the date, time and venue of the next fixture and training session and a recheck of player availability. Individuals with specific problems, such as taping requirements, should see the coach and make special arrangements. It is important that training sessions finish at the arranged time.

The final step, following the session, is an evaluation by the coach as a preparation for future sessions. This could include an analysis of the fitness testing and skills testing results and a review of the game performance. The time allocation to the various elements of a training session is illustrated in figure 12.38.

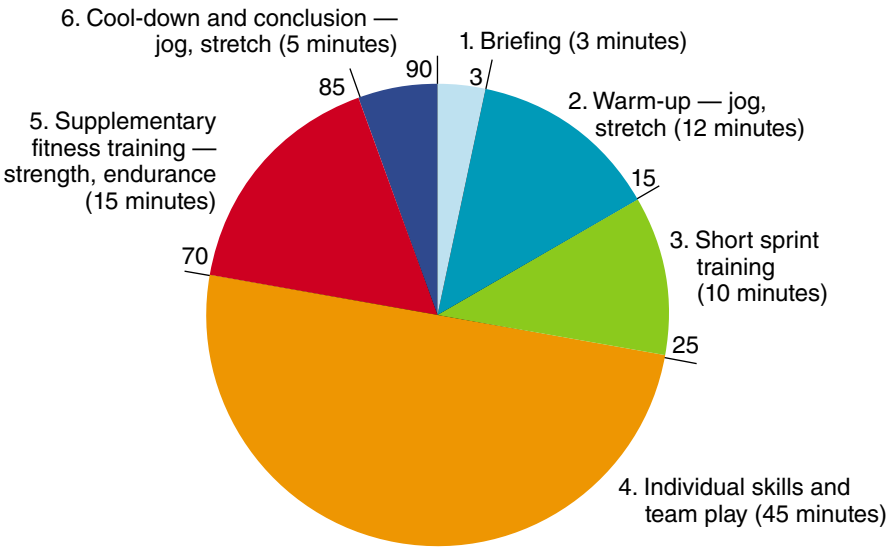


Figure 12.38: Time allocation in a 90 minute training session (*Source:* FS Pyke, *Better Coaching: Advanced Coaches Manual*, Australian Sports Commission, 1991, p. 249.)



APPLICATION

Designing a training session

Design a training session for a sport of your choice. Include time allocation for the different elements plus warm-up and cool-down activities, skills practices, strategies and information relating to other training session elements. Compare your session with others in your class. Choose one of the training session plans and conduct it with the class. Evaluate the session by considering the following questions.

1. Did the activities match the abilities of the group?
2. What was the reaction of the group?
3. How could the session be modified or improved?



INQUIRY

Structuring training sessions

eBookplus

Briefly examine different methods of structuring training sessions. You may wish to use the **Training sessions** weblinks in your eBookPLUS or research others. Write a brief report on your findings.

Planning to avoid overtraining

Overtraining is a chronic psychological and physiological condition caused by training loads that are too demanding for an athlete to manage.

Sometimes, because of poor scheduling or high levels of dedication, an athlete can suffer chronic training stress, which leads to performance deterioration. In the early stages, it might be recognised as staleness. However, staleness can progress to a more chronic condition known as **overtraining**, which leads to burnout.

Overtraining develops as a result of subjecting athletes to high-intensity training practices when they are in a stage of fatigue. High-intensity training requires a longer period for regeneration and refreshment than does moderate training. Athletes must be careful to balance work requirements with an appropriate recovery period. When there is too much work and insufficient time for recovery, the athlete becomes physically fatigued and mentally drained in what is called the overtraining state.

The onset of the overtraining state can be recognised by lack of motivation and poorer performances. However, its steady development is concealed and difficult to establish objectively. While the best signs are an increasing resting heart rate and higher blood lactate levels, the observation of performance, amount of drive and level of enthusiasm is the most effective detection method. Other signs include insomnia, infections and decreased appetite.

Amount and intensity of training

study on

Concept code: PDH-158

Practice HSC exam questions

Overtraining is primarily caused by too much training, so adjustment to the amount and intensity of training needs to be made. Some individuals have lower training stress thresholds and may show signs of overtraining when others do not. Personal factors, medical conditions, sleep (quantity and quality), drugs, nutrition, environmental stress and general health all need to be examined in light of training volume.

Better attention to training volume and intensity projections established in periodisation charts help prevent overtraining. The level of intensity needs to be varied from one activity to the next and from one training session to the next. Athletes need not overload in every training session. Recovery strategies need to be an integral part of training. For game players, recovery sessions might focus on strategies, skill building, team talks or watching videos of

opposition plays. Volume or the amount of training can be varied by manipulating frequency and duration of sessions. Less and shorter training sessions may be needed and may even achieve the same or better results. There is a fine line between too little and too much training, with optimal performance being the product of training balance, periodised recovery, variety and individual differences.

study on
Concept code: PDH-159
Practice HSC exam questions

Physiological considerations

The underlying cause of overtraining is a combination of physiological and psychological factors. While the poorer performance is obvious, the exact causes might be more difficult to identify. Two important physiological considerations include lethargy and injury.

Lethargy is characterised by feelings of slowness, tiredness and lack of energy. Athletes in a lethargic state do not train or perform to their best ability, leading to a gradual deterioration in performance. Even simple tasks appear difficult while concentration and focusing skills appear to be diminished. As lethargy is usually the result of excessive training volume and intensity without sufficient rest and relaxation periods, measures need to be taken to address the problem.

Injury comes in many forms such as bone breakages and pain associated with overuse. Depending on the extent and seriousness of injury, athletes may be out of training and performances for a considerable period of time. The principle of reversibility is relevant to the injured athlete. If the athlete is unable to manage any training and conditioning, important gains made in cardiorespiratory endurance, strength and power are overturned. Other considerations such as match practice and experience are also affected.

Injury may occur in training and games as a result of poor warm-up, accidents and excessive load. Training volume may cause injury as might be the case with endurance runners being affected by shin splints. It is important to establish routines and practices such as use of taping, protective equipment and balanced periodisation plans to minimise the risk of injury. While the physical effects of injury are obvious, the psychological and in some cases, financial, costs are sometimes more significant.



Figure 12.39: Lethargy and injury are two important physiological problems that can arise from overtraining.

study on

Concept code: PDH-160

Practice HSC exam questions

Psychological considerations

The most important psychological considerations in relation to overtraining relate to motivation or lack of it. When physical stability is threatened, emotional factors assume greater magnitude and affect health and well-being. The result is a loss of motivation, enthusiasm for training and competitive desire. Symptoms might include:

- increased nervousness
- poor concentration span
- irritability or anger
- emotional sensitivity
- depression.

Strategies to improve the mental well-being of athletes suffering overtraining include:

- the reduction or cessation of training
- active rest
- use of relaxation techniques
- change of routine and environment such as using cycling as a break from swimming
- replacing pressure with positive reinforcement.

Prevention of the overtraining state is best achieved through being careful not to exceed an athlete's stress tolerance, and adapting the volume and intensity of training to each individual.



INQUIRY

Overtraining

Investigate the following issues regarding overtraining.

1. How much training is too much?
2. What are the signs of overtraining in athletes?
3. What measures can be taken to address overtraining in athletes?
4. How can overtraining be avoided?

eBookplus

You may wish to use the **Overtraining** weblinks in your eBookPLUS to assist you in your investigation.



ETHICAL ISSUES RELATED TO IMPROVING PERFORMANCE

CRITICAL QUESTION

What ethical issues are related to improving performance?

When the desire to improve performance becomes a powerful motivating factor, sometimes ethical issues come to the forefront. Performance enhancing drugs and the use of advanced technology are growing concerns, particularly among elite athletes where the line between success and failure, fame and anonymity can be all too thin.

Use of drugs

Performance enhancing drugs are substances that can improve an athlete's performance in a particular sport or activity. Drug use in sport, or doping carries serious health risks and can jeopardise an athlete's future in the sport.

study on

Concept code: PDH-161

Do more
Dangers of performance-enhancing drugs

Practice HSC exam questions

Dangers of performance enhancing drug use

The consequences of drug use by athletes can, in some cases, be more damaging than habitual social drug use by non-athletes. Some drugs carry serious health risks including liver tumours, cancer, high blood pressure, kidney tumours, trembling, depression and body fluid retention as might be the case with steroids. While some changes, such as testicular atrophy and reduced sperm production, can be reversed, others such as baldness and gynaecomastia (breast enlargement) cannot.

Changes in social, psychological and emotional behaviours are also apparent. Steroids, in particular, are related to mood swings, irritability, aggression, sexual arousal, confusion and memory loss. Other drugs such as alcohol and diuretics result in reduced concentration and reaction time, as well as reducing important sporting abilities such as coordination.

Drug use has the potential to affect livelihood. Use of performance enhancing drugs is banned in competition. Athletes found guilty of using performance enhancing drugs are banned from competition for extended periods of time, usually years. They lose their reputation and their income when sponsorships and endorsements are cancelled. Anti-doping regulations are very strict (see page 503) and athletes who cheat by using drugs to improve their chances of success take great risks. Athletes convicted of drug use stand to lose all that they could earn as well as their reputation, pride and personal accomplishment.

INQUIRY

The ethics of drug use in sport

Organise a class debate on the subject: 'That performance enhancing drug use in sport is cheating'. The **Drug use in sport** weblinks in your eBookPLUS may assist you.

eBookplus

Using drugs for strength

Human growth hormone (HGH) and anabolic steroids are drugs usually associated with a desire to improve strength and power in sports such as weight-lifting, body building, shot-put, hammer throw, wrestling and sprinting.

Human growth hormone

Human growth hormone is a naturally occurring substance that increases the rate at which amino acids are transported to skeletal muscle cells.

Human growth hormone (HGH) or somatotropin is a hormone produced naturally by the body that is responsible for growth. It exists in every cell in the body that contains growth hormone receptors. Taking artificial forms of the hormone can lead to increased muscle size and strength. It also acts in the mobilisation of fat and making it available as a source of energy. This allows glycogen to be held in storage for the later phase of endurance events, where a sprint finish may be required.

The long-term effects of using artificial growth hormone are serious and include:

- overgrowth of face, hands and feet (acromegaly)
- gigantism
- muscle weakness
- diabetes
- heart disease
- disfigurement from bony overgrowth
- osteoporosis and arthritis.

study on

Concept code: PDH-162

See more
Drugs that improve strength

Practice HSC exam questions

study on

Concept code: PDH-163

See more
Drugs that improve aerobic performance

Practice HSC exam questions



Figure 12.40: Artificial forms of human growth hormone are taken by some athletes.

Anabolic steroids

Steroids can be anabolic (tissue building) or androgenic (producing masculine characteristics such as strength, power, speed and aggressiveness). It is impossible to produce a steroid that is completely anabolic or completely androgenic. This is particularly significant to female athletes who take anabolic steroids to increase strength as they gain unwanted male features such as facial and body hair in the process.

Steroids were widely used in past decades to increase weight, strength and power and reduce the recovery time between workouts. They stimulate protein synthesis in muscle cells, while simultaneously arresting its breakdown. This increases the body's ability to utilise protein and prevent its degeneration. Steroid use has been an issue in sports such as weight-lifting, body building, track and field (particularly throwing events) and some team sports where bulk and aggression is an advantage.

Steroids are derivatives of the male sex hormone testosterone and cause development of masculine characteristics.

The effects of **steroids** depend on the dosage, regularity and time period of use. They can include:

- testicular atrophy and a decreased level of reproductive hormone
- increased or decreased libido (sex drive)
- liver damage
- higher blood pressure as well as decreased HDL (high density lipoprotein) and increased LDL (low density lipoprotein), leading to increased chance of heart disease and high susceptibility to blood clotting
- increased nervous tension and possible manic or depressive episodes
- increased masculinity and heightened risk of musculo-tendinous injury.

The effects on women include:

- infertility, clitoral hypertrophy and sore nipples
- increased sex drive
- masculine appearance, including deepening voice and facial hair
- increased aggressiveness.

Using drugs for aerobic performance

Erythropoietin

Erythropoietin (EPO) is a natural hormone that stimulates red blood cell production.

Erythropoietin (EPO) was originally developed for people with anaemia and kidney deficiencies to help them to manufacture extra red blood cells. Erythropoietin acts on bone marrow, stimulating red blood cell production. It is a form of 'blood doping', because the increased number of red blood cells allows athletes to absorb more oxygen and improve their stamina.

Athletes whose performance could benefit from EPO use are those who feature in endurance events where sustained effort is required, such as marathons, triathlons and distance cycling. However, athletes taking EPO are also more at risk in endurance events because they lose valuable fluid, causing changes to blood consistency. Erythropoietin increases blood viscosity, contributing to poor circulation, blood clots and even stroke. It also causes chest pain, headache, high blood pressure, joint pain, fatigue and shortness of breath after each dose. It has caused death in a number of cases. The drug has performance enhancing properties and, until recently, it was undetectable by testing procedures. However, tests are now available that detect EPO in both blood and urine.

SNAPSHOT

Armstrong a fraud and frauds can't be heroes. Not now, not ever

By Patrick Smith

Lance Armstrong is a creep. A liar, cheat and a bully. So awful is Armstrong, you are right to question whether all his work for cancer patients is not just calculated camouflage to protect his abuse of drugs, his competitors, teammates and supporters.

He is not just part of the drug regime that saturated cycling when he was at his peak, but he has been that culture's bodyguard. Its enforcer. And he remains so today, arrogantly dismissing the US Anti-Doping Agency findings by telling the world through Twitter that he was 'unaffected' by the release of the 1000-page investigation findings. No one in sport has lived a bigger lie. Tiger Woods led two lives, one in public and one in bedrooms other than his own. But he did not cheat his sport as an athlete. Woods is flawed. Armstrong, who used his bedroom as a blood bank, is a crook.

And he had accomplices. They are not just within his team and entourage. Not just his doctors on the tour, not just his 'people', not just his teammates, not just his message boys and fetch-it people.

They include cycling administrations, international and local. They include a besotted media and they include a sycophantic public. Excused are those who fight and fought cancer armed with the inspiration of the Armstrong myth.

A read of USADA's Reasoned Decision published on Thursday tells you that Armstrong was not exposed earlier because the sport of cycling did not want to catch him. Nor did the media have the courage to expose him, nor the public the will to disbelieve him.

The USADA documents detail a sport not just aware of, but complicit to, the use of performance-enhancing drugs. It is inconceivable that officials were not conscious that cyclists believed that they could only become competitive on the tour if they used EPO, blood doping, testosterone, cortisone and other drugs and techniques. It appears fundamental to drug use flourishing that cycling officials chose not to stop it. Armstrong, after all, was the face of a sport with an international profile.

The media did not just praise Armstrong, but fawned over him. An example: when Armstrong announced in August he would not fight the charges tabled by USADA, News Limited journalist Anthony

(continued)

Sharwood wrote this: 'There'll be some hard-bitten French sports journalists popping champagne corks tonight, while a few in the Australian press will uncork chardonnay. Let them gloat. Lance Armstrong is still a winner to me and to so many of us.'

Why? He's a fraud. And frauds aren't and can't be heroes. Sharwood addressed the Armstrong cheating again this week after USADA published the results of its investigation. 'The cult of Lance is over now. He's no longer locking anyone with those eyes. His credibility is dead in the water. Mind you, it doesn't say much about the health of the sport of cycling that he was allowed to win seven Tours de France in the first place,' Sharwood wrote.

Nor does it say much about the media that sections so fiercely supported Armstrong when all around him tested positive or were found to be involved in drug cheating. It is true Armstrong made it as difficult as he could for anyone who might question the validity of his performances.

He was wealthy, had influence and was litigious. USADA alleges he was able to make a positive EPO test 'go away'.

A positive test to a steroid was excused after Armstrong's team doctor backdated a script for a cortisone-based ointment for treatment of saddle sores. Nonetheless, too much of the media found it easier to swoon than to suspect. It was not just the media. Former South Australian premier Mike Rann defended Armstrong as an 'honourable' man after the star of the state's Tour Down Under was accused on US TV by former teammate Tyler Hamilton of regular use of EPO.

There was too much to lose if Armstrong was found to be a fraud, so best pretend the growing evidence was the result of a 'witch-hunt', which is exactly what Armstrong's people did and aggressively so. How does honourable stack up now?

This year's Tour de France winner Bradley Wiggins said: 'It's pretty damning stuff. It is jaw-dropping the amount of people who have testified against him. It's not a one-sided hatchet job. I'm shocked at the scale of the evidence.' But not of the scale of drug use?

So vast was drug abuse in cycling that the Lance Armstrong years have to be expunged from the record books altogether. No asterisks, just nothing. Most of the placegetters have proved to be drug cheats. From the 1998 Tour won by drug cheat Marco Pantani to the 2010 edition won by another drug fraud, Alberto Contador, only once, in 2008, has the winner, Carlos Sastre, not been associated with drug deceit.

In every Tour won by Armstrong, at least two of the top three placegetters have been found guilty of drug infractions. In 2003, seven of the top 10 have been exposed. Cyclists filled up with drugs in races as regularly as Formula One drivers stop for petrol.

Cycling will go on, the Tour will continue to draw headlines and publicity, but if you take it seriously, emotionally invest in the race, you do it at your peril.

Armstrong always chanted that he had been tested more than 500 times and never returned a positive. That only proves he never tested positive, not that he did not use drugs. More importantly, the creep must have defended himself more than 500 times and never told the truth. You can be positive about that.

Source: The Australian, 13 Oct. 2012.



INQUIRY

Armstrong a fraud and frauds can't be heroes. Not now, not ever

Lance Armstrong's drug cheating behaviours cost him a considerable amount financially and destroyed his reputation. Discuss why some elite athletes are still willing to take risks with performing enhancing drugs.

study on

Concept code: PDH-164

Do more
Masking drugs

Practice HSC exam questions

Using drugs to mask other drugs

Some drugs, such as diuretics and alcohol, are used to mask other drugs, dilute urine or decrease excretion of the ergogenic drug.

Diuretics are drugs that increase the amount of fluid (water and urine) passing from the body.

Diuretics

Diuretics are used to treat health problems such as liver and kidney disease. They have played a role in sports such as racing, boxing and weight-lifting, where weight reduction is often essential. They are banned because they can clear evidence of steroid use from the body. Apart from the interruptions to training caused by the need to urinate frequently, some detrimental effects of diuretics include:

- dehydration
- dizziness and possible fainting
- headache
- loss of coordination
- heart and kidney failure.



Figure 12.41: Urine samples being tested in a laboratory for EPO

Alcohol

Alcohol is a depressant; that is, it slows bodily functions. It is a powerful drug and toxic in large quantities. Alcohol is particularly dangerous when consumed with other drugs, such as sleeping pills. Alcohol is commonly found in cough mixture, so athletes have been known to use cough mixture as a masking drug.

The effects of alcohol on the body are progressive and depend on the quantity consumed, the person's size and tolerance level, and the length of time between drinks. The effects of alcohol include:

- dizziness and loss of coordination
- loss of inhibition
- slowed reactions and slurred speech
- blurred vision
- possible aggression
- vomiting
- unconsciousness or death if large amounts are taken.

Benefits and limitations of anti-doping

Sample collection (also known as doping control or drug testing) is an essential part of promoting and protecting doping-free sport. It is the process to detect the use of a prohibited substance, or prohibited method, by an athlete. Sample collection consists of testing, conducted by an anti-doping organisation such as the Australian Sports Anti-Doping Authority (ASADA). Use the **ASADA** weblink in your eBookPLUS to find out more and watch a video on sample collection.

Sample collection in sport is now quite extensive throughout the world, with many thousands of tests performed each year.

The *benefits* of sample collection (testing) include the following.

- It protects the right of athletes to compete in a sporting environment free from doping.
- Athletes should be rewarded on their natural ability and training outcomes, not chemical enhancement.
- Knowing that athletes can be tested any time, anywhere, is a deterrent to athletes who might consider doping.
- Doping is harmful to the health of athletes.
- Athletes like being tested because they like being able to prove that they are competing clean.

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study on

Concept code: PDH-165

Practice HSC exam questions

The *limitations* of sample collection include the following.

- On 1 January each year, a revised World Anti-Doping Agency Prohibited List is released, so athletes must be aware of what is prohibited and keep up-to-date with their information.
- Because athletes have previously tampered with samples, athletes must remove clothing from the knees to the mid-torso, and from the hands to the elbows, and a chaperone (of the same gender as the athlete) must witness the urine sample leaving the athlete's body. This process can be confronting for some athletes.
- Testing is very costly, amounting to several millions of dollars annually worldwide.



INQUIRY

Pros and cons of drug testing

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Draw and complete a table like the one below to identify the pros and cons of drug testing. Use the **Pros and cons** weblinks in your eBookPLUS to find information that may assist you.

Pros of drug testing	Cons of drug testing



INQUIRY

Ethical issues and drug use

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Use the **Sports and drugs** weblink in your eBookPLUS to read arguments for and against using performance enhancing drugs in sport. Justify reasons why drugs are considered to be unethical.

Use of technology

The use of technology to assist sport has gained considerable attention in recent decades, particularly since the first moon landing in 1969. This feat depended on extensive development and use of computer technology and on the construction of strong but lightweight attire and equipment. The benefits of NASA's immense technological advancement were soon realised by the rest of the world, and entrepreneurs in both business and sport adapted the technology for refinement in their own areas. Improved cycling helmets, graphite golf club shafts, lycra bodysuits and the controversial fast swimsuits are only some of the sport-related technologies of the last half century. It would be difficult to discern which advances were more significant in terms of performances or more beneficial to sport itself. Certainly, computer timing in sports such as swimming and video analysis to improve skill execution rank among the most important developments.

Training innovation

Institutes of sport and research centres have, as a result of considerable public funding, developed sophisticated methods of measuring and analysing physiological progress as a result of training. Athletes attending sports academies

(a)



(b)

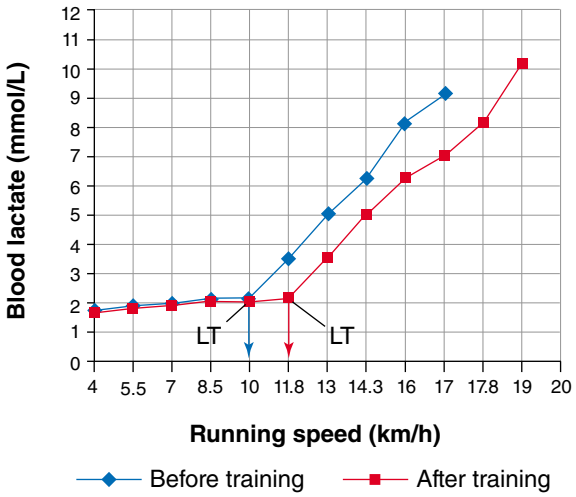


Figure 12.42: **(a)** Lactate threshold testing in the laboratory and **(b)** a chart that identifies the lactate threshold differences before and after training.



Figure 12.43: Instrument for field testing of lactate threshold

now have access to a wealth of information that is used to monitor the pace of adaptations, together with machines and instruments to observe, analyse and evaluate technique. Two areas where there have been considerable training innovation are in lactate threshold testing and biomechanical analysis.

Lactate threshold testing

Most athletes use heart rate monitors to establish their level of intensity relative to their target heart rate during exercise. Elite athletes often aim to train at levels of intensity close to the lactate threshold or level at which lactate begins to accumulate rapidly in the blood. This point is characterised by a burning sensation, increased ventilation rate and deteriorating performance. Determining the point at which blood lactate starts to accumulate rapidly is important for athletes as training regimes are geared to push back this point for as long as possible while still working at high levels of intensity.

There is a range of equipment and a number of ways to establish lactate threshold. The most accurate and reliable method is testing blood samples during graded exercise tests in the laboratory. In these tests, treadmills, bicycle ergometers or rowing machines are used with blood samples being taken at graded levels of intensity. Using this information, a lactate performance curve is generated and this shows rises in lactate levels. Equipment to do this is both expensive and limited in terms of availability.

More convenient and less expensive are portable lactate analysers. However, they require athletes to

undergo periodic fitness tests that have a set of protocols so that measurement can be compared from one occasion to the next. Simpler field tests require athletes to perform work similar to what is required in competition. With the aid of special heart rate monitors that have a split time facility, the lactate threshold can be established. For more detailed information on lactate threshold testing, use the **Lactate threshold** weblink in your eBookPLUS.

eBookplus

Biomechanical analysis

Biomechanical analysis is used to improve sporting performance. It explores the various techniques applied to skills such as throwing, catching, bowling, jumping and manipulating objects. Measures such as video analysis, photography, use of comparative images and slow motion replays allows performance of skills to be subjected to a high degree of scrutiny. Movements are explored in detail, problems identified and ways of making them more biomechanically efficient recommended. Biomechanical analysis aims to make execution of any movement more skilful, efficient and safe.

Video analysis, for example, is now used in a range of coaching, viewing and performance appraisal situations. Video allows analysis of player movements, strategies and techniques, with a view to:

- *improving technique*. The way a player executes a movement such as a tennis serve or swimming stroke can be observed repeatedly in slow motion to locate error.
- *improving visualisation*. By observing a skill performed repeatedly or in slow motion, a player's conceptualisation of what is required for proper execution is enhanced.
- *establishing biomechanical efficiency*. By observing the movements of skilful players, coaches can gain an insight into how movements can be performed more efficiently and demonstrate these to their players.
- *analysing strategies*. Coaches (particularly in team sports where there are numerous movements occurring with the ball and away from the ball) find video replays useful for analysing the effectiveness of strategies used both by their team and their opponents.

study on

Concept code: PDH-166

Do more
Training innovation

Practice HSC exam questions



Figure 12.44: Coaches and sports scientists use video analysis to monitor and improve a swimmer's stroke and other elements of technique.

Three-dimensional motion analysis

Three-dimensional motion analysis is a relatively new technique used to examine player movements when executing a specific skill. With reflective markers attached to various parts of the body, a skill such as golf swing is performed. The animation obtained through the sequence can then be scrutinised and used to improve technique, prevent injury or compare with previous performances. To see how this works, use the **Biomechanics laboratory** weblink in your eBookPLUS.

Global positioning systems (GPS)

The use of GPS devices has increased in popularity among high profile teams and players. These devices provide valuable information such as player work rate (speed, distance covered) during a game and ability to recover. This allows training programs to specifically address the skill and fitness needs of individual players. These devices have also become popular in golf by providing players with the exact distance from their ball to the pin on the golf green. Use the **GPSPORTS** weblink in your eBookPLUS to see how GPS devices are benefiting some clubs in the National Rugby League.

Three-dimensional simulations

Some three-dimensional simulations are used to provide replications of the way a particular movement should look. By examining these movements, players can observe correct techniques and compare to their own. Simulations can also be used to provide realistic sport field environments, such as a basketball hoop for players to shoot at. Most of this software provides immediate feedback. Use the **Golf swing** and **Basketball throw** weblinks in your eBookPLUS to view how three-dimensional simulations are used to improve these specific skills.

Equipment advances

Modern athletes have a considerable advantage in terms of equipment available to improve performances or make skill execution easier and safer. Some examples of equipment advances are shown in table 12.11.

Fast swimsuits

The technology of racing swimsuits advanced considerably from 2000. Manufacturers competed to produce suits with the most performance-enhancing features while staying within the competition rules of not improving buoyancy. For example, the features of the Speedo LZR Racer, approved and worn by the medal-winning swimmers at the Beijing Olympics in 2008, included:

- fabric that had the lowest possible level of friction drag in the water, developed using NASA's wind tunnel technology
- a streamlined shape with a corset-like support around the lower torso to help swimmers hold the best position in the water
- fully bonded seams to reduce drag while allowing full movement and flexibility.

Issues of fairness and equity were raised. Some suggested that swimmers who wore the fast suits had a significant advantage over other swimmers who could not afford them. Others saw the technology as a natural progression in the sport and used the example of the cyclists' aerodynamic helmet shape, which was launched controversially at the 1984 Olympics but is now standard equipment worn by all racing cyclists.



Figure 12.45: The Speedo LZR Racer was approved and worn by many swimmers at the 2008 Beijing Olympics but was banned from use in competitions from 2010.

study on

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The debate escalated in mid-2009 when a new range of suits was introduced, made from all-polyurethane fabric that significantly improved buoyancy. Swimming's governing body, FINA, acknowledged that the technology had gone too far and imposed a ban from 2010 on 'any device or swimsuit that may aid speed, buoyancy or endurance'. This was not before a large number of world records were broken at the 2009 World Championships by some swimmers wearing the all-polyurethane full-body suits.

New rules from 2010 specify the type of textile and the shape of the suits for men and women. Use the **FINA** weblink in your eBookPLUS to access the latest rules and restrictions.

Compression garments

Compression garments are a type of athletic clothing that fit very tightly to the body providing a sense of firmness around the limbs during exercise. It is claimed that they advance the recovery process following activity, improve performance by delaying the onset of fatigue and decrease muscular damage as a result of exercise. Further research needs to be done to fully substantiate these claims. To further investigate the benefits of compression garments, use the **Compression garments** weblink in your eBookPLUS.

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Golf balls

The golf ball used today is larger and technology has been able to embed it with the most appropriate number and size of dimples for maximum elevation and distance given the clubhead speed applied by the golfer. Manufacturers strive to design and create the most technologically superior golf balls for top class competition. Use the **Golf ball technology** weblink in your eBookPlus to read about one example.

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Other examples of equipment advances are shown in table 12.11.

Table 12.11: Training innovations and their effect on performance

Sport	Equipment advances	Implications
High jump	High jump mats used instead of sand Techniques like the Fosbury flop instead of the scissors	Heights cleared by athletes are increased because landing on their back is now possible.
Pole vault	Carbon fibre poles	Material allows greater flex and therefore increased vertical propulsion over the bar.
Running	Lightweight nylon used in spikes Lycra clothing	Weight and air resistance effects on times are reduced, and comfort for the athlete is increased.
Swimming	Bodysuits Caps Goggles Breaststroke whip kick Underwater dolphin movement in backstroke and butterfly	Drag component is reduced. Streamlining is improved. Swimmer achieves greater propulsion through water. Swimmer produces more efficient and powerful force.
Golf	Synthetic fibres (for example, tungsten used in golf balls) Graphite shafts Metal alloy heads on driving clubs	Balls respond better for distance, spin and control. Durability is improved. Dimples vary to give balls different characteristics (for example, distance or spin). More variation in 'flex' creates a higher 'whipping' action for extra distance. Greater area of contact results in high level of result (that is, less margin for error). Accuracy is increased. Lighter material allows more mass at the point of contact, creating greater distance.
Cycling	Carbon fibre components Helmets Suspension on mountain bikes	Frames, pedals, wheels, gears, etc. weigh less, so create less resistance. The efficiency of the cyclist's effort is increased. The shapes and designs of components are more aerodynamically sound. Cyclists can ride more extreme country safely. The stress on cyclists' bodies is reduced, so energy is focused on creating forward motion.
Sprint running	Crouch start versus standing start	Biomechanical efficiency is increased and quadriceps are able to create greater forward force out of the blocks.
Discus/ shot-put	Rotation (spin) delivery	Velocity of projectile is increased at point of release. Momentum is increased as a result of the combined muscle actions involved.
Athletics	Rubber compound used in tracks and runways	Tracks respond to effort, so the efficiency of an athlete's output is increased. There is a high reaction component for jumps and forward motion.
Australian football	Configuration of stops used in football boots	There is less stress on players' feet because boots are like running shoes; agility is increased.

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Use the **Ready, tech, go** weblink in your eBookPLUS and read the article 'Ready, tech go'. Some of these technologies improve performance while others improve data collection and scoring. What drives the race to continually improve technology in sport? Are we becoming too dependent on technological advancements for success?



INQUIRY

Technology and sport

Divide the class into small groups. Allocate each group one of the following technology areas:

- computerised timing; for example touch pads and multifunction stopwatches
- video analysis; for example, biomechanical analysis and slow motion replays
- equipment; for example, golf clubs and balls
- clothing; for example, racer swimsuits and lycra clothing
- physiological performance; for example, lactate and maximal oxygen uptake testing.

In your groups, research the area and investigate how this technology has been used to improve performance. Present findings from each group to the class.

INQUIRY

Ethical issues

Develop an argument to address the following issues.

- Has technology gone too far in attempting to improve sports performance?
- Has access to performance enhancing drugs created unfair competition?

If you are unsure of how to develop an argument, use the information at the **Develop an argument** weblink in your eBookPLUS.

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The **Drugs and sport** weblinks may assist you with information in developing your argument.

Choose a sample of arguments to be read to the class as a stimulus for further debate.

SUMMARY

- Strength training is a general term that encompasses all types of exercise designed to improve strength and increase muscle size.
- Three forms of strength training are resistance training, weight training and isometric training. All forms improve strength but use different equipment to do so.
- Effective strength training requires exercise designed for specific muscle groups. By manipulating variables such as resistance, sets, speed, repetitions and rest, strength training can address different needs.
- Three types of aerobic training are continuous, Fartlek and long interval. Aerobic training is sustained, of low to moderate intensity and improves the capacity of the aerobic system of energy supply.
- Anaerobic training aims to improve speed and power. Preferred methods to enable this include resistance training, plyometrics and short interval training.
- Training for power and speed requires resistance training programs to ensure that exercise speed is increased. Plyometrics, or bounding activities, are excellent for developing power.
- Three common forms of flexibility include static, dynamic and ballistic. Static flexibility is an indication of the range of movement at a series of joints while the body is in a fixed position. It is considered the safest form of stretching. Dynamic flexibility is the ability of the muscles to move a joint through its full range of motion. It is commonly used in warm-ups for games-based sports where movements require a full range of motion.
- Skill training is improved by drills practice, modified and small-sided games and games for specific outcomes. Skill training attempts to improve technique together with other important game skills such as decision making and tactical awareness.
- When planning to improve performance, some general considerations such as fitness requirements, timing of events, climate and seasonal adjustments need to be considered.
- Planning to improve performance requires developing a detailed overview of what is to be done to achieve the goals. It is a summary of smaller phases that are consummated in the overall plan. The process of structuring training into phases or periods that can be managed independently of other periods is called periodisation.

- There are three phases of competition — pre-season, in-season and off-season. Training volume and intensity vary according to which phase players are in.
- Macrocycles are long-term planning frameworks and may represent an entire planning program. It encompasses the available preparation time preceding a major competition and identifies all lead-up competitions and major events along the way.
- A microcycle includes detailed information about frequency of training, intensity, duration and volume, together with skills, activities, resistance training, plyometrics and specific session organisation.
- Peaking and tapering are two important issues for elite athletes. Peaking is the phase of training in which performance is optimised to meet the demands of a race, competition or series. Tapering is a period immediately before competition when the volume and intensity of training is reduced.
- Elements to be considered when designing a training session include health and safety, overview, warm-up, cool-down, instruction, practice, conditioning and evaluation. Planning to address these elements improves the quality and outcomes of the session.
- Overtraining is a chronic psychological and physiological condition caused by training loads that are too demanding for an athlete to manage. Adjustments to the amount and intensity of training are necessary to overcome the problem. Overtraining is characterised by certain physiological considerations such as lethargy and injury, together with psychological considerations such as loss of motivation.
- Some athletes try to improve performance using artificial means such as drugs. Human growth hormone, steroids and EPO are the drugs most commonly used. These drugs are illegal, so athletes sometimes try to mask their use with other drugs. While testing is used to identify performance enhancing drugs in the body, ethical considerations relating to fairness need to be addressed.
- Use of technology has flourished in sport in recent years. Training innovation such as lactate threshold testing and biomechanical analysis, together with equipment advances, such as golf balls having soft urethane elastomer covers with a dimple pattern, have ensured that time and distance records continue to be broken.

QUESTIONS

Revision

1. Define strength training. How can strength be developed within a weight training program? (H8) (3 marks)
2. Describe the difference between elastic and hydraulic resistance training. (H9) (2 marks)
3. Explain how strength is developed using isometric training. (H8) (2 marks)
4. Contrast the key features of continuous, Fartlek and long interval training. (H8) (5 marks)
5. Explain how speed and power are developed through resistance training. (H7) (3 marks)
6. Outline the nature of plyometric training. Suggest a range of exercises that could be used as part of a power development program. (H10) (3 marks)
7. Outline the key differences between static and dynamic flexibility training. (H9) (3 marks)
8. Indicate circumstances where a ballistic flexibility program might be utilised. (H17) (2 marks)
9. Describe how decision making and tactical awareness might be developed within a small-sided game. (H17) (4 marks)
10. Outline the function of drills practice. Briefly outline a drills practice suitable for use in a games-based training session. (H9) (4 marks)
11. Explain why climate and season are important considerations in training plans. (H17) (4 marks)
12. Explain why knowledge of a schedule of events is an important consideration when planning to improve performance. (H10) (3 marks)
13. Define periodisation. Why is it important in the construction of a training program? (H8) (3 marks)
14. Describe characteristics of the preparation phase that makes it different from the competition phase of a training program. (H10) (4 marks)
15. Explain what is meant by peaking and tapering in performance. How would you assess if an athlete was at the peak of performance? (H9, H16) (4 marks)
16. Describe the elements of a training program. Suggest how each element improves movement potential. (H7) (4 marks)
17. Outline health and safety considerations of which an athlete needs to be aware. (H8) (4 marks)
18. Explain the importance of warm-up and cool-down in a training session. (H8) (3 marks)
19. Explain how overtraining is identified. (H16) (3 marks)
20. Explain how planning can be structured to avoid overtraining. (H17) (3 marks)
21. Outline the harm caused by performance enhancing drugs. (H7) (3 marks)
22. Argue a case against using steroids to increase strength. (H17) (5 marks)
23. Explain what EPO is and why might it be the drug choice of athletes in endurance events. (H16) (4 marks)
24. Briefly outline the benefits and limitations of drug testing. (H16) (4 marks)
25. Use examples to describe how technology is being used to improve performance. (H8) (5 marks)
26. 'The only way that there will ever be a level playing field in elite sport is to allow all athletes to use performance enhancing drugs.' Discuss. (H17) (6 marks)

Extension

1. Investigate an area in which technology has made a significant difference to performance. Outline how the changes work to improve performance and suggest future developments in this area. (H8) (6 marks)
2. Choose a sport or activity. Using the syllabus as a support or scaffold, apply each of the critical questions listed in 'students learn to . . .' sections of the syllabus. (H7–H11, H16, H17) (12 marks)

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CHAPTER 13
Equity and health



OUTCOMES

On completion of this chapter, you will have covered Outcomes **H1**, **H2**, **H3**, **H5**, **H14**, **H15**, **H16** from the PDHPE HSC syllabus.

CRITICAL QUESTION

Why do inequities exist in the health of Australians?

Factors that create health inequities

Health inequities are experienced by a range of populations, including Aboriginal and Torres Strait Islander peoples, the socioeconomically disadvantaged, Australians born overseas, people living in rural and remote locations, and people with disabilities. The factors that are considered to cause this inequity are:

- daily living conditions
- quality of early years of life
- access to services and transport
- socioeconomic factors
- social attributes
- government policies and priorities.

Daily living conditions

Living conditions are people's everyday environments, including the places where they live, play and work.

People in poor **living conditions** are at greater risk of contracting and spreading communicable diseases. When this is combined with having a large or extended family in the one home, a cycle of ill health can develop because individuals are continually reinfected. Some indigenous people in remote areas live in improvised dwellings such as sheds or 'humpies'. The ability to maintain an adequate level of hygiene to prevent the spread of disease in these circumstances can be difficult.

Likewise, the socioeconomically disadvantaged and the elderly can find themselves renting or occupying housing that is older and run-down. These conditions contribute to a higher incidence of respiratory diseases, especially asthma. Older dwellings are more likely than newer buildings to need costly maintenance of items such as the plumbing. Socioeconomically disadvantaged individuals who cannot afford adequate insulation or safe heating in their homes are often the victims of injury or deaths related to burns.

Some socioeconomically disadvantaged people also live in overcrowded conditions. Many individuals living in a confined area may increase the possibility of stress-related illnesses and there is a greater potential for domestic violence or abuse.

Quality of early years of life

The early years of life are extremely important for a child to develop to their full potential. Even before a baby is born they are affected by individual, environmental, socioeconomic and sociocultural factors. These factors continue to have an influence throughout the individual's life span.

Genetic and environmental factors

The combination of genetic material from each parent may increase the child's risk of developing a particular disease such as diabetes, or decrease the risk for diseases such as skin cancer and be a protective factor. Besides passing on genetic material that may influence the hair colour and height characteristics of her child, a mother can also pass on the effects of drug use and other lifestyle behaviours. Premature births and foetal alcohol syndrome are common when mothers abuse substances during pregnancy. Babies born prematurely have lungs that are not fully developed at birth, so they must stay on a ventilator in hospital. Babies born with drug addiction suffer withdrawals and

may not fall into regular sleeping patterns for some time. Smoking also contributes to low birth weight babies who experience health disadvantages from the moment they are born. Research suggests that a child who is born with a low birth weight or prematurely may continue to experience poor health throughout their life.

Young children who are exposed to passive smoking in the home environment are at greater risk of developing respiratory illnesses such as asthma. This debilitating disease can impact on the quality of life and restrict a child's ability to exercise and manage their weight effectively. The effects of being exposed to toxic chemicals by cleaning products or vapours given off by plastic products in the home is also a serious concern. These invisible potential carcinogens may take years of exposure before they develop into cancer or cause some type of allergic reaction that can have a long-term health consequence. The outdoor environment is also a potential source of ill health. Air quality, noise pollution and a safe water supply all have an impact in the early years of life.

Socioeconomic status of parents

The socioeconomic status of the parents has a bearing on a child's potential to achieve good health. Parents on higher incomes can afford private health insurance and are able to gain easier access to diagnostic testing and treatment for young children who experience ill health. Parents from lower socioeconomic circumstances may be unaware of problems with their child's development, which may only be picked up through routine screening programs conducted in schools or at baby health centres. It is common for people from lower socioeconomic status backgrounds to not immunise their children for infectious diseases such as whooping cough, which can spread through the community and delay the development of other young children.

People from higher socioeconomic status backgrounds are more likely to provide adequate housing that suits the needs of their children. Housing that lacks an adequate water supply or sanitation increases the risk of children contracting infectious diseases. Overcrowding can contribute to domestic disharmony and place stress on relationships. A family's ability to afford nutritious food influences the development of a child. An adequate supply of essential nutrients is important for proper brain development and physical growth. Too many kilojoules can lead to obesity which in turn can make exercising difficult. People from low socioeconomic backgrounds tend to eat a higher proportion of takeaway meals that are high in fat and rich in kilojoules. These dietary habits are passed on to the child and affect their early years.

More affluent areas also have easy access to GPs, a variety of health services to choose from and a range of specialists who can deal with serious health issues. Any child with a serious illness will also be supported through community services and access to major hospitals with modern diagnostic equipment and treatment procedures. These all help to promote good health in the early years of life.

Sociocultural factors in the early years

Sociocultural factors also play an important role in the early years of life. Beyond the basic needs of food, water, clothing and shelter are love and security. Some cultures have strong family support structures, with the older relatives and siblings taking care of the young when both parents have to work. However, some families cannot provide this level of support and infants might spend more time with friends or in daycare where their nurturing experiences will be different.

INQUIRY

Quality of the early years

Create a mind map to summarise factors that impact on the quality of the early years of life and can lead to inequities in health.

Access to services and transport

To have access to health services, there must be a good infrastructure and an awareness in the community of the care available. The elderly, in particular, can find it difficult to travel to specialists in the city, especially if they are also socioeconomically disadvantaged or disabled. If they must rely on public transport, elderly people can find it difficult to use and may be hampered if their area has an infrequent service.

Rural and remote areas experience the greatest disadvantages in accessing health services. This has led to many people relying on health care that is provided to them on a rotational basis or on telemedicine, which is provided over the phone or by the internet and videoconferencing.

There are groups in the community who can remain unaware of important health messages. Non–English-speaking migrant groups, for example, may be unaware of important health promotion initiatives presented in the mass media. It therefore becomes essential to use community newspapers to reach these groups. Area health centres also become a vital link.

Migrants may also find it difficult to locate doctors who speak their language and who are culturally sensitive to their needs. Indeed, the reluctance of indigenous people to seek 'traditional white medicine' comes from past distrust and, in remote areas, from language barriers.

Finally, those people without health insurance have to go on waiting lists for public hospital treatment, so their access to health services may be delayed. A low socioeconomic status accompanied by a disability can become a double disadvantage in achieving good health.

Socioeconomic factors

A person's socioeconomic status contributes to their standard of health. People of a low socioeconomic status tend to have a poor attitude towards maintaining their health. This is partially reflected in the fact they are more likely to use a primary or secondary health facility (that is, a doctor or hospital), rather than a preventative health service such as immunisation, dental checkups or breast screening. In research studies they report their health as being fair to poor.

Socioeconomically disadvantaged people can be caught in poverty traps caused by generations of unemployment. Attitudes passed down through the family can contribute to the devaluing of work and education by younger people. Because these young people have relatively poor role models, they are less likely to travel or experience the broader views of society.

People of a low socioeconomic status tend to adopt unhealthy behaviours, such as higher rates of smoking, excess alcohol consumption, a high-fat diet, irregular eating patterns and patterns of physical inactivity. These all contribute to the higher mortality and morbidity rates that are experienced by this group. Life expectancy is 35 per cent lower than higher socioeconomic groups. Because they are on relatively low incomes, people of a low socioeconomic status are less able to buy medicines to treat minor illnesses, and their nutritionally poor diet lowers their immunity to many infections.

As a group they have a higher incidence of disability and serious chronic illnesses.

People whose socioeconomic status would be classified as high are more likely to listen to health promotion messages and act upon them. They are able to afford private health insurance and therefore wait shorter periods for treatment. Their place of residence also usually promotes health rather than making it deteriorate. A higher socioeconomic status increases one's chances of having good health.

SNAPSHOT

Housing assistance remains important for many Australians as affordability pressures grow

Housing assistance remains important for many Australians, particularly with increasing households experiencing 'housing stress', according to a report released today by the Australian Institute of Health and Welfare (AIHW).

The demand for social housing (rental housing provided by government or not-for-profit community organisations) continues to be high and waiting lists remain long.

The report, *Housing assistance in Australia 2012*, shows that the number of Australian households experiencing moderate 'housing stress' (defined as spending more than 30% of gross household income on housing costs) increased from 900 000 (or 14% of all households) in 1995 to 1.4 million (17%) in 2010.

'The number of households in severe housing stress (defined as spending more than 50% of gross household income on housing) also increased — from 300 000 (4.6% of all households) in 1995 to more than 460 000 (5.5%) in 2010', said AIHW spokesperson Geoff Neideck.

Over half a million of these households are low income households (those whose income is in the bottom two-fifths of the population).

Government housing assistance is provided under the National Affordable Housing Agreement, which aims to ensure that all Australians have access to affordable, safe and sustainable housing. Over the last decade, support has increasingly been focused on those in the greatest need, including groups such as Indigenous Australians, young and older Australians and people with disability. Support is also focused on people who were homeless, whose life or safety was at risk in their accommodation, whose condition was aggravated by their housing or who had very high rental costs.

Source AIHW media release, 5 December 2012.



INQUIRY

Housing assistance remains important for many Australians as affordability pressures grow

Read the snapshot 'Housing assistance remains important for many Australians as affordability pressures grow', then answer the following questions.

1. How are 'housing stress' and 'severe housing stress' defined?
2. Which groups are in most need of housing assistance in Australia?
3. Critically analyse the factors that contribute to health inequity due to rising costs of housing. Discuss as a class.

Occupation

Each occupation carries an element of risk that can affect a person's health. General office work might seem relatively safe, but stress, exposure to radiation or repetitive strain injury can cause debilitating physical conditions that can reduce the quality of a person's life.

Workers who use heavy machinery or who are involved in the transport industry are at greater risk of injury leading to disability or death. People in rural and remote areas are particularly affected. There are also industrial processes that put some workers at risk of developing cancers through chemical contamination and respiratory dysfunction through inhaling vapours. This is more likely to affect males, as they tend to take on jobs with a higher risk than females. Migrants, workers on low incomes, and the young are also more likely to take risks at work to maintain employment.

Access to and level of education

A person's education level generally determines their level of income, socioeconomic status and health. The more time a person spends in education, the greater the potential there is for them to develop a good level of **health literacy**. Young people who leave school early and remain unemployed are at a greater risk of developing poor mental health and depression, leading to self-harm behaviours. It is also likely that their socioeconomic status will remain low throughout their life.

Health literacy is the ability to understand and interpret health information and use it to promote and maintain good health.

Migrants from non–English-speaking backgrounds face the difficulty of learning a new language, so they may not fully understand health promotion messages contained in health lessons and in the media. These students should receive health literature presented in their own language.

Statistically, indigenous people are less likely to have post-school qualifications and, as a group, they tend to leave school at an early age. For indigenous populations in rural and remote areas, traditional schooling may seem culturally inappropriate, as indigenous languages and customs are not taught as part of all school curriculums.

Some indigenous communities are developing their own schools, as are many migrant groups. The growth in independent schools has the benefit of promoting the customs of particular cultures, and may encourage a better attendance rate by students who might otherwise drop out of mainstream schools, as the following case study shows.

CASE STUDY

Indigenous children and impaired hearing — effects on education

'Indigenous children who are unwell, tired, hungry or emotionally insecure have less capacity to take advantage of available opportunities to learn.' (MCEETYA Taskforce on Indigenous Education Paper, *Solid foundations: Health and education partnership for Indigenous children aged 0–8*, p. 4).

Poor health is a major stumbling block to effective learning. It can entail absence from school or training sessions or, where attendance occurs, it can seriously impair students' capacity to learn.

Australia's Indigenous population suffers from comparatively high rates of lower life expectancy at birth, low birth weight and failure to thrive in infancy, poor quality diet, disease, low levels of social and emotional wellbeing, substance misuse, childhood trauma and injuries.

It is important that teachers are aware of these issues and how they might impact on schooling . . .

What educators can do

Teachers are not equipped to deal with these issues as they present in students. Partnerships with health agencies and communities are required for effective action.

However, education can play an important preventive role and help to break the cycle.

There are two issues which recur among these case studies — nutrition and hearing loss — where direct intervention by educators can be practicable.

Nutrition: Hungry kids won't concentrate. It's that simple. Providing food has been criticised as outside the province of schools and training institutions, a welfare operation which builds dependency. But if a Vegemite sandwich makes the difference between a good session and one which is disrupted, then, in the short term, a Vegemite sandwich is the way to go.

Hearing: Conventional education and training relies heavily on auditory input. The comparatively high incidence of otitis media (OME or 'glue ear') among Indigenous young people in some parts of the country seriously diminishes their capacity to respond . . .

The issue

Research has established that Indigenous Australians have a very high prevalence of upper respiratory problems and related diseases, including OME. During the critical years for speech and language development, as well as for growth and elaboration of the nerve pathways between the inner ear and the temporal cortex of the brain, the great majority of Indigenous children are experiencing fluctuating hearing loss. Such sensory deprivation during the developmental period subsequently makes it much more difficult for these children to learn English as a school language.

OME in *advantaged* populations around the world is approximately 5% in childhood, falling to less than 1% after age 12. The prevalence of OME among Indigenous Australian children living in remote communities has been found to range from 40–70%, with younger children experiencing more frequent infectious episodes.

Eardrum perforations and ruptures typically begin within the first three months of life. With repeated ruptures, healing, and re-ruptures, the eardrums become scarred and thickened. In many cases the ruptures become too large to heal and require reconstructive surgery to repair . . .

What happened?

Ear examination and hearing testing was provided for 1032 students. Those students found to have active ear disease were provided with medical treatment, in cooperation with families, schools and community clinics.

In summary, 79% of this group of Indigenous students were found to have an educationally significant hearing disability . . .

Workshops were held at each of the six schools, for teachers and assistant teachers, community liaison officers and other staff. This covered topics such as: ear disease, auditory deprivation and language development; implications for schools and support services for students with hearing disabilities; phonological awareness (PA) intervention program for Indigenous language-users who are speakers of English as a foreign language; classroom acoustics, and FM classroom hearing aids and speaker systems; structuring learning environments to promote inclusion of students with hearing disabilities.

The in-service program concluded with a negotiated plan for how each school would be involved . . .

Students' literacy and phonological awareness levels were tested at the beginning and end of the project to measure the impact of the school-based intervention program.

The main findings

- Indigenous Australian students in this project had a very high prevalence of ear disease and persisting hearing disabilities compared to non-Indigenous students . . .
- The relationship between hearing loss and decreased school achievement for Indigenous students was again strongly established.
- Hearing support services at school are especially relevant for Indigenous students learning English as a second language — this can't be underestimated! English is the school language, and students who have to work at the stressful activity of trying to understand what is said on the basis of second language or foreign language issues, and then have a hearing loss on top of that, encounter a nearly impossible task . . .

(continued)

- Phonological awareness scores predict literacy level . . .
- Something again that is entirely reversible — classroom acoustics. They vary throughout the Territory schools considerably, but they are generally very poor listening environments for students with hearing disability, especially when they are learning English as a foreign or second language . . .
- Many students have reduced capacity to process auditory information. Central auditory processing disorders may be part of the sequel to the early onset of conductive hearing loss . . .
- Finally, the one statement that reflects the data clearly from over a thousand students in the Territory: high attending Indigenous students who have ear disease and hearing loss, where there has been intervention, stay in school longer and achieve above intensive English.

Source: 'What works: improving outcomes for indigenous students', Bourke Public School case study, www.whatworks.edu.au.



INQUIRY

Identifying factors that cause health inequity

Critically analyse the case study 'Indigenous children and impaired hearing — effects on education'. Identify the factors contributing to health inequity and discuss the effectiveness of the strategies used.

Social attributes

Australia is considered to be a very multicultural society, with its own blend of races, values, attitudes, religions and range of socioeconomic status. These unique attributes or features contribute to the overall patterns of illness and death, and can work towards better health for all, or create health inequities in subgroups within that society. Discrimination, racism and gender differences can impact the level of health achieved by those affected. Mental health issues, substance abuse and self-harming behaviours are common and can lead to social exclusion.

Social exclusion

Social exclusion occurs when a community or group shows bias against particular individuals, which results in them being excluded or feeling left out.

Social exclusion can lead to individuals or subgroups of the population feeling disempowered or unable to connect with mainstream society. This can be evident in anti-social behaviour such as vandalism, self-harming behaviours such as suicide or substance abuse, or withdrawal from society as in the case of some homeless people. If social exclusion continues for a long period of time it can expose generations to a lifetime of ill health that is difficult to overcome. The current poor health of many indigenous Australians can be attributed to discrimination and their dispossession from traditional lands.

Individuals or subgroups of the population can become socially excluded when they do not have proper political representation, their health needs are not being considered in government policies, or they are unable to gain equal access to resources. Societies need to work towards making all subgroups of the population feel valued and supported. Young people, the disabled, the elderly and various ethnic groups need to know their health needs are being addressed and that they are able to access health services, regardless of geographic location, issues of discrimination or socioeconomic status.

Discrimination

Being part of a group that has been or continues to be discriminated against can lead to poorer health outcomes. The fact that women's wages are lower, relatively, than males' wages means that their health can be affected if they delay treatment for financial reasons. The fact that women's sport receives less media attention has been thought to impact negatively on the participation patterns of younger females. Moreover, the media's narrow stereotyping of women has caused some women to become obsessed with body image. This has resulted in the higher prevalence of eating disorders among women.

Discrimination is the unfair treatment of a person or group based on factors such as their sex, race, cultural origins, age and disability.

Discrimination can also be experienced by individuals who have a disability. They will often require medication or continual treatment to relieve their condition, some of which will be covered by Medicare but not all. Depending on their disability, the person may be financially dependent on a pension, which limits their income and results in a relatively low standard of living.

Government policies and priorities

The federal and state governments are responsible for prioritising health care and allocating funds to the general health areas and specific population groups. The national health priority areas (cardiovascular disease, cancer control, injury prevention, mental health, diabetes, asthma and arthritis and musculoskeletal conditions) receive a higher level of funding.

Indigenous people, although having health that is two to three times worse than that of non-indigenous people, receive only marginally higher funding. Government economic and social policies of the past, which did not allow indigenous people to determine their own affairs, have contributed to their ill health. Now that this issue is being addressed, indigenous health is anticipated to improve.

The cost of health care is always increasing, which means that there are often competing priorities for government funding. Inevitably, some areas won't receive as much as they require. The introduction of 'lifetime health cover' was designed to ease the burden on the public health-care system by encouraging people to take out hospital insurance earlier in life. There is a risk that this policy may achieve an improvement in health only for those who can afford it.

The introduction of mandatory sentencing laws in the Northern Territory in 1997 greatly affected the health of indigenous people. For the general indigenous population, it represented another form of discrimination, and was a source of emotional suffering. These laws were repealed in 2001; however, indigenous people are still over-represented in gaols in the Northern Territory and throughout Australia. For those who are imprisoned, the exposure to violence, drug taking, abuse and the spread of sexually transmitted infections can have lifelong health consequences.



INQUIRY

The effect of multiple risk factors on health

1. With reference to a specific population group — for example, the socioeconomically disadvantaged — explain how multiple risk factors contribute to the health inequity of this group.
2. Recommend strategies for the management of health care for this group.



INEQUITIES EXPERIENCED BY POPULATION GROUPS IN AUSTRALIA

CRITICAL QUESTION

What inequities are experienced by population groups in Australia?

The syllabus requires students to study the health inequities experienced by any *two* of the following population groups:

- Aboriginal and Torres Strait Islander peoples
- people from geographically remote areas (this text includes rural areas)
- the homeless
- people living with HIV/AIDS
- the incarcerated
- the aged
- people from culturally and linguistically diverse backgrounds
- the unemployed
- people with disabilities.

Aboriginal and Torres Strait Islander peoples and geographically remote population groups (rural) have been selected in this text because they suffer considerably poorer health than the general population. Students are strongly encouraged to follow their own interests in selecting their focus populations. Summaries of other population groups are included in this section for students to begin their own, more detailed research.



APPLICATION

Challenging generalisations about health inequity

Complete the following for the *two* population groups you have selected.

1. Examine the current health data to determine areas of inequity and the degree to which the gap is reducing or increasing.
2. Analyse the impact of the health determinants.
3. Examine the media's role in influencing social attitudes and public policy.
4. Evaluate government interventions.

Once you have completed your research make a presentation to the class of your findings.

Aboriginal and Torres Strait Islander peoples

Indigenous people have poorer health than the rest of the population. The current epidemiology indicates that this gap is likely to increase and that health promotion initiatives need to target the factors that contribute to this inequity.

Epidemiology and areas of inequity

Epidemiology is the study of disease in groups or populations.

The **epidemiology** indicates the health disadvantages for Aboriginal and Torres Strait Islander peoples begins at an early age. Indigenous mothers tend to give birth to babies with a lower birth weight and there is a higher infant mortality rate. The indigenous population (548 400 in 2011) is a relatively young one as a result of a much lower life expectancy (see figure 13.1). In 2011, the median age of the Aboriginal and Torres Strait Islander population was 21 years, compared

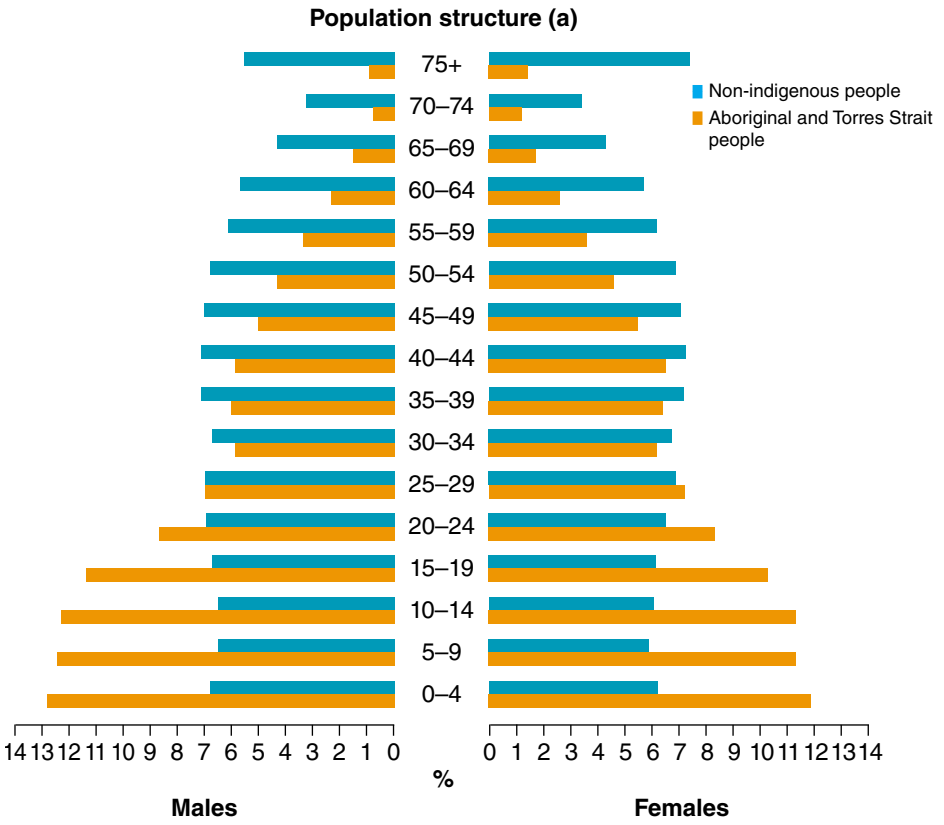


Figure 13.1: Age structure of Australia's indigenous and non-indigenous population, 2011

to 38 years for the non-indigenous population. Although the indigenous population represents approximately 2.5 per cent of the total population, they have health that is two to three times worse and it is showing little improvement.

Life expectancy

The AIHW report *Australia's health 2012* indicated that life expectancy at birth for indigenous males was 67.2 years, 12 years lower than that of non-indigenous males. The life expectancy at birth for indigenous females was 72.9 years, 10 years lower than that of non-indigenous females.

Mortality rates

Infant mortality refers to the number of infant deaths in the first year of life, per 1000 live births.

In 2010 the **infant mortality** rate for the whole of Australia was 413 deaths per 100 000 live births. The infant mortality rate for indigenous people was much higher: 730 deaths per 100 000 live births.

Reliable mortality statistics for indigenous people of all ages are available only from Western Australia, the Northern Territory and South Australia. The mortality rates for indigenous people increase with their degree of remoteness. (About 27 per cent of indigenous people live in remote areas, compared with only two per cent of non-indigenous people.) As a whole population, indigenous people die younger than non-indigenous people. Current research suggests that there is evidence of a small improvement in mortality rates for indigenous people in the period 1991–2002 (see the snapshot, page 525).

Morbidity

Morbidity is the incidence or level of illness or sickness in a given population.

Indigenous people fare worse in nearly every cause of disease. Their **morbidity** rates are particularly high for cardiovascular disease, respiratory illnesses, diabetes and injuries.

Figure 13.2 shows the main causes of death of indigenous people by gender.

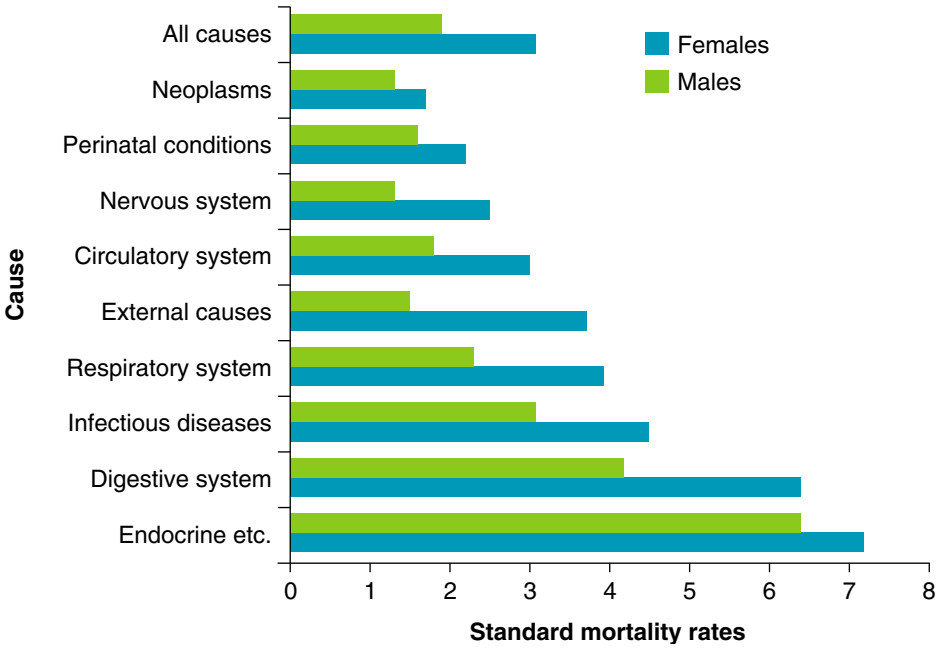


Figure 13.2: Causes of death among indigenous Australians, by gender, 2004–08

Hospitalisation

The hospitalisation rate for indigenous people is about two to three times that of other Australians. The higher rate can be partially attributed to having to stay at hospitals for treatment because of factors related to remoteness, but indigenous health overall is generally poorer, with particularly high rates of chronic kidney disease. The hospitalisation rate for indigenous people would be 30 per cent more than the rate for non-indigenous people if hospitalisations for kidney dialysis was excluded from the statistics. The rates of GP encounters and hospitalisations for indigenous people is shown in table 13.1.

Table 13.1: GP encounters and hospitalisations of indigenous Australians, by major diseases, conditions and iinjuries, various years

GP encounters 2005–06 to 2009–10		Hospitalisations 2007–09	
Condition	**Rate**	**Condition**	**Per cent**
Respiratory	21	Injury and poisoning	16
Psychological problems	16	Respiratory	13
Skin problems	16	Digestive	11
Diabetes/other metabolic	15	Mental disorders	9
Musculoskeletal	14	Cardiovascular diseases	7
Cardiovascular	13	Genitourinary disease	5

Source: Australian Institute of Health and Welfare, *The health and welfare of Australia's Aboriginal and Torres Strait Islander people: an overview 2011*, Canberra, table 4.1, p. 48.



Differences in epidemiology

1. What is the difference between the life expectancy of indigenous and non-indigenous Australians?
2. Examine the data in figure 13.2 and table 13.1 and write a short report on the most significant information that they reveal.

3. Read the snapshot 'Detailed stats released on Indigenous health'. (a) Identify the health determinants that have been improving recently, and those that have been declining. (b) What are the areas of health determinants where further is needed? (c) To which domain of health determinants does each of these belong?
4. Research the latest epidemiology data for indigenous Australians. Use the **Indigenous health** weblinks in your eBookPLUS. Discuss the latest trends and whether any improvements have been made.

eBook*plus*

SNAPSHOT

Detailed stats released on Indigenous health

A report released today by the Australian Institute of Health and Welfare (AIHW) provides detailed statistics and analysis on the state of Aboriginal and Torres Strait Islander health.

The report, *Aboriginal and Torres Strait Islander Health Performance Framework: detailed analyses*, provides over 2000 pages of comprehensive analysis against 71 health indicators covering health status and outcomes, determinants of health and health systems performance.

'When it comes to health status and outcomes, some significant health gains have been made towards closing the gap in health disadvantage between Indigenous and non-Indigenous Australians', said AIHW spokesperson Dr Fadwa Al-Yaman.

'For example, deaths from avoidable causes among Indigenous Australians declined by 20% between 1997 and 2008 and the gap between Indigenous and non-Indigenous infant mortality has closed significantly.'

'But, there are many areas where further improvements are needed to close the gap in health disadvantage. For instance, babies of Indigenous mothers are still twice as likely to be of low birthweight as babies born to non-Indigenous mothers, and Indigenous hospitalisation rates for diabetes were 4 times the rate of other Australians in 2007–08.'

The report looks at 5 domains of determinants of health — environmental factors, socioeconomic factors, community capacity, health behaviours and person-related factors.

'Recent improvements in health determinants include: a decline in the proportion of Indigenous Australians aged 15 years and over who are current smokers (52% to 47%); an increase in Indigenous school retention rates from Year 10 to 12 (46% to 50%) and an increase in the employment rate for Indigenous Australians (44% to 54%)', Dr Al-Yaman said.

'But there are several areas of health determinants where further work is required, for example, Indigenous mothers smoked during pregnancy at around 3 times the rate of non-Indigenous mothers and the rate of Indigenous imprisonment increased by 11% since 2007.'

Source: AIHW, media release, 27 September 2011.

Impact of health determinants

Despite advances in medicine, technology and treatment of disease, indigenous health lags behind that of the general population. The reasons for the poor level of health of indigenous people can be attributed to factors such as:

- poor living conditions
- poverty
- low levels of education
- unemployment
- colonisation
- dispossession
- discrimination
- difficulties maintaining culture
- importance of land
- funding not commensurate with needs
- hospitalisation rates
- traditional understandings about health.

Poor living conditions

According to the Australian Bureau of Statistics one quarter of all Aboriginal and Torres Straight Islander adults live in overcrowded conditions (2008). The main problems appear to be a shortage of bedrooms and adequate living areas, the need for building repairs and the breakdown of household utilities. Larger households are more common in rural areas. In the Northern Territory, overcrowding affected 61 per cent of indigenous people in rented and community housing. This overcrowding leads to greater levels of stress, increased risk of abuse and the spread of infectious diseases.

Poverty

The household income of indigenous people is substantially lower on average than that of other Australians. In 2006, the median household income of indigenous people was $362 per week compared with $642 per week for non-indigenous people. Government benefits are the main source of income for more than half of the indigenous population. The tendency towards large households, and cultural traditions that promote the sharing of resources mean that this income is not sufficient to maintain good health. In remote areas, food is more expensive and limited in its availability. Poor nutrition has contributed to the high incidence of diabetes in this population.

Poverty also precludes indigenous people from taking out private health insurance, so many must rely on Medicare. Long-term poverty also contributes to poor mental health and the high rate of suicide and self-harm behaviours.

Low levels of education

Indigenous people as a whole population have a lower level of education. National surveys of Aboriginal and Torres Strait Islander peoples report that school participation rates are lower than for all Australians and governments have initiated programs to try to address this. Level of education is linked to potential income, so until education levels improve, indigenous people are destined for low incomes and potential ill health — a vicious cycle.

In 2011, the Australian Bureau of Statistics reported a steady increase in indigenous students attending schools, and an increase in the numbers of those staying on until year 12 (see figure 13.3 on page 527). This is a positive sign for the future.

Unemployment

Surveys have shown that indigenous people are almost three times as likely as non-indigenous people to be unemployed. According to the Australian Bureau of Statistics, the unemployment rate for indigenous people was 17 per cent in 2008, compared with 23 per cent in 2002. The majority of indigenous people live in rental accommodation and have less opportunity to improve their socioeconomic status and standard of living or health.

Colonisation

Despite indigenous people's courage and determined resistance, their land was colonised. This resulted in the displacement of indigenous people from their lands to native camps, missions or areas deemed unsuitable for early settlers. Colonisation introduced previously unknown diseases such as smallpox, leprosy and venereal diseases, to which indigenous people had little resistance. Indigenous people's previous nomadic way of life ensured their camp sites never became polluted, but once they were forced to live in the same small areas, their health became seriously affected.

The colonisation of Australia led to the clearing of large areas of land for farming, resulting in a change in diet for indigenous people. Traditional foods, which had provided adequate protein, carbohydrate, fruit and vegetables, were replaced with handouts of flour, tea, sugar, jam and dried meat, which led to malnutrition. Farmers began culling many of the kangaroos, thus reducing the supply of fresh meat, and the physical activity gained from hunting and gathering was lost. By being forced to live in designated areas with no natural water supply, indigenous people have also become susceptible to trachoma, a disease that results in blindness.

Indigenous people still suffer from the social and cultural disruption caused by colonisation, as is evident in the high incidence of mental health problems in the indigenous population.

Dispossession

Indigenous people managed the land carefully and were thus able to sustain their way of life for thousands of years. Written records of ownership were not needed, as indigenous people knew their own tribal boundaries. Being dispossessed of their land has meant that indigenous people have lost their economic independence and traditional way of life, which has resulted in a substandard level of health.

Indigenous people who were removed from tribal lands were forced to move to missions or housing commission accommodation in the cities. They became totally detached from their culture and traditional way of life. The indigenous people's spiritual belief in the Dreaming and their links to the land have been severed by dispossession. The psychological scars of dispossession run very deep in indigenous people and contribute to poor mental health for many.

Australian government policy in 1951 aimed to force assimilation and gave legal power to police and administrators to remove indigenous and 'half caste' children from their parents to white training institutions, missions or childless white couples. This resulted in generations of indigenous people losing ties to their family and culture. This policy was not abandoned until the 1970s, when a more appropriate program of self-determination was proposed. Few accurate records were kept, so many families are still separated today. The Stolen Generation has many emotional issues to resolve before a good level of mental health can be achieved for the affected people.

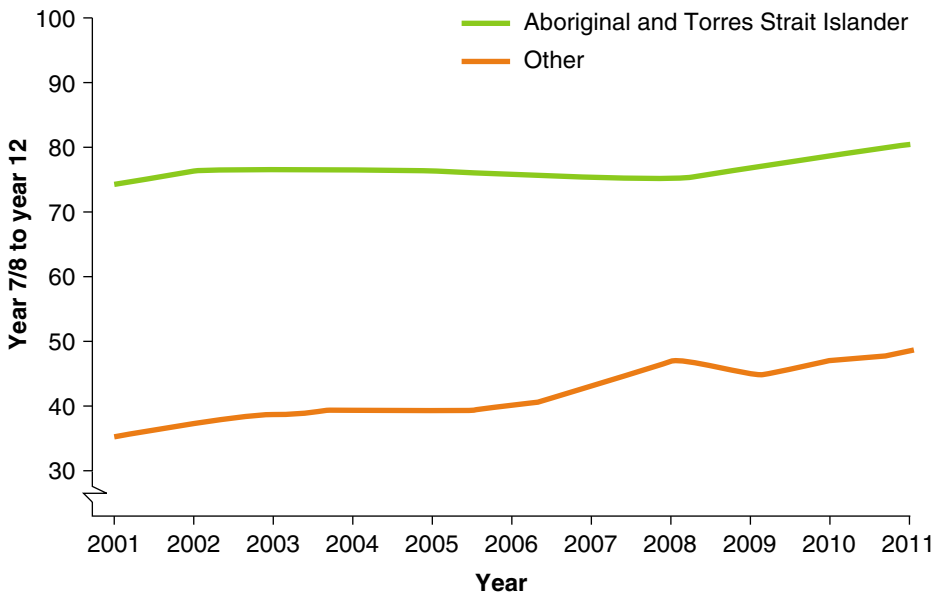


Figure 13.3: School retention rates by indigenous status, full-time students, 2001–2011

The personal tragedy of the Stolen Generation

All my mother could say was, 'Oh, no, not my Baby, please let me have her. I will look after her.'

As that policeman walked up the hospital path to get my little sister, May and Myrtle and I sobbed quietly. Mother got out of the car and stood waiting with a hopeless look. Her tears had run dry I guess. I thought to myself, I will gladly go, if they will only leave Geraldine with Mother.

'Mrs Clements, you can have your little girl. She left the hospital this morning,' said the policeman.

Mother simply took the policeman's hand and kissed it and said, 'Thank you, thank you.'

Then we were taken to the police station, where the policeman no doubt had to report. Mother followed him, thinking she could beg once more for us, only to rush out when she heard the car start up. My last memory of her for many years was her waving pathetically, as we waved back and called out goodbye to her, but we were too far away for her to hear us.

I heard years later how after watching us go out of her life, she wandered away from the police station three miles along the road leading out of the town to Moonahculla. She was worn out, with no food or money, her apron still on. She wandered off the road to rest in the long grass under a tree. That is where old Uncle and Aunt found her the next day.

Source: AIHQ media release, 19 June 2012.



Aboriginal children at an outback mission after being taken from their homes



INQUIRY

Consequences of dispossession

The snapshot 'The personal tragedy of the Stolen Generation' is an extract by an indigenous person taken from her family at a young age.

1. Describe the emotions reflected in the language of Margaret Tucker.
2. Explain what might have been the possible effect on her mother's health.
3. As a class, discuss the implications of the Stolen Generation for all Australians. Look at the effect on indigenous health and what needs to be done in the future.

Discrimination

Indigenous people were not allowed to vote in Australian federal elections until 1967. In outback areas, their movements were controlled by the issuing of permits. This speaks volumes about how indigenous people have been discriminated against. The anti-discrimination laws that have been introduced in recent years have helped to improve the treatment of indigenous people, but there are still many areas of discrimination that affect their health and still need to be addressed.

Indigenous people are over-represented in the judicial system. There is a high rate of suicide among young indigenous males in custody. Moreover, the gaols are often far away from the family, thus preventing support from family members.

Discrimination continues to occur daily in the housing market and employment sector. Verbal abuse and harassment does little to improve the self-esteem and self-worth of people who statistically suffer poor mental health.

Difficulties maintaining culture

Indigenous people are becoming increasingly urbanised, which makes it increasingly difficult to preserve traditional culture. Nevertheless, they have managed in many ways to do so, and it is a source of great pride. Groups such as the Bangarra Dance Theatre and artists from the Utopia region in the Northern Territory have kept traditions alive and given hope to younger indigenous people. There are many more such examples.

In remote areas, traditional languages are still used and the easing of certain laws has allowed some traditional hunting activities to continue. This has helped to improve nutrition and physical activity patterns. Greater self-determination has seen the development of Aboriginal schools, which are better able to cater for the needs of indigenous youth. However, there is still more to be done to ensure that Aboriginal languages are fostered and maintained.

The importance of land

As mentioned earlier, land holds a central place in the identity of indigenous people. It helps define who they are and it is treated with great respect because their ancestors are connected to it. Indigenous people campaigned for many years for land rights, and since the 1970s, various state and territory governments have granted indigenous groups ownership of their land.

Another way for indigenous people to gain access to or control of traditional land is through the *Native Title Act 1993* (Cwlth). Reinstating ownership over land may help to heal the emotional and mental scars of dispossession, allowing indigenous people to re-establish their spiritual connection with the land.



INQUIRY

Examining the importance of land to indigenous people

Read the extract from *Maybe Tomorrow* written by indigenous author Boori Pryor and then critically analyse it in terms of the following.

1. Explain what his essential message is for the future.
2. Outline how this might be achieved.

Funding not commensurate with needs

In 2008–09, the estimated health expenditure for indigenous Australians was $3.7 billion, or 35 per cent of Australia's total health expenditure. This represents $6787 per person for indigenous Australians, compared to $4876 per person for non-indigenous Australians, despite the fact that indigenous people's health is two to three times worse. They generally have higher rates of hospitalisation in all causes and the incidence of diabetes is increasing to alarming levels. To improve indigenous health, funding needs to be increased in proportion to needs.

Maybe tomorrow

. . . If people can see the beauty of Aboriginal culture, which is this country, then this will be a much happier place. The land and Aboriginal culture go hand in hand. You can't separate them. The land is the giver of life. It is our mother. It's like the vein of life. If you cut this, if you separate these two things, we die . . . To feel happy about yourself, you must feel happy about the place you live in. To feel happy about the place you live in, you must get to know that place. To get to know that place, you must ask the people who have lived there the longest, the Aboriginal people. We have the key that can open the door to the treasures of this land.

Source: Boori Pryor, *Maybe Tomorrow*, Penguin, Melbourne, 1998.

Hospitalisation rates

Indigenous Australians have hospitalisation rates two to three times that of non-indigenous Australians. Generally, indigenous people have restricted access to GPs, pharmaceuticals, culturally appropriate health services and private health insurance. It is usually Aboriginal health workers who provide the primary health care in indigenous communities, and their services need to be strengthened and developed further. The number of indigenous doctors is slowly increasing, with some universities offering places specifically for indigenous medical students. It is important that indigenous people be in greater control of developing their own health services in accordance with what they perceive their needs to be.

Traditional understandings about health

Traditionally, medical care was administered by respected elders who used the bush medicines that could treat burns, coughs, colds, stings and headaches, for example. Today, tea tree oil and eucalyptus oil are part of our modern treatment procedures. The lifestyle diseases of diabetes, ischaemic heart disease and high blood pressure were previously unknown among indigenous people.

In the Northern Territory, some indigenous groups have resurrected 'Grandmothers' Law', which is part of indigenous childbirth practices. They have managed to move indigenous women away from white-run hospitals to birthing centres that are culturally sensitive to indigenous women's issues.

Summary of health data and determinants for Aboriginal and Torres Strait Islander peoples

Seventy per cent of Aboriginal and Torres Strait Islander peoples live in metropolitan areas, but their relative health decreases with increasing levels of remoteness.

Areas of inequity

Mortality compared to the Australian population:

- life expectancy for indigenous males born in 2005–07 is 67.2 years, and 72.9 years for indigenous females
- the three leading causes of death are diseases of the circulatory system, injury (accidents, suicide and assault) and neoplasms (cancer)
- indigenous people die at younger ages relative to non-indigenous Australians
- all causes of death rates are twice that of non-indigenous Australians
- infant mortality rates are decreasing
- there have been improvements in overall mortality, but the health gap is widening between indigenous people and non-indigenous Australians.

Morbidity compared to the Australian population:

- indigenous people are more likely to experience disability or reduced quality of life due to ill health and self-report their health as fair to poor
- the main areas of ill health are due to cardiovascular disease, mental disorders, chronic respiratory diseases, type 2 diabetes and cancers
- indigenous people have higher hospitalisation rates for dialysis, injury, respiratory infections, digestive diseases and substance abuse
- indigenous people suffer higher rates of poor dental health
- psychological distress is higher in indigenous people, with females especially affected.

Table 13.2: Impact of health determinants for Aboriginal and Torres Strait Islander peoples

Health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Higher rates of smoking contribute to cancers (50 per cent of indigenous people smoke). • Not all indigenous people consume alcohol, but those who do drink do so at high risk levels, contributing to poor mental health and injuries. • Substance abuse is an issue, with higher rates of illicit drug use contributing to poor mental health, suicides and injuries. • Obesity levels increase with age and remoteness, which is contributing to CVD and diabetes. • Physical activity levels decrease with increasing age and contribute to CVD and diabetes. • Indigenous people have a reduced sense of being in control of their lives, which puts them at risk of depression.	• Higher fertility rates can compound problems caused by overcrowding and teen pregnancies, resulting in additional stress. • Higher mortality rates at a younger age means indigenous people experience grief and loss more frequently. • Traditional high fibre and protein diets are being replaced with refined carbohydrates and fats, leading to nutritional deficiencies. • Cultural beliefs of kinship contribute to extended families living within the same household, which can contribute to the spread of infectious diseases (this is more common in remote areas). • Loss of cultural ties can put indigenous people at risk of poor mental health. • Indigenous people suffer higher levels of discrimination and racism, which impacts mental health. • Indigenous people prefer to use culturally sensitive health services when available.	• Lower relative incomes limit indigenous people's capacity to buy their own home, purchase luxury items such as cars, or afford more nutritious foods or private health insurance. Their quality of life is reduced. • Some indigenous people rely on government assistance for income and housing, which can affect their self-esteem and ability to become independent. They become burdened with a welfare mentality that can be passed on by subsequent generations. • Indigenous people have higher rates of unemployment, which can be related to a lack of opportunities, skills and education, but also to discrimination. • Indigenous people tend to be involved in higher risk occupations such as trades, transport and mining, which puts them at a higher risk of injuries. • Indigenous people have lower levels of educational attainment and retention rates at schools, which affects mental health.	• Some rental housing contributes to poor living conditions and overcrowding worsens with increasing levels of remoteness. • Some Housing Commission areas increase the risk of exposure to violence, substance abuse and criminal activity. • Poor transport infrastructure in some areas can limit services and social networks, resulting in social isolation and depression. • Increased remoteness limits availability of safe drinking water and adequate waste disposal, which increases the risk of the spread of infectious diseases. • The availability of fresh fruit and vegetables decreases with remoteness, which can lead to nutritional deficiencies. • Indigenous people suffer higher rates of incarceration, which places them at risk of injury or suicide.

Media's role

The media's role is to provide a balanced perspective of Aboriginal and Torres Strait Islander peoples. Negative issues such as violence, crime, and substance and child abuse must be addressed by all subgroups of the population. The media's aim should be to increase public awareness, and stimulate society and the government to act by increasing funding and resources. The positive perspective needs to be a far greater focus in the media: an appreciation of traditions, a respect for cultural values and beliefs, promotion of role models and educating society about sensitive issues such as the Stolen Generations and land rights.

The general media supports anti-discrimination laws and challenges racism in sporting contexts. The Commonwealth Government provides funding for indigenous media — newspapers, magazines, radio and television stations that give indigenous people important health and social information in their own languages with cultural sensitivity.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific indigenous-based health services such as community support services, screening programs, social and emotional well-being services, transport services and accommodation. Specific interventions include:

- Health for Life 2006 to improve primary health-care services, the quality of child and maternal health care and chronic disease care
- Northern Territory Emergency Response 2007, which provided health checks for children in the Northern Territory and then organised follow-up treatments
- Puggy Hunter Memorial Scholarship Scheme which funds Aboriginal and Torres Strait Islander peoples who wish to take up health profession training. Aboriginal and Torres Strait Islander peoples are also included in the national suicide prevention strategy to improve mental health, national drug campaign to reduce the use of dangerous drugs and the national tobacco campaign to reduce smoking.



INQUIRY

Aboriginal and Torres Strait Islander peoples

1. Using the summary on pages 530–32 as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness of the interventions, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

People in rural and geographically remote locations

Epidemiology and areas of inequity

Around a third of Australians live in rural and remote areas. The epidemiology of people in rural and remote areas indicates that they have higher levels of risk factors and suffer from poorer health than people living in metropolitan areas. Overall, they have higher mortality rates, hospitalisation rates for some causes of illness and a lower life expectancy. Of the 2.3 per cent of the overall population who live in remote or very remote areas, 13.4 per cent of the population in remote areas and 44.8 per cent of the population in very remote areas are indigenous Australians.

Life expectancy

People living in rural and remote areas of Australia have life expectancies lower than those of the general population, and life expectancy decreases with remoteness. In regional areas, life expectancy is one year lower than in major cities and in remote areas it is 7 years lower (see table 13.3).

Table 13.3: Life expectancies by remoteness area, 2003–4

	Major cities	Inner regional	Outer regional	Remote areas	Very remote areas
Males	79.0	77.8	76.9	76.5	72.1
Females	83.8	83.1	82.6	81.8	77.6

Source: AIHW, *Rural, regional and remote health: indicators of health status and determinants of health*, Canberra, 2008.

Mortality

In 2002–04, death rates for males in rural and remote areas were significantly higher than for males in major cities: 1.1 times higher in inner regional areas, 1.2 times higher in outer regional and remote areas, and 1.7 times higher in very remote areas. The comparison for females in rural and remote areas and major cities is the same, except that death rates for outer regional areas were 1.1 times higher. The lowest infant mortality rates in Australia are found in the capital cities, and the highest rates are found in remote areas. The main contributing factors to infant mortality are congenital anomalies, SIDS and low birth weight.

Hospitalisation

The hospitalisation rates for injury in rural and remote areas are higher than in metropolitan areas. The trend for males to be hospitalised more than females is a pattern that occurs in metropolitan areas and in rural and remote areas. With greater remoteness, both male and female hospital separation rates rise. The difference between areas can be related to environmental, lifestyle and occupational factors.



INQUIRY

Trends in causes of death

For five of the causes of death outside of major cities in table 13.4, write a statement that describes the data.

Table 13.4: Percentage of leading causes of 'excess death'* outside major cities, 2002–04

Cause of death	Males	Females
Coronary heart disease	19.0	19.0
Other circulatory disease	13.0	28.0
Motor vehicle accidents	10.0	8.0
Chronic obstructions	10.0	6.0
Other neoplasms (a)	8.0	7.0
Other causes (b)	5.0	9.0
Diabetes	4.0	9.0
Other injuries	5.0	5.0
Suicide	6.0	0.0
Prostate cancer	6.0	0.0
Lung cancer	4.0	4.0
Total	**92.0**	**95.0**

* Excess death is death in excess of what would be expected if major city rates had been applied.

(a) Other neoplasms excludes lung, colorectal, breast, cervical, prostate cancer and melanoma.

(b) Other causes excludes neoplasms, circulatory and respiratory diseases, injury and poisoning, diabetes, renal failure, and liver disease.

Source: AIHW, *Rural, regional and remote health: indicators of health status and determinants of health*, Canberra, 2008, p. 73.

Impact of health determinants

Rural and remote populations have poorer health in comparison to urban and city dwellers. Their health is influenced by a number of factors, including:

- geographic and social isolation
- exposure to drought, flood and fires
- access to services

- lack of infrastructure
- structural factors
- occupational hazards
- unemployment
- education
- attitudes towards illness
- barriers to using health services.

Geographic and social isolation

As the distance from a major urban centre increases, people's socioeconomic status tends to decrease, contributing to a poorer level of health. People in remote areas suffer the poorest levels of health in the population group as a whole. Geographical isolation reduces people's access to health care and makes them dependent on health care provided on a rotational basis by the Royal Flying Doctor Service, or on travelling vast distances to seek attention. For example, delays in the treatment of burns victims contributes to the fact that burns are a major cause of death in remote areas for young children and the elderly. There is a greater dependence on 'telemedicine' provided over the telephone or by radio and on the self-administering of appropriate medication.

Geographical isolation also leads to social isolation. A lack of personal support structures contributes to the higher incidence of poor mental health and depression, leading to behaviours involving self-harm or attempted suicide. The suicide and self-harm rate for young gay men is high in rural and remote areas because of the conservative attitudes to sexuality in these communities.

The rates of homicide and domestic violence become higher with increasing levels of remoteness. Many women who are isolated may not report abuse, as they may fear reprisal, lack financial independence, lack transport or be pressured by their community to remain where they are. The elderly are at greater risk of burns and injuries related to falls, because a high proportion live in their own homes, which, naturally, lack specialist facilities. Nursing homes, hostels and home care services are often full and are a long way from family and friends.

Exposure to drought, flood and fires

People in rural and remote areas can be subjected to a greater level of physical danger and injury as a result of the many natural disasters particular to their region. Repeated sequences of drought, flood or fire can emotionally scar and depress individuals who depend on the land for their livelihood. Years of hard work can be swept away overnight, and the task of rebuilding lives can be delayed for weeks or months. Diets may be affected, as fresh fruit and vegetables may be unavailable for long periods and they may have to rely on canned and preserved goods during periods of isolation. Even re-establishing their livelihood can expose individuals to the risk of developing infections and diseases from contaminated water or from disposing of dead livestock.



INQUIRY

Rural health — issues and services

Use the following weblinks in your eBookPLUS to gain insights into rural health services and initiatives.

eBook*plus*

1. Click on the **Rural Health Services** weblink. Choose one of the services and initiatives listed, such as the Medical Specialist Outreach Assistance Program,

the Rural Women's GP Service or the Drought Assistance Measures, and write a short report explaining its role and how it works.

2. Click on the **Royal Flying Doctor Service** weblink and read some of the real-life 'RFDS stories' to gain an insight into the work carried out by the organisation.
3. Click on the **beyondblue** weblink and read about the challenges faced by men living in rural and remote communities.

Access to services

The level of medical services reduces as remoteness increases. Access to screening clinics and support groups is restricted in most rural areas, and the primary health-care provider in remote areas tends to be a nurse rather than a doctor. This is because many doctors choose to work in the cities, for family, social and financial reasons but also because of 'burnout'. In some rural areas, the local GP is the only source of medical help, and doctors can find themselves on call almost 24 hours a day, seven days a week.

When individuals need specialist treatment, they are required to travel long distances and usually have to stay away from home for lengthier periods if the treatment is continuing. Patients with chronic conditions may find themselves hospitalised for longer periods because it is too far to travel home and return for treatments. This separation from the family and home can cause distress.

The elderly in rural areas have less access to nursing homes or hostel-type care at hospitals because they focus more on acute care. The elderly therefore remain at home, which is likely to contribute to the higher number of deaths caused by falls with increasing levels of remoteness.

SNAPSHOT

Desperate need for better access to antenatal screening in the bush

Rural women across Australia desperately need and deserve much better access to advanced ultrasound and other antenatal screening services, and the federal and state governments must work together urgently to ensure this is provided, the Rural Doctors Association of Australia (RDAA) and Rural Doctors Association of Queensland (RDAQ) said today.

A study published recently in the *Medical Journal of Australia* found that, since 2000, there has been a 14.3 per cent fall in maternal-age-adjusted rates of Down syndrome births among mothers living in urban areas of Queensland, but no fall for mothers who live in rural areas of the state, when geographic location only is considered.

The authors of the study have suggested that a range of factors — including unequal access to advanced ultrasound screening for rural women — are the likely explanations for the difference.

'This study provides yet more evidence that rural Australians are facing tremendous disadvantages in accessing local health services,' RDAA President Dr Peter Rischbieth said. 'There is an urgent need for much better access to local healthcare, including advanced antenatal screening through ultrasound, in rural and remote areas.

'It is very difficult for many rural women to access advanced ultrasound screening locally during their pregnancy, due to a lack of advanced ultrasound machines and a lack of sonographers who are specifically trained in screening for Down syndrome and other conditions.

'While antenatal blood tests are certainly useful in screening for these conditions, a combination of blood tests and advanced ultrasound screening is the 'gold standard' in ensuring the optimum accuracy of results early in pregnancy . . .

'There is also precious little financial support available for rural women who may need to travel long distances to major centres to access advanced ultrasound screening.

(continued)

'The federal and state governments must work urgently to address the disadvantage suffered by rural Australians when it comes to healthcare access. Paramount in this is implementing a national Rural Health Obligation to ensure rural Australians have better access to rural doctors, local rural hospitals and rural health services.'

President of the RDAQ, Dr Christian Rowan, said … 'The lack of access to optimum antenatal screening is denying rural women and their families a basic choice that pregnant women in the cities take for granted, that is access to the most accurate test for Down syndrome and other conditions early in their pregnancy …'

Source: Rural Doctors Association of Australia, media release, 3 April 2007.



INQUIRY

Health service inequity

1. Describe the health inequity that is the issue in the snapshot 'Desperate need for better access to antenatal screening in the bush'.
2. Why is it difficult for rural women to access advanced ultrasound screening?
3. In what way is the Rural Doctors Association attempting to address social justice principles in relation to health service access?
4. Use the internet to find out about the Rural Health Obligation. Who is proposing it and what has been the government's response?
5. Use the **HREOC Healthy Community Projects** weblink in your eBookPLUS. Scroll down to the list of rural health initiatives. Choose one of the initiatives and write a short report on its aims and what makes it successful.

eBookplus

Lack of infrastructure

Sparse infrastructure in rural areas means that many individuals must rely on private motor vehicles for transport. The high numbers of road accidents suggests that travelling long distances at high speeds and on roads that are often poorly maintained contributes to the elevated injury statistics.

As some rural regions experience high rates of unemployment, many businesses relocate to other rural centres, leaving buildings unoccupied and people having to travel much further for goods and services. The decline in some regions means that funding to some towns is reduced, which again contributes to the downward spiral.

Structural factors

In many rural areas, economic resources are tied up in assets such as machinery, livestock, natural resources and crops. People from farming families may be asset rich, but cash poor, so their ability to satisfy basic needs and maintain their socioeconomic status may be hampered by this situation.

The livelihood of all rural community members depends on producers having good seasons and getting good prices for their crops, livestock and other produce. Globalisation and the removal of trade barriers has meant that some rural areas have become unable to compete, so they have had to develop new enterprises to survive and take out loans to finance these new ventures, creating uncertainty and stress for families.

The very nature of rural work exposes people to the harsh conditions of all types of weather. Working conditions tend to deteriorate with remoteness and carry a higher element of risk. Workers may be required to live in shared

accommodation during seasonal work periods, and this can lead to mental stress due to separation from their families. In general, living conditions also tend to deteriorate with increasing remoteness and the difficulty of maintaining adequate hygiene puts people at risk of developing infections and diseases.

Some of the positive structural factors of rural life are the strong social support offered by the community in times of hardship, the affordability of housing and the lifestyle. Indeed, many city people are drawn to country areas to improve the quality of their lives.



Figure 13.4: Outdoor workers in rural areas are often exposed to harsh weather conditions.

Occupational hazards

The operation of heavy machinery in mining, forestry, agriculture and transport puts rural people at a higher risk of injury and disability. The fact that many rural workers must travel long distances to find work increases the risk of road-related injuries and fatalities, and creates stress when families become fragmented. Agricultural workers who work with pesticides, herbicides and chemicals must ensure appropriate use and handling procedures are followed to reduce the risk of developing respiratory diseases and cancers.

Unemployment

In some rural areas, unemployment is becoming an increasing problem, leading to a trend for young people to move to the cities to find work. Those who move are separated from the family, while those who remain may become long-term unemployed and be at risk of low self-esteem and depression. The high rate of suicide in rural young people, particularly males, is of great concern. The long-term unemployed also tend to develop unhealthy lifestyle patterns, which are associated with higher rates of alcohol consumption, smoking and physical inactivity leading to obesity.

Education

Unless children in rural areas live close to a major centre, they are more likely to have to attend a boarding school, which leads to further fragmentation of the family. Children of primary-school age in isolated areas may choose to be

involved in the School of the Air, but after primary school they must choose whether to attend boarding school or continue their education through correspondence. Unfortunately, the high rate of unemployment in some rural areas does not always provide an incentive for some young people to pursue further education.

Attitudes towards illness

Rural people living further away from regional centres are more likely to delay treatment, because it is inconvenient to travel long distances unless it is a serious illness. Statistically, rural people visit their doctors less often than city people. Rural males tend to adopt lifestyles with few positive health-related behaviours and accept work-related injury as a normal consequence of their way of life. There is also a belief in some rural areas that country people need to be tough to survive, and admitting illness may be seen as a sign of weakness.

Barriers to using health services

The perception that 'small towns talk' is likely to be accurate and may prevent some people from seeking out health services other than their GP. They may fear embarrassment or the difficulties caused by a lack of privacy.

Ethnicity can also be a barrier for using health services, because migrants may feel that their customs will not be respected or that language difficulties prevent them from seeking the appropriate treatment.

Summary of data and determinants for rural and geographically remote populations

Rural and geographically remote populations include populations in areas outside major cities, which account for approximately a third of the Australian population (including the 2.3 per cent of the population who live in remote or very remote areas).

Areas of inequity

Mortality (in comparison to major cities):

- life expectancy decreases as remoteness increases. People in regional areas have life expectancies one to two years less than people in major centres and people in remote areas have life expectancies seven years less than people in major centres.
- the three leading causes of death are circulatory disease, cancers, respiratory diseases and injury
- death rates are 1.1 times higher for all ages in regional areas and 1.7 times higher in remote areas.

Morbidity (in comparison to major cities):

- health in general is slightly poorer
- there is a higher incidence of certain chronic diseases. The incidence of cancer is significantly higher in regional areas due to sun exposure and smoking. Cancer incidence in very remote areas is significantly lower in very remote areas compared to major cities.
- high incidence of self-reporting of cardiovascular diseases
- higher hospitalisation rates for dialysis and preventable conditions because of delays in seeking treatment or limited access to medical professionals
- higher rates of poor dental health due to less access to fluoridated water

- psychological distress is higher in remote areas. Males in outer regional and remote areas are 1.2 times more likely to report very high levels of psychological distress than males in major cities.
- females reported cases of diabetes 1.3 times higher than females in major cities and arthritis 1.2 times higher.

Table 13.5: Impact of health determinants for rural and geographically remote populations

Health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Higher rates of smoking, especially in remote areas, which contributes to different cancers. • High levels of alcohol consumption, which increases with remoteness. This contributes to CVD, poor mental health and injuries. Males are more at risk. • Lower levels of illicit drug use, except for cannabis which is contributing to poor mental health, suicides and injuries. • Obesity levels tend to increase with age and remoteness and contributes to CVD and diabetes. • Physical activity levels decrease with increasing age and also contribute to CVD and diabetes. Males are more at risk. • Diets in regional areas are more likely to include adequate fruit and vegetables, but this decreases with remoteness.	• Cultural expectation to be tough can cause individuals to take more risks with their health and take more risks at work, resulting in more injuries. • This attitude of toughness can see individuals delay seeking treatment, resulting in poorer health for specific medical conditions. • In remote areas individuals live in communities that can be socially isolated and this increases the risk of mental health problems and domestic violence. • Many rural areas have higher proportions of migrant populations who can suffer discrimination and racism. This impacts on their mental health and self-esteem. • Rural areas also tend to have strong community support networks that work in times of natural disaster to promote good mental health for those in need.	• Lower relative incomes and employment opportunities limit capacity to buy their own home, purchase luxuries or private health insurance. Many farmers are asset rich but cash poor. • Reliance on bank finance can affect mental health, especially in times of poor harvest or as a result of globalisation. Debts can be passed on to the next generation or force families to leave traditional homes. • Primary production and mining jobs increase exposure to chemicals and pesticides and transport-related injuries. • Individuals in remote areas and some rural areas have lower levels of educational attainment and retention rates at schools, which affects mental health. • Remote areas have limited access to a variety of goods and services.	• Poorer living conditions and over-crowding increase with remoteness. • Some communities are at a higher risk of violence, substance abuse and criminal activity because of their relative isolation. • Poor transport infrastructure in some areas can limit services and social networks, resulting in social isolation and depression. • Limited health services result in people having to travel long distances or stay for extended periods away from the family for health care, usually in hospitals. • Increased remoteness limits the availability of safe drinking water, fresh food and adequate waste disposal, which increases the risk of the spread of infectious diseases and nutritional deficiencies. • Variable road conditions contribute to higher incidence of road-related injuries.

Media's role

The role of the media is to provide a balanced perspective on life in rural and remote areas. Negative issues such as the harshness of the environment, drug use, isolation, violence and the occurrence of natural disasters needs to be balanced with the positives. The media should aim to increase public awareness and encourage the government to act by increasing funding for services and infrastructure. The positive perspectives of rural life need to be promoted in the media: an appreciation of the ever-changing environment, a respect for rural values and beliefs, promotion of an alternative lifestyle at an affordable cost and educating society about sensitive issues such as the effects of globalisation and natural disasters on communities. The media also encourages healthy competition between the city and country in sports.

The media supports rural communities in public debates regarding the social and financial effects of globalisation, increases in fuel costs and interest rates. Regional media networks use newspapers, magazines, radio and television stations to provide important health and social information.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific rural-based health services such as the Royal Flying Doctor Service, which provides better access to health. Specific interventions include the:

- rural retention program, which financially assists long-serving GPs
- nurse scholarship program, which is an incentive for nurses to move to rural areas
- National Rural and Remote Health Infrastructure Program, to improve access to health services
- Rural Health Education Foundation, which televises health information to remote areas for GPs and nurses. Other national strategies are also accessible for most large rural centres.



INQUIRY

Rural and geographically remote populations

1. Using the summary on pages 538–40 as a guide, investigate two or three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Inequities for other population groups — summaries

Summary of data and health determinants for the homeless

A person is classified as homeless if they do not have access to safe, secure and adequate housing. Homelessness affects men, women, families, young people and children. There are four categories of homelessness:

- primary, when individuals live on the streets, in parks, squats or cars
- secondary, when people live with friends or relatives
- tertiary, when people live in boarding houses for the short or long term.
- marginal, when people live in caravans.

More than 100 000 people are homeless each year, with an increasing number being young people.

Areas of inequity

Mortality (compared to the rest of the Australian population):

- the longer a person is homeless (primary category), the lower their life expectancy
- the main causes of premature death (primary category) are attributed to substance abuse, particularly overdoses and violence
- the health gap is widening because homelessness is affecting an increasing number of people from various socioeconomic circumstances.

Morbidity (compared to the rest of the Australian population):

- long-term homeless people have higher rates of problematic drug use and suffer poor mental health; for example, depression and schizophrenia.

These conditions can develop after the person becomes homeless and are not necessarily the initial cause of homelessness.

- homeless people have higher rates of infectious diseases such as gastro-enteritis, nutritional deficiencies and respiratory illnesses such as bronchitis and asthma
- blood-borne diseases such as hepatitis, as well as STIs are also more prevalent
- homeless people are at greater risk of physical and sexual assault and injury
- Aboriginal and Torres Strait Islander peoples are over-represented in the homeless population in relation to their proportion of the total population.

Table 13.6: Impact of health determinants for homeless people

Health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Problematic drug use can contribute to poor mental health and the emergence of psychiatric disorders such as schizophrenia. • Drug dependence can lead to overdoses and involvement in crime to support habits. • Alcohol consumption contributes to the injuries and assaults that particularly affect young homeless people. • Smoking is common and contributes to bronchitis and other respiratory illnesses. • Unsafe sexual practices spread STIs and can result in unwanted pregnancies. • Ignorance of health messages means needles may be shared, which increases the risk of contracting HIV or hepatitis. • Behaviour disorders can mean individuals can't maintain normal relationships as part of a family. This can be a source of stress. • Homeless people can experience difficulty in delaying gratification, resulting in compulsive spending or gambling.	• Family and relationship breakdowns can leave individuals without support or accommodation for the short or long term. • Domestic violence can leave a person no choice other than to be homeless or seek alternative temporary accommodation. • Society's acceptance of alcohol as a less harmful drug contributes to higher consumption rates, especially by young people who can develop dependence. • Media stereotypes can encourage young people to rebel and move out of home without adequate support • Government allowances make it easier for young people to leave home rather than resolving family conflicts.	• The homeless suffer severe disadvantage with no assets, little security or stability in their lives, which impacts mental health. • A lack of affordable housing can force people into becoming homeless, especially in major cities, resulting in depression. • Unemployment can force individuals into poverty, which restricts choices and causes social alienation. • The homeless become dependent on handouts and welfare and lose a sense of control over their lives. • Young people with behaviour disorders are often unable to continue with schooling and leave prematurely without skills. • Economic recession can cause families to lose their homes, especially if they are single parent families on welfare.	• Some homeless people are exposed to harsh environmental conditions which place them at greater risk of developing severe respiratory illnesses. • Homeless people living in 'squats' do not have an adequate water supply, sanitation or electricity to maintain hygiene or quality of life. • Homeless people who live in parks are at greater risk of sexual and physical assault. • Some homeless people rely on health care delivered to them by volunteer organisations in mobile vans or when they visit refuges. • A limited supply of places at refuges means that organisations have to prioritise placements, with older males missing out. • 'Soup kitchens' provide meals for the homeless free of charge and provide a point of contact to support homeless people who otherwise would not seek help. • Most outreach services target young people and women with children first as they are at greater risk.

Media's role

The media's role is to provide society with a sympathetic perspective of the issues faced by the homeless. Negative issues that focus on drug dependence, crime and rebellion must be addressed in a compassionate manner. The media needs to work in a positive way to focus on issues, such as:

- lobbying governments for increased funding for services and accommodation for the homeless
- finding ways to reduce domestic violence and resolve family conflict that keeps families intact
- warning young people of the dangers of problematic drug use and raising awareness that homelessness can affect people in all walks of life in times of economic uncertainty.



Figure 13.5: Soup kitchens and hostels provide meals for the homeless free of charge and provide a point of contact to support homeless people who otherwise would not seek help.

The media can promote employment programs, community networking programs, national strategies on mental health and initiatives that create stronger family structures. The Commonwealth Government can use its media outlets (ABC and SBS) to educate and stimulate debate on the homeless.

Evaluating government interventions

The Commonwealth Government provides mainstream health services, plus other interventions such as:

- SAAP — Supported Accommodation Assistance Program to assist homeless people, women and children escaping domestic violence
- National Homeless Strategy 1999 — aims to halve homelessness by 2020
- Stronger Family and Communities Strategy — builds support networks
- Household Organisational Management Expenses Advice — helps people plan budgets
- Family and Relationship Counselling — assists with dysfunctional relationships
- Counting the Homeless Project — collects accurate data to plan strategies and allocate resources
- Network Job Placement and Employment Training Program — finds jobs for young people
- National Action Plan on Mental Health 2006–2011 — reduces the impact of the stress of being unemployed.



INQUIRY

Homeless people

1. Using the summary on pages 540–2 as a guide, investigate two or three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for people living with HIV/AIDS

HIV is a retrovirus that can reduce the human immune function so that relatively minor infections become deadly. There is no known cure. There are four stages to the virus:

- primary stage (first two to six weeks), when the initial infection occurs and people may report flu-like symptoms
- asymptomatic HIV infection stage (months to years later), with no outward signs or symptoms
- symptomatic HIV infection stage, where symptoms appear

- the late stage disease, which presents as AIDS (acquired immune deficiency syndrome). In the AIDS stage a person's immune system is no longer able to protect them from developing pneumonia or various types of cancers. The result is death.

The virus is mainly spread through homosexual contact between males. The virus was first discovered in the 1980s and in December 2010 there were an estimated 21 391 people living with an HIV diagnosis in Australia. Aboriginal and Torres Strait Islander peoples are at higher risk of contracting the disease because of their relatively poor health overall.

Areas of inequity

Mortality (compared to other countries):

- the death rate from HIV/AIDS in Australia is far lower than in many other countries. Africa is most affected by the HIV/AIDS epidemic.
- by the end of 2009, more than 6775 deaths had occurred because of AIDS
- the health gap is widening because, despite a large reduction in deaths since 1995, the number of people living with HIV/AIDS is increasing. Treatments and testing have improved survival time but a cure has still not been found. AIDS is fatal.

Morbidity (compared to other countries):

- Australia has a low prevalence of HIV notifications
- HIV is a disease that by law must be reported. Between 1993 and 2006 more than 12 000 new notifications were made for HIV. Seventy per cent of these notifications were for males.
- when a person develops AIDS they become vulnerable to diseases such as Kaposi's sarcoma, pneumocystis carini pneumonia, toxoplasmosis, cytomegalovirus disease and thrush, which affects the oesophagus, throat or lungs. The body's immune system is usually able to prevent these conditions from becoming life-threatening. However, when a person develops AIDS their body's immune system is compromised and cannot fight these infections.
- people with HIV may spend months or years in relatively good health until a triggering factor, such as stress, a relationship breakdown or minor illness causes the development of AIDS.

Media's role

The media's role is to provide society with a sympathetic perspective of the issues faced by people with HIV. Negative issues that focus on drug use or alternative lifestyles must be addressed in a more caring and sensitive manner. The media can work in a positive way to focus on issues such as lobbying the government for increases in funding for improved services, support networks, research for a cure or providing greater support for the carers of people with HIV. The media also needs to continue to make the public aware of the causes of the spread of HIV and continue the push for the fair treatment in society of all homosexual people.

The general media supports people with HIV through supporting anti-discrimination laws, especially regarding employment and highlights laws that protect us from self-harming behaviours related to substance abuse.

The Commonwealth Government provides programming that specifically targets issues for the gay community that are broadcast on radio and television stations (ABC and SBS).

Table 13.7: Impact of health determinants for people living with HIV/AIDS

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Unsafe sexual practices are the major contributing factor to the spread of HIV. Homosexual males are at particular risk and the most widely affected (88 per cent). The median age for HIV infected homosexual males is 38 years. Heterosexual males account for eight per cent of the notifications for HIV. • Injecting drug use accounts for one per cent and has reduced over the years because of health initiatives such as needle exchange programs and ((information. • Having several sexual partners and having intercourse at an early age also increases the risk of contracting HIV or any other STI. • Reluctance to use a condom contributes to possible contraction of any STI or HIV. • Individuals who visit sex workers also increase the risk of exposure to the virus. • Babies are at risk of infection during birth or via breast milk if their mother is infected. • Individuals who have a blood transfusion are at minor risk due to blood screening.	• Some sections of society are less tolerant of homosexual lifestyles and may engage in vilification of homosexual people, which places additional stress on individuals with HIV. • Anti-discrimination laws aim to protect individuals with HIV from harassment. • The stigma attached to having any STI results in people delaying seeking diagnosis and risks the infection of other individuals. • Religious beliefs of celibacy or abstinence before marriage can help to protect individuals from contracting HIV. • HIV also affects the partners and families of individuals with the virus, who must learn to adopt new health habits.	• Young people who leave school at an early age may miss important safe sex information. • Overseas travellers must take special precautions not to contract HIV when visiting high risk countries. There is no vaccine to protect against it. • Sex workers need to be educated and made accountable for the spread of the disease.	• Safe injecting rooms have helped to reduce the number of notifications of HIV spread by injecting drugs. • Mobile needle exchange vans that go to areas at greatest risk also help to reduce the spread of HIV to specific subgroups of the population. • Improved access to condoms at places such as clubs, service stations and supermarkets has contributed to safer sex practices. • Mandatory reporting has enabled statistics to be gathered that help track the spread of the virus.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific HIV-based health services such as:

- Home and Community Care (HACC) — provides community support services
- National HIV Testing Policy 2006 — screening programs and the National HIV/AIDS strategy.

HIV-infected individuals can also access any of the national strategies and interventions that target diseases related to cancer and pneumonia.



People living with HIV/AIDS

1. Using the summary from pages 542–4 to above as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for people who are incarcerated

The incarcerated population includes adults in prisons (median age 34 years) and young offenders (median age 18 years) in juvenile justice institutions. Males make up 93 per cent of the incarcerated population, with 27 per cent of them from indigenous backgrounds. Male imprisonment rates are slowly increasing, with female rates doubling between 1991 and 2006.

Areas of inequity

Mortality (compared to the general population):

- slightly higher mortality rate
- natural causes account for 44 per cent of all prison deaths. The number of deaths from self-inflicted injuries has dropped significantly since 2001.
- there is a high mortality rate among offenders who are released
- there is a high rate of deaths due to drug overdoses, usually heroin in combination with another drug
- excess deaths for indigenous males and females were both higher
- young offenders had death rates nine times higher than those of a similar age
- the health gap is widening between incarcerated people and the general Australian population.

Morbidity (compared to the general population):

- incarcerated people suffer poorer mental and physical health in general
- they experience high rates of blood-borne diseases such as hepatitis and STIs
- drug dependence is a common health problem for many
- they suffer a higher proportion of mental illness as a result of daily substance abuse, depression, psychosis or expulsion from school
- cases of traumatic brain injury (TBI) are high. TBI is caused by jolts or blows to the head from fights, assaults and contact sports.
- young offenders suffer more chronic illnesses, exposure to infectious diseases, behavioural problems and substance use disorders.



Media's role

The media's role is to provide a balanced perspective of incarcerated people. Negative issues such as violence, crime and substance abuse must be addressed in a way that increases the public's awareness and forces government action. The media can work in a positive way to focus on issues such as successful rehabilitation programs, community service work undertaken by offenders, issues in society that contribute to discrimination, racism and unemployment, causes of deaths in custody, and alternatives for young offenders to avoid incarceration.

The media is obliged to follow all laws regarding the disclosure of identity or information that may jeopardise a fair trial for those waiting in gaol or in the juvenile justice system. The general media also supports anti-discrimination laws and challenges racist attitudes in society, which help to promote the government's policy of multiculturalism and tolerance within society.

Figure 13.6: A range of health issues can affect people in prison.

Table 13.8: Impact of health determinants for incarcerated people

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Higher rates of smoking contribute to different cancers (80 per cent of young offenders smoke). • High rates of alcohol and drug use contribute to drug dependence and increase the risk of poor mental health/suicide, chronic health problems and injuries. • Incarcerated people are more likely to engage in unsafe sexual practices that can spread STIs. • High rates of unsafe tattooing and body piercing increase the spread of blood-borne diseases such as hepatitis. • Incarcerated people have a reduced sense of being in control of their lives, which puts them at risk of depression/suicide. • Poor sleeping habits, forgetfulness, headaches and poor appetite are reported more commonly by incarcerated people.	• Incarceration results in stigmatisation by society. This is a vicious cycle that ex-offenders find difficult to deal with, causing more depression and possible suicide. • Social exclusion due to incarceration can make it difficult for offenders to adjust to normal life. • Higher mortality rates at younger ages means incarcerated people experience grief and loss more frequently. • Family instability and parental imprisonment contribute to poor mental health and a lack of adequate adult role models to set behavioural boundaries for children. • Families become separated for extended periods, causing depression. • Indigenous culture values freedom and incarceration can be difficult to cope with. Some deaths in custody have resulted. • Incarcerated people suffer higher levels of discrimination in employment, which impacts mental health.	• During incarceration offenders may have limited opportunities to earn a small allowance for luxuries. Therefore family support can be essential. Food, water, shelter, clothing and health care are provided to maintain general health. • Education programs for offenders aim to improve their prospects of employment on release. Many offenders have low levels of years of schooling or educational attainment, resulting in low self-esteem. • Ex-offenders are severely disadvantaged by limited income. Their property and possessions may also have been repossessed, given away or abandoned. Suicide attempts are common within the first two weeks of release. • Ex-offender housing may be substandard and be shared accommodation. The risk of re-offending to satisfy basic needs is high.	• Incarcerated people are held in shared cells with other possibly violent offenders, which places them at risk of injury or STIs. • The government provides health services, but offenders are at a high risk of mental health problems and spreading blood-borne diseases and STIs because of risk-taking behaviours. • Lack of privacy and boredom contribute to a high incidence of self-harming behaviours and substance abuse when the opportunity presents itself. • Recreational opportunities are limited and must be shared with other offenders. Fights can develop over racial taunts. • Exposure to hardened criminals can cause relatively new offenders to become involved in more crime for self-protection.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific health services within each place of incarceration. These can include community support services, screening programs, social and emotional well-being services, transport services, rehabilitation and education programs. Specific interventions include:

- Naltrexone Exit Program to reduce addictions to illicit drugs
- Crisis Care Unit to deal with mental health
- The Keeping Safe Program to control blood-borne infectious diseases
- Work Camps that teach social skills and integrate incarcerated people into the community through project work.



INQUIRY

Incarcerated people

1. Using the summary on pages 544–6 to above as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for the aged

The aged includes those individuals 65 years and over living on pensions or as self-funded retirees. They live either at home, in hostels, residential care units or nursing homes. One in eight Australians is an aged person (13 per cent of the total population in 2006).

Areas of inequity

Mortality (compared to the Australian population):

- life expectancy when measured at age 65 is 83.9 years for males and 86.4 years for females (six years more than at the start of the twentieth century)
- life expectancy when measured at age 85 is 90.9 years for males and 92.1 years for females (reductions in cardiovascular disease are contributing to improved life expectancy)
- the leading causes of death are coronary heart disease and cerebrovascular disease (stroke) (30 per cent), followed by cancer (males: lung and prostate; females: breast cancer; colorectal cancer was common to both sexes), chronic pulmonary obstructive diseases, dementia, diabetes and diseases of the arteries
- specific age death rates reveal 65–74-year-olds most commonly die from pancreatic cancer, cirrhosis of the liver and ovarian cancer (females). Deaths in 75–84-year-olds are most often due to dementia, influenza and pneumonia. Those 85 years and over most commonly die from influenza, pneumonia and kidney failure.

Morbidity (compared to the Australian population):

- the aged experience higher rates of disability with severe core activity limitation (severe limitations on self-care, communication or mobility)
- the aged can expect to live longer with some type of disability, with adult hearing loss, reduced eyesight and arthritis being the most common minor illnesses. More serious conditions include Parkinson's disease for males, and osteoarthritis and fractures for females.
- hospitalisation rates are higher for the aged, males in particular. It is common that after discharge the aged are placed into residential care or die from complications.
- the aged are hospitalised for treatment of diseases of the circulatory system (10.8 per cent), cancers and tumours (9.8 per cent), digestive diseases (9 per cent), diseases of the eye (5.9 per cent), musculoskeletal disesases (5.1 per cent), injury or poisoning (5 per cent) and respiratory diseases (4.6 per cent).
- the majority of aged people self-report their health as good to excellent, but only fair to poor with increasing age. Females are in better health than males at all ages.

Media's role

The media's role is to provide society with a sympathetic perspective of the issues faced by aged people. Negative issues such as diminished driving skills and limited knowledge of technology must be addressed in a compassionate and caring way. The media can work in a positive way to focus on issues such as lobbying the government for increases in the pension, improvements in residential care and support services, greater subsidisation of medicines, treatments and research into conditions that affect the aged, and continued recognition of the sacrifices made by war veterans and widows.

Table 13.9: Impact of health determinants for aged people

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Genetic factors can act to protect or place some individuals at higher risk of particular diseases, such as cancers. • Females tend to adopt healthier lifestyles than males and seek out preventative health services more often. • Alcohol consumption contributes to cirrhosis of the liver and kidney failure. • Smoking by aged people contributes to various cancers; for example, lung, lip and throat. • Restrictions in movement result in the development of high blood pressure, high cholesterol levels and increased weight gain, which all contribute to the impact of diseases of the circulatory system. • The aged living at home may suffer nutritional deficiencies because of poor access to shops or the costs of living.	• Australian society tends to undervalue its aged people and their contributions, resulting in the aged feeling forgotten. • Australia's ageing population is going to make greater demands on health services and the tax system, limiting the financial support to the aged. This could further reduce their quality of life. • The fracturing of family groups lessens the support available to the aged and increases the reliance on residential care, which can lead to depression in the aged. • Extended periods of family separation can also lead to episodes of depression. • The aged who suffer dementia place a higher level of stress on the family. • Much of the aged population is from migrant backgrounds who may still persist with traditional medical treatments.	• The aged find it difficult to cope with inflation and changes in the economy. Self-funded retirees may be forced onto the pension to survive as investments have been lost or diminished. • Aged people receiving pensions can afford only basic necessities and have little for luxuries. Diets can become restricted which contributes to poor health. • Many of the aged are forced to sell their homes and move into assisted care, which may not always be near their family or in their local area in which they have friends. • The age receive government assistance for health care and subsidised medicines through the Pharmaceutical Benefits Scheme (PBS).	• House maintenance can be an issue for some aged people living at home. Older homes can be damp, have stairs and require expensive plumbing and electrical work. Pneumonia, falls and burns are common among aged people. • The aged in residential care have good access to health services and information. However, those living at home can be less informed and rely on community services who visit on a weekly basis. • Rising costs of property ownership force many aged people to move to more affordable rural areas which can be further away from essential health services. • Public transport is not suitable for the aged and so they may rely on food deliveries such as Meals on Wheels, or taxi services, including ambulance transport.

The general media supports anti-discrimination laws and challenges racist attitudes in society, which help to promote tolerance. The Commonwealth Government provides funding for specialist radio and television programs (such as on the ABC and SBS) that cater for the interests of the aged and broadcasts information in a variety of languages to suit older migrants.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific aged-based health services such as community support services, screening programs, social and emotional well-being services, transport services and accommodation. Specific interventions include:

- Pharmaceutical Benefits Scheme (PBS), which gives reliable and affordable access to a wide range of medicines
- Immunise Australia Program, which provides vaccinations against infectious diseases such as influenza
- National Diabetes Register, which helps collect data
- National Suicide Prevention Strategy, which targets mental health
- bowel cancer screening for aged people
- Home and Community Care (HACC), which provides services for the aged at home.

INQUIRY

The aged

1. Using the summary on pages 547–8 as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for people from culturally and linguistically diverse backgrounds (CLDB)

People from culturally and linguistically diverse backgrounds (CLDB) include migrants, overseas students and refugees. Australia has the largest immigrant population in the world: one in seven Australians was born in a non–English-speaking country.



Figure 13.7: Australia has a multicultural population, with one in seven Australians born in a non–English-speaking country.

Areas of inequity

Mortality (compared to the Australian-born population):

- slightly lower mortality rate overall (nine per cent lower than Australian-born people)
- lower death rates that vary according to country of origin: People born in the United Kingdom, Poland and New Zealand have death rates similar to Australian-born people. People born in the United States have recorded the highest standard death rates. People born in south-east or north-east Asian countries have the lowest standard death rate, particularly people born in Vietnam, who have approximately half the death rate of Australian-born people.
- people born in the Netherlands and the UK have higher death rates from lung cancer. People born in Croatia, Greece, India, Lebanon and Poland have higher death rates from diabetes. People born in Croatia and Poland also have higher death rates due to coronary heart disease. People born in the UK and Ireland have more deaths due to influenza and pneumonia.
- the health gap is slightly wider (overseas-born people are healthier) when they first arrive, but narrows the longer they stay and adopt an Australian lifestyle.

Morbidity (compared to the Australian-born population): people born overseas

- generally have health as good as if not better than Australian-born people
- have lower hospitalisation rates and lower rates of disability
- have fewer mental health or behavioural problems
- have lower incidence of asthma.

However, their health decreases the longer they stay in Australia and adopt similar lifestyle behaviours to that of Australian-born people. Individuals from refugee backgrounds can also suffer significant psychological distress from exposure to war, conflicts and separation from family.

Table 13.10: Impact of health determinants for people from culturally and linguistically diverse backgrounds

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Higher rates of smoking by people from the Oceania countries (New Zealand, Papua New Guinea, Solomon Islands, Kiribati and Fiji) contribute to the development of cancers. • Low exercise levels or a sedentary lifestyle by people from Southern and Eastern Europe, North Africa, the Middle East and South East Asia contribute to some individuals becoming overweight. • Low consumption of vegetables by most subgroups of this population can contribute to some nutritional deficiencies in diets. However, those individuals who continue with their own country's traditional foods are more likely to maintain good health. • A self-selection process by the migrants themselves means that they are generally more financially secure and emotionally prepared to change countries.	• The government screens migrants and refugees for health problems to prevent the spread of infectious diseases and limit the costs to the health and welfare systems. • Anti-discrimination and racism laws aim to reduce mental health issues. • Multicultural policies aim to encourage assimilation into Australian society. • Family bonds and relative support are generally high, which contributes to good health. • Cultural conflict can arise between the traditional ways and the new ways adopted by the children of people from CLDB. Family disharmony can result. • Some religious beliefs can place people from CLDB at risk of discrimination, resulting in poor mental health and social alienation. • Extended periods of family separation can lead to episodes of depression.	• Highly skilled workers (GPs, engineers, nurses) and unskilled workers (factory hands and farm labourers) are targeted to fill vacancies in the Australian workforce, so they tend to benefit from full employment. • However, the exploitation of unskilled workers has occurred in some instances and resulted in them being paid low wages, working in an unsafe manner or forced into cramped dormitory-style living conditions. • As part of the targeted migration program the government provides financial assistance for a period of time. • Education levels and English language skills can vary dramatically between people of CLDB and can sometimes result in poor health literacy. However, most health information is printed in a variety of languages with interpreter services also available to ensure access. English speaking classes are also available.	• Migrant workers are located in areas of greatest need; for example, doctors and farm labourers to rural centres, factory hands and nurses to metropolitan cities. Each location can have a specific effect on their general health. • People from CLDB tend to move into areas of similar cultures, which provides them with social and support networks, but these areas can also be of a low socioeconomic status. • People from CLDB can potentially have larger or extended families living under the same roof, leading to overcrowding and potential stress. • Through Medicare the government provides access to a national health service for all people of CLDB.

Media's role

The media's role is to provide society with a balanced perspective of people from culturally and linguistically diverse backgrounds. Negative issues such as limited English speaking skills, system rorting, religious/cultural differences and interracial violence must be addressed in a way that increases the public's awareness and forces the government into action. The media can work in a positive way to focus on issues such as the success of multiculturalism, the cosmopolitan nature of some of our major cities and the contribution of people from CLDB in art, sport, science, research, medicine and education.

The general media supports anti-discrimination laws and challenges racist attitudes, which helps to promote the government's policy of multiculturalism and tolerance. The Commonwealth Government provides specialist radio and television stations (ABC and SBS) to broadcast information in a variety of languages with cultural sensitivity. Government laws allow newspapers and magazines to be printed in foreign languages with relative freedom of speech.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides interpreter services and health information in a variety of languages.

Community support services, screening programs, transport services and crisis accommodation can all be accessed by individuals from culturally and linguistically diverse backgrounds. Specific interventions include:

- bilingual heart health program for Greek–Australian women, which was conducted in Greek community centres and provided educational information
- the oral health promotion program for older migrants, which targeted Greek and Italian social clubs and provided free products and dental hygiene advice.



INQUIRY

People from culturally and linguistically diverse backgrounds

1. Using the summary on pages 549–51 as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for the unemployed

Being unemployed can be short term (less than a year) or long term (more than a year) and fluctuates according to economic and climatic factors. The longer an individual is unemployed, the closer their health begins to resemble that of the socioeconomically disadvantaged. Unemployment can affect any person of working age and is concentrated in some households, which then become dependent on welfare payments. Young people are especially vulnerable and more than a quarter of the long-term unemployed in Australia are aged 15–24. Underemployment is also an issue because individuals want to work but cannot get enough hours or an adequate wage, which results in them living in relative poverty.

Areas of inequity

Mortality (compared to the Australian population):

- the longer a person remains unemployed the lower their life expectancy
- long-term unemployment contributes to premature mortality for the most disadvantaged groups of the jobless
- the long-term unemployed have higher death rates for nearly all causes of death
- the health gap is widening because unemployment is affecting an increasing number of people from various socioeconomic circumstances and can result in individuals living in relative poverty for long periods of time, which dramatically affects mental health.

Morbidity (compared to the Australian population): the long-term unemployed

- have higher rates of problematic drug use and poor mental health, such as depression. These conditions can develop after the person becomes unemployed and is not necessarily the initial cause of joblessness.

- have higher rates of diabetes, arthritis and respiratory diseases (asthma) and circulatory diseases such as heart disease and stroke
- make more visits to doctors, hospital outpatient services and emergency departments
- can suffer low self-esteem and loss of confidence, which places them at greater risk of self-harming behaviours, suicide and attempted suicide.

Table 13.11: Impact of health determinants for the unemployed

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Obesity can limit mobility and restrict employment options. Some employers have strict guidelines regarding this area of health. • Individuals with debilitating conditions or who have suffered a work injury may no longer be able to find work in their chosen occupation. • Age can limit some people to certain types of employment. For example, labourers tend to be younger males, not older men. • Drug dependence can lead to a criminal conviction and affect job applications. • Smoking is common in the unemployed and affects their ability to carry out manual work. • Behaviour disorders can make individuals unable to maintain normal relationships or deal with work-related stress. • Compulsive disorders such as gambling can affect work performance.	• Parents who are both long-term unemployed set an example for their children, who may adopt a welfare mentality. • Society sometimes views older people as not being able to cope with the workload and they are therefore replaced with younger workers. • Media stereotypes can encourage young people to lead the life of a 'dole bludger who just surfs everyday'. • Some young unemployed people who are receiving government allowances may lose the incentive to actively seek work.	• The long-term unemployed can suffer severe disadvantage with diminishing assets, mounting bills and threats of eviction from their homes by banks or owners, which affects mental health. • A lack of employment can force families to separate to find work, which places relationships under stress. • Unemployment can force individuals into poverty that restricts food choices and causes social alienation. • The unemployed become dependent on handouts and welfare and lose a sense of control over their lives. • Young people with conduct disorders are often unable to continue with schooling and leave prematurely without skills. They therefore cannot find employment easily. • Globalisation and technology have made some jobs redundant, so the people who previously performed those jobs require retraining. • The long-term unemployed find it difficult to maintain or develop skills and so lose confidence and self-esteem.	• Some people are exposed to dangerous environmental conditions, such as asbestos, which places them at greater risk of developing severe respiratory illnesses. • Geographic remoteness can limit the jobs available in a community. • Natural disasters can devastate entire industries, which do not recover quickly.

Media's role

The media's role is to provide society with a sympathetic perspective of the issues faced by the unemployed. Negative issues that focus on laziness, 'dole bludging', rorting the system, generational unemployment or drug abuse must be addressed in a compassionate manner. The media needs to work in a positive way to focus on issues such as stimulating the economy, providing jobs and training for young people, removing the stigma of being labelled as unemployed and the effects of unemployment on families, who descend into poverty. The media can also remind people that unemployment can affect people in all walks of life in times of economic uncertainty.

The general media can promote employment programs, community networking programs, national strategies on job creation and initiatives that create strong economic growth. In addition the Commonwealth Government through its media (ABC and SBS) can support anti-discrimination laws, fight racism and keep the population informed about workplace safety, industrial relations issues and minimum wages.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific employment programs such as the Community Job Program, Network Job Placement, Employment and Training Programs, and Reconnect for young people. Other initiatives include the:

- National Suicide Prevention Strategy and beyondblue, which target mental health
- National Drug Strategy, which targets drug abuse
- National Tobacco Campaign, which targets smoking
- Supported Accommodation Assistance Program (SAAP), which provides emergency housing
- Household Organisational Management Expenses Advice Program, which provides advice on how to live on a budget.



INQUIRY

The unemployed

1. Using the summary on pages 551–3 as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.

Summary of health data and determinants for people with disabilities

Disabilities include impairments, activity limitations or participation restrictions that affect everyday activities. They can be classified as mild, severe or profound. The types of disability are:

- physical
- sensory/speech
- intellectual
- psychiatric
- acquired brain injury (ABI).

In 2009, 4 million people or 18.5 per cent of the Australian population were affected by some type of disability, with 5.8 per cent having a severe or profound disability.

Areas of inequity

Mortality (compared to the Australian population):

- as life expectancy increases for the average Australian, so does the life expectancy for people with a disability due to advances in medicine and early diagnosis
- increased life expectancy also results in increased years spent with a disability and can affect quality of life
- life expectancy is increasing for specific conditions such as Down Syndrome and cystic fibrosis. Further research on other disabilities will provide hope for others.
- the health gap is steady or narrowing slightly because of better treatment and early diagnosis of specific diseases which cause disability. However, people can expect to live longer with some type of disability which affects their quality of life.

Morbidity (compared to the Australian population):

- the level of disability an individual experiences increases with age
- prevalence rates of disability have remained stable over the years, with many people experiencing multiple disabilities
- disability rates for indigenous people are higher overall, with earlier onset of disability and more premature deaths due to disability
- young people's disability is often related to psychiatric or work/accident-related injuries
- older people's disability is often related to musculoskeletal conditions, arthritis and heart ailments
- aged people's disability is often related to long-term conditions, such as CVD, cancer, dementia, hearing and vision impairment.

Table 13.12: Impact of health determinants for people with a disability

Impact of health determinants			
Individual	**Sociocultural**	**Socioeconomic**	**Environmental**
• Age increases the risk of developing a disability; for example, dementia, hearing loss. • Genetic factors can act to protect or place some individuals at higher risk of particular diseases, such as schizophrenia. • Gender can also place particular sexes at higher risk because of their lifestyle behaviours. For example, females are at a higher risk of developing depression and males take more risks, resulting in a physical disability caused by a motor vehicle accident or work injury. • Females tend to adopt healthier lifestyles than males and seek out preventative health services more often. • Substance abuse can contribute to mental illness or increase the risk of CVD.	• Societies' attitudes are improving towards the disabled, but instances of discrimination still occur, which can affect mental health and feelings of independence. • Society is moving away from institutions to community care residences to improve the health of the disabled and make them feel more a part of society. • Families experience emotional and financial stress if they are forced to care for the disabled in their own home if government support is insufficient. • Families may also become affected if the disabled are placed in residential care away from their local area.	• The disabled can find it difficult to cope with inflation and changes in the economy and generally have a lower quality of life. • The disability support pension provides enough income for basic necessities and little for luxuries. Medicines, therapy and equipment are subsidised but are an added cost for the disabled. • The disabled may find it difficult to find suitable work and become reliant on welfare payments that restrict income and affect self-esteem. • The young disabled are less likely to complete year 12. • Family income may be reduced to a carer's pension if the disabled are at home. • Delays in compensation payments can create stress for the disabled, who may go into debt because of medical expenses. • There is a growing trend towards integrating the disabled into mainstream society.	• Exposure to chemicals and unsafe workplace practices can increase the risk of injury or long-term disability. • The disabled in residential care have good access to health services and information. However, those living at home must rely on community services that may visit on a weekly basis. • Some young disabled people are forced to live in aged care facilities that do not suit their social needs. • Disabled people still experience difficulty accessing some public transport and buildings, which affects their independence. • Limited financial resources means that there is only a small number of disability workers who can provide support for the disabled. • Many boarding houses that provided meals and accommodation for the disabled are closing down, resulting in those who cannot find an alternative becoming homeless.

Media's role

The role of the media is to provide society with a sympathetic perspective of the issues faced by people with disabilities. Negative issues that focus on their limitations must be addressed in a more caring and sensitive manner. The media can work in a positive way to focus on issues such as lobbying



Figure 13.8: Disabled people still experience difficulty accessing some things able bodied people take for granted, which affects their independence.

the government for increases in pensions and allowances, employment opportunities for the disabled, greater support for the carers of people with disabilities, and improvements in access to public transport and buildings. The media also needs to raise awareness of the causes of disability, especially from environmental factors, and continue the push for the disabled to be integrated into mainstream society.

The general media supports disability discrimination laws and highlights laws that protect people from self-harming behaviours related to substance abuse, motor vehicles and violence which can cause disability. The Commonwealth Government provides specialist radio and television stations (ABC and SBS) to cater for some of the needs of the disabled, including broadcasts of some TV programs with subtitles for the hearing impaired.

Evaluating government interventions

In addition to mainstream health services, the Commonwealth Government provides specific initiatives for people with disabilities such as community support services, screening programs, transport services and accommodation. Specific interventions include:

- the National Injury Prevention and Safety Promotion Plan 2004–14, aimed at reducing accidents
- the Pharmaceutical Benefits Scheme (PBS), which subsidises medicines
- 'beyondblue', which targets depression, especially in young people
- road safety campaigns such as 'Speeding — no one thinks big of you' and 'No belt, No brain' that target preventable injuries
- job placements that get people with disabilities into the workforce.



INQUIRY

People with disabilities

1. Using the summary on pages 553–5 as a guide, investigate two to three government interventions aimed at trying to improve the health of this particular population group. Evaluate the effectiveness, keeping in mind the characteristics of an effective health promotion strategy (see page 562).
2. Recommend any future directions or strategies the government should take to make further improvements in this population's health status.



BRIDGING THE GAP IN POPULATIONS' HEALTH STATUS

CRITICAL QUESTION

How may the gap in health status of populations be bridged?

Funding to improve health

The Commonwealth Government provides funds for most non-medical health services, pharmaceuticals and health research. In collaboration with the state governments and territories, it jointly funds public hospitals, home and community care for the aged and disabled, and some residential facilities for the aged, including war veterans' homes. As the costs of health care have increased, so has the responsibility of the government to provide cost-effective management of the limited resources in health. This limited funding must be distributed in a way that responds to the needs of many groups in the population. The improved accountability on the use of funds is anticipated to improve the health outcomes for a larger percentage of the Australian population.

Funding for health

According to the Australian Bureau of Statistics, total health expenditure in 2009–10 was $121.4 billion.

Almost all of the Commonwealth Government funding for the provision of health services is made up from general revenue such as taxation. The 1.5 per cent Medicare levy covers 20 per cent of the total Commonwealth Government health expenditure. The introduction of the one per cent additional surcharge for those high-income earners who do not have private health insurance was aimed at forcing more people to contribute to the cost of their own health care.

The four major kinds of Commonwealth health funding mechanisms are:

- health-care agreement grants, which are given to the state and territory governments to operate the public hospitals and other health services
- medical benefits that provide rebates to patients using private doctors and optometrists
- pharmaceutical benefits scheme that subsidises medicines
- health program grants, which are used to fund health-care services for people with special needs; to promote the use of higher technology; to improve GPs' skills and associated services; and to fund services such as Meals on Wheels.

Funding for specific populations

The Australian Government Department of Health and Ageing announces in its budgets the funding that will be directed to specific health areas and populations over either the year or over a five-year period. The state and territory governments allocate funds and administer specific programs. Cooperative action and the sharing of initiatives for the benefit of all Australians are features of the Council of Australian Governments (COAG).



INQUIRY

Funding for specific populations

1. Read the snapshot 'Government invests in frontline health services'. Draw a web or mind map to show the specific populations that are receiving attention for funding in this budget overview.

2. Use the **Health Budget** weblink in your eBookPLUS to research the most recent health budget announcements and issues. Choose a specific population and write a brief report on a health funding initiative to support it.

SNAPSHOT

Government Invests in Frontline Health Services

The Gillard Government will deliver major new health initiatives and continue to support frontline health services for Australian families in the 2012–2013 Budget.

Health Minister Tanya Plibersek said the Government is directing $74.5 billion to essential health and ageing services, making it easier for patients to access care when and where they need it.

Ms Plibersek said new investment in the health portfolio will focus on areas of need: dental health, rural and regional facilities and aged care.

'Despite facing a tough budget, the Government has managed to deliver much needed new initiatives for patients including in dental health, additional bowel cancer screening and millions of dollars for health facility construction.'

Ms Plibersek said at the centre of health initiatives in this year's Budget is a targeted $515.3 million investment in oral health for Australians who are least able to afford dental care.

'400 000 people who have been waiting for care on public dental waiting lists will benefit from these measures which are a significant step towards a better system of dental care', Ms Plibersek said.

'This new spending will also provide a boost to the dental workforce and improved dental facilities in rural and remote areas.'

The Government will also prioritise the things that make a difference to Australians' lives, including front-line services, while we continue to build a strong economy for the future.

The health budget also focuses on rural and regional Australia with $475 million directed to new and upgraded health and hospital infrastructure across 76 projects in country areas.

Projects include hospital redevelopments, developing community health centres, multi-purpose services, dental facilities and providing training and accommodation facilities for health professionals, in locations across Australia as diverse as Broken Hill, Proserpine, Halls Creek, Mt Isa and Bunbury.

'It's important that families in rural and regional Australia can access the right care at the right time close to their local communities', Ms Plibersek said.

The Government is delivering long overdue reform of Australia's aged care system through a five year, $3.7 billion package to build a better, fairer and more nationally consistent aged care system. This will enable older Australians to get the help they deserve so they can remain living in their own homes for as long as possible.

The Government will also invest $49.7 million to expand the National Bowel Cancer Screening Program.

'Under the expanded National Bowel Cancer Screening Program, screening will be offered to people turning 60 years of age from 2013 and 70 years of age from 2015, with biennial screening phased in from 2017–18', Ms Plibersek said.

Evidence shows that biennial screening has the potential to reduce these cancers by 15 per cent to 25 per cent and prevent between 300 and 500 Australian deaths annually.

Ms Plibersek said the Government was also committed to further modernising the Australian health system and was investing an additional $233.7 million into the continued rollout of the national electronic health records system, which will reduce errors and duplication of services.

Source: Australian Government Department of Health and Ageing, media release, Minister for Health, 8 May 2012.

Limited resources

The public health system has been pushed to its limits, and this is reflected in the waiting lists for public hospitals. The government initiative 'lifetime health cover' aims to encourage a larger proportion of the population back into private health insurance so that individuals will contribute more to their own health care. Resources may then be directed to more disadvantaged groups so that they have more equitable access to health care.

Health promotion is a combination of science, medicine, practical skills and beliefs aimed at maintaining and improving the health of all people.

Most health funding and resources are currently directed towards acute and chronic care, but increased awareness of the importance of prevention has led to more funds and resources being allocated to **health promotion** and research. GPs are receiving greater support in developing a preventative role in health.



Figure 13.9: Medical technology is a costly part of health care.

The rising cost of wages and modern technology has increased the level of accountability by governments and the health-care system. The distribution of resources is such that duplication of services is avoided and areas of greatest need are established. This has led to the closure of some hospitals and the opening of others in higher demand areas.

The Commonwealth and state governments are being held more accountable for delivering health services that are cost-effective, that maximise the use of resources and meet the health needs of all groups within the population. This results in the development of health infrastructure that can address many health inequities. The increase in the number of area health centres aims to improve people's access to health care and information.

Increased accountability has been achieved because of improved data collection and a greater awareness in the community of the importance of good health. Individuals themselves are being asked by governments to be more accountable and to act in ways that are health promoting.

INQUIRY

Funding of health

1. Explain why additional funding does not automatically solve the problems of health inequity in Australia. Use specific examples.
2. 'Funding should go to where there is the greatest chance of success rather than the greatest need.' Is it possible to do both? Discuss.

Actions that improve health

Funding alone will not solve health inequity. To improve the health of disadvantaged groups in the population we also need to encourage actions such as enabling, mediating and advocating.

Enabling

Enabling means forming partnerships with individuals or groups to empower them, through mobilising human and material resources, and using knowledge and skills in order to promote and protect their health.

Enabling refers to an individual's control over the cultural, social and economic factors that affect their health and health potential. A supportive environment, access to information, strong life skills, and opportunities to make healthy choices promote enabling. The self-empowerment of individuals encourages them to use their knowledge and skills to promote lifestyle changes that are long term and beneficial. The emphasis is on developing partnerships with health workers and other health activists who can provide access to health information, help with the development of health skills, and lobby to reshape public **health policy**.

Health policy is a set of formal government statements that define priorities and plans in response to health needs, available resources and other political pressures.

Mediating

Mediating means working to bring about consensus and reconciling the different interests of individuals, communities and sectors in a way that promotes and protects health.

According to the Ottawa Charter, the prerequisites and prospects for health cannot be ensured by the health sector alone. There needs to be coordinated action by the health sector, governments, non-government and voluntary organisations, industry, local authorities and the media.

Inevitably, conflicts will arise and these will require **mediation**. Any introduced changes can affect people's way of life, living conditions, organisational structures and the distribution of limited health resources. The health needs of the whole population must be balanced with those of disadvantaged groups, whose health is often far worse. To reconcile these conflicts, health promotion practitioners and social groups need to advocate the case for change and the redistribution of resources. By involving the public in identifying and addressing the health needs of communities, a consensus of opinion can be achieved. The decisions will reflect a greater empathy for disadvantaged groups and local needs because they take into account different social, cultural and economic conditions.

Advocating

Advocating for health is a combination of individual and social actions designed to speak up for specific groups, gain political commitment, policy support, social acceptance and systems support for a particular health goal or program.

Advocating the special needs and concerns of specific groups leads ultimately to a more coherent, community-centred and culturally appropriate health policy. The 'whole of government' approach to health ensures consistency in health service availability and programs. Many disadvantaged groups in the population have little access to political forums in which their needs can be addressed. Migrants who do not speak English may be unaware of the health services and resources available to them or how to initiate changes in government policies that will lead to improved health outcomes. Such groups require advocates to promote their concerns; the advocates could be religious leaders, tribal elders, advisers or councillors.

A social justice framework for addressing health inequities

Social justice is a value that favours the reduction or elimination of inequity, the promotion of inclusiveness of diversity, and the establishment of environments that are supportive of all people.

We discussed **social justice** principles in chapter 1 (see pages 15–16). These include equity, diversity and supportive environments.

Achieving improvements in social justice requires a framework to address the causal factors of health inequity. This framework consists of:

- empowering individuals in disadvantaged circumstances
- empowering disadvantaged communities
- improving access to essential facilities and services
- encouraging economic and cultural change.

Empowering individuals in disadvantaged circumstances

A priority for empowering individuals is improving their level of health literacy. A greater knowledge of health and services empowers individuals, so that they can cope with circumstances and develop problem-solving skills. By encouraging individuals to accept responsibility for their own health, they are more likely to pursue healthier lifestyles and adopt health-promoting behaviours. Strong personal support networks are essential in giving the individual the confidence to make lifestyle changes.

Empowering disadvantaged communities

The first step in strengthening a disadvantaged community is to instil a sense of 'connectedness' in its members by creating a network. Individuals who, in the past, felt disempowered soon develop a sense of empowerment by being part of a group that makes decisions affecting their health. They can then plan and implement programs that are culturally sensitive and specific to their needs. This may involve changing aspects of their environment, finding information, reallocating resources or advocating the review of policies that make them disadvantaged. Lobbying governments will also increase awareness in the wider community and help to educate members in other similar communities.



Figure 13.10: Antenatal classes are an example of a support network for new parents.

Improving access to essential facilities and services

Improvements in infrastructure are likely to allow disadvantaged individuals to seek treatment earlier and on a more regular basis. Having more indigenous primary health-care workers and more purpose-built facilities that cater for cultural differences will improve access to health.

Encouraging economic and cultural change

Government funding is essential to building supportive environments that promote better health for disadvantaged groups. The provision of an adequate health infrastructure ensures that many disadvantaged individuals will no

longer live in conditions that perpetuate the cycle of ill health. Because many disadvantaged minority groups are considered to have a low priority for the allocation of funds, they must draw attention to their needs by lobbying the government and changing people's attitudes. This in turn can be used to change society's values and beliefs so that they become more sympathetic to change. Health inequity will not be addressed unless the population considers it to be an important enough issue.

CASE STUDY

Connecting in a rural community

The company known as Co-opera was formed in 1990 to bring opera to regional and remote communities in Australia. In February 2009, Co-opera took to the oval in Cobar, a rural and mining town of around 6000 people in central New South Wales, and staged *The Magic Flute*.

Dr Russell Roberts, Director of the area's Mental Health Drug and Alcohol Service, praised the initiative and the combined efforts of the Cobar Arts Council, the Greater Western Area Health Service, the Cobar Shire Council and the Outback Division of General Practice in bringing the performance to Cobar. As well as giving rural people an opportunity to see a live opera performance, the event was a health promotion strategy in that it showed support for the community and contributed to a positive environment. This in turn helps people affected by mental illness to develop resilience and feel included in society. Dr Roberts explained:

> 'The community event underlines the importance of community connectedness for our social and emotional wellbeing. When people think about mental health and drug and alcohol services, they usually think about mental illness and treatment, yet a major part of our work is at the other end of the spectrum — about supporting people and communities to be resilient and have good mental health, in order to prevent mental health problems.
>
> Events that happen in our normal day to day lives affect our mental health . . . and we all need to build our resilience and supportive communities so we can deal with the inevitable stresses and difficult times . . . It's about having a sense of purpose and feeling safe and secure, being free from violence or the threat of violence and having hope for the future.
>
> Combating negative stereotypes and attitudes is one of the most crucial aspects of promoting mental health for all people. Better engagement and social inclusion of people living with mental illness will both help this process and be helped by it.'

Source: Greater Western Area Health Service media release, 18 February 2009.



INQUIRY

Connecting in a rural community

1. Read the snapshot 'Connecting in a rural community' and explain the expected benefits of staging an opera performance in this regional community.
2. How does this event play a role in addressing disadvantage in the community?
3. Explain how the elements of the social justice framework apply to this health initiative.
4. Use the **Cobar Shire Council** weblink in your eBookPLUS and research the availability of health services in the community. Outline any differences you notice between the availability of medical services for the Cobar community and those in a city environment such as Sydney.

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Characteristics of effective health promotion strategies

Any strategy that aims to improve the health status of a particular population must have certain characteristics. It must:

- move that group towards equity in health
- involve working with the target group in program design and implementation
- have cultural relevance and appropriateness
- ensure that those who deliver the strategy are credible
- provide practical help in allowing people to participate
- focus on skills, education and prevention
- have an effect on social factors and infrastructures
- set targets that are relevant to the population concerned
- support the whole population while still providing extra resources to those in high risk groups
- involve collaboration between various sectors and inform all groups of how they are contributing to the overall plan.

In this section, the characteristics of an effective health promotion strategy will be examined using the Health Promoting Schools initiative as a focus. This initiative was a joint project of the New South Wales departments of Health and of Education and Training, the Catholic Education Commission of New South Wales and the Association of Independent Schools, New South Wales. The strategies were originally developed from the **Ottawa Charter** and are actively promoted globally by the World Health Organization. Any other health promotion strategy can be used to examine the following characteristics.

The **Ottawa Charter** for Health Promotion is a document that represents a global approach to health promotion by the World Health Organization. It aims to enable people to increase control over and improve their health. It outlines prerequisites for health.

Working with the target group in program design and implementation

To develop a health-promoting school requires the interaction of students, parents, teachers and community groups.

Students and other groups should identify the key health issues and environmental circumstances that result in any health inequities. As a group, they can use problem-solving skills to develop strategies that target their specific health needs and then implement programs in a coordinated way. Involving all the relevant groups increases the success and sustainability of the initiatives.

Students may choose to conduct surveys or questionnaires of fellow students or parents to determine issues of importance. Alternatively, they may become involved in leadership groups such as the student representative council to raise issues or give input on school policies. Through their involvement, students learn about the interrelatedness of health and the natural and social environment. Moreover, by being empowered through involvement, individuals learn that they can take action to affect the determinants of their health.



Investigating school policies

Investigate what steps your school has taken towards becoming a health-promoting school. Report back to the class.

Ensuring cultural relevance and appropriateness

Each school has its own identity, which is a product of the cultural influences particular to that area. These are sometimes reflected in the school ethos, such as 'we learn to live'. However, a school's culture can also be seen in the languages spoken by the students, the sports played, the subjects it emphasises, its rules, and its important events and celebrations.

Minority ethnic groups may make up a large proportion of a school population and schools can adopt policies and procedures that complement what is taking place in students' homes. For example, when planning physical activities, a school may need to take into account any students who need to fast as part of the Islamic festival of Ramadan.

The school can also address specific health problems by, for example, providing children from low socioeconomic backgrounds with breakfast at school because they would otherwise not have eaten. Input from respected 'elders' of the community can also strengthen any such initiatives.



INQUIRY

Ensuring relevance

Debate the relevance of your school's ethos and general culture in promoting health. Consider anti-bullying policies, peer support and mentoring programs.

Focusing on skills, education and prevention

In order to focus on skills, education and prevention, the curriculum can be developed across all key learning areas to promote health. For example, drug education in PDHPE classes can be supported by the use of relevant news articles and stories in English classes, thereby consolidating students' health literacy skills. Other approaches to consider are:

- encouraging students to develop skills in decision making, problem solving and interacting through all the key learning areas
- giving students opportunities to practise healthy decision making
- educating parents about the problems that young people face
- educating students about the problems faced by other young people.



INQUIRY

Developing skills

Think critically about your school canteen. Does it provide the chance to practise healthy decision making? Discuss as a class.

Support the whole population while directing extra resources to those in high-risk groups

A school with an effective health-promoting strategy may need to seek or allocate additional resources to target the groups within the school who are particularly at risk of poor health — for example, those most likely to have inadequate nutrition at home, or those suffering from eating disorders such as anorexia. At the same time, the school would still need to ensure that attention is being paid to the overall health-promoting strategy that affects the rest of the students. Achieving this balance requires the support of the whole school.

Intersectoral collaboration

Collaboration between the health sector, the Department of Education and Training and a non-government organisation led to the introduction of Life Education vans to some schools. Other examples of collaboration between sectors are:

- the Healthy Canteen policy in some schools leading to negotiations with businesses that provide food to the schools
- schools working with the family and community groups to provide programs such as reading support.

Schools working on a health-promoting strategy need to consider similar ways of involving the various sectors, for example:

- finding businesses to sponsor sports events
- getting the school involved in Jump Rope for Heart
- fundraising in the community for the purchase of equipment and the building of facilities.

SUMMARY

- The keys to social justice principles are valuing diversity, achieving equity and creating supportive environments.
- Disadvantaged groups in the population may be exposed to multiple social-risk factors, which contribute to health inequity.
- Health inequities arise because of differences in daily living conditions, the quality of the early years of life, access to services and transport, socioeconomic factors, social attributes and government policies and priorities.
- Funding alone will not solve all health inequity problems; the appropriate health infrastructure is also needed.
- The Medicare levy (1.5 per cent) covers only 20 per cent of the total health expenditure, the balance being made up from general revenue.
- The main types of health action that create sustainable improvements in the health of disadvantaged groups are enabling, mediating and advocating.
- The social justice framework for addressing health inequities includes empowering individuals in disadvantaged circumstances, empowering disadvantaged communities, improving access to facilities and services, and encouraging economic and cultural change.
- The gap in health inequity is increasing for some populations.
- The health of indigenous people is two to three times worse than the rest of the population.
- The median household income per week for indigenous Australians is less than that of non-indigenous Australians.
- In rural areas, levels of health decrease as remoteness increases.
- Rural people are exposed to a higher risk of work-related injuries.
- More than 100 000 people are homeless each year, with an increasing number being young people.
- There is no known cure for HIV/AIDS, although modern treatments help to extend the life expectancy of those infected.

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Digital docs:
A summary quiz and revision test on this chapter's content are available in Microsoft Word format in your eBookPLUS.

- Males make up 93 per cent of the incarcerated population, with 27 per cent from indigenous backgrounds.
- One in eight Australians is an aged person.
- Australia has the largest immigrant population in the world; one in seven Australians was born in a non-English speaking country.
- Young people are especially vulnerable to unemployment and made up a quarter of the long-term unemployed population in 2011.
- In 2009, 18.5 per cent of the Australian population was affected by some type of disability.

QUESTIONS

Revision

1. Critically analyse how your school provides a supportive environment that enables you to achieve good health. (H3) (12 marks)
2. Briefly outline the principles of social justice. (H1) (3 marks)
3. Explain how the principles of diversity and equity, along with supportive environments, promote social justice. (H14) (5 marks)
4. Health inequities are experienced by a range of population groups. Identify a specific population group and discuss how inequities are created. (H2) (5 marks)
5. Identify the key differences in health between males and females. (H2) (2 marks)
6. Account for the effect that racism and discrimination can have on a person's health. (H15) (5 marks)
7. Describe the health of indigenous Australians. (H2) (4 marks)
8. Explain how actions such as enabling, mediating and advocating can improve the health of indigenous people. (H14) (5 marks)
9. Suggest strategies to improve the health of indigenous Australians. (H15) (3 marks)
10. Describe how the Commonwealth Government disperses funds for health. (H5) (4 marks)
11. Critically analyse the effect that limited resources have on the health-care system. (H1) (12 marks)
12. Outline the essential framework for addressing health inequities. (H14) (3 marks)
13. Identify the characteristics of an effective health promotion strategy. (H3) (2 marks)
14. Briefly outline the most common settings for health promotion. (H5) (3 marks)
15. Outline the major health concerns for Australian children. (H2) (3 marks)
16. Explain what intersectoral collaboration is. Use a specific example in your response. (H5) (5 marks)
17. Critically analyse the effect that colonisation and dispossession has had on indigenous Australians' health. (H3) (12 marks)
18. Identify the major factors that affect the health of rural and remote communities. (H2) (2 marks)
19. Recommend strategies to improve the health of people in rural and remote areas. (H15) (3 marks)
20. Explain why geographical remoteness is significant in affecting an individual's health. (H3) (5 marks)
21. Choose two subgroups of the population and justify the use of the Pharmaceutical Benefits Scheme to provide affordable medicines for the group. (H14) (8 marks)
22. Account for the impact of the health determinants on a homeless person's ability to maintain good health. (H3) (5 marks)
23. Explain the media's role in providing a balanced perspective of the incarcerated. (H5) (5 marks)
24. Briefly describe the mortality and morbidity patterns for aged people. (H1) (4 marks)

Extension

Analyse the appropriateness of a current health promotion strategy targeting a particular health inequity of a disadvantaged group. Make a PowerPoint presentation for the class. (H14) (10 marks)

Appendix 1

Techniques, hints and practice exam

The following information is intended to provide guidance by helping you to become familiar with the HSC exam. It covers areas such as planning and how to answer questions. This is followed by a practice exam, which is modelled on the HSC exam.

Answers to multiple choice questions and some sample responses and marking guidelines for other selected questions are provided for teachers in the *Outcomes 2 Fifth edition* eGuidePLUS.



EXAM PREPARATION

In the same way that we need to rehearse physical skills in order to learn them, so too do we need to practise for exams. The more familiar we become with exams in terms of time management and response requirements, the better we will be able to perform in the HSC paper. Some suggestions, in relation to study, are:

- use study time effectively to learn information and generate beneficial summaries. Use pictures, diagrams, tables and mind maps where possible as these contain considerable information that can be recalled readily. It is easier to think in pictures than words.
- to make information 'stick' during study, be active in your learning. Talk, question yourself, test, draw charts, illustrate and put words into pictures where possible.
- during study, work on meaning and understanding. Explain in your own words. If you can do this, you have demonstrated understanding and this will greatly increase your chances of retaining the information.
- practise doing exams. Past papers and notes from the marking centre (containing answers to multiple-choice questions and feedback on extended response questions) are available from the 'HSC Exam papers' link at the New South Wales Board of Studies website at: www.boardofstudies.nsw.edu.au.

Format of the HSC paper

Time

- There is five minutes of reading time.
- This is followed by three hours working time.
- Black pen is preferred, although blue pen may be used.

Organisation

- The paper is divided into sections I and II.
- Section I is worth 60 marks and includes questions on core strands only. However, these questions are presented in both multiple-choice (Part A) and short answer (Part B) formats.
  - Questions 1 to 20 consist of 20 multiple-choice questions selected from HSC cores 1 and 2. Each question is worth one mark for a total of 20 marks.
  - Question 21 is on HSC core 1. It is worth 20 marks and may comprise a series of short answer questions relating to health priorities in Australia.
  - Question 22 is on HSC core 2. It is worth 20 marks and may comprise a series of short answer questions relating to factors affecting performance.
- Section II relates to the options. This section is worth 40 marks. There are questions relating to each of the five options. Students must select *two* options and answer in the booklets provided. There are two questions for each option. It is strongly recommended that you answer questions on the two options that you studied during class.

Answering questions on the HSC paper

The key words for questions — what they mean

The critical part of a question is the verb or verb phrase (called key words), usually found at the beginning of the sentence, which indicates how the question is to be answered. It is essential that the style of writing and information supplied reflects this requirement. For instance, the style expected in answering a question that begins with 'discuss' will necessarily be different from one that requires you to 'describe'. Knowledge about the key words listed in the table will help you correctly address questions. It is important to note that examination questions for the HSC will continue to use self-explanatory terms such as 'how', or 'why' or 'to what extent'. Use the **Keywords** weblink in your eBookPLUS to access the full list of key words and their accepted meaning or interpretation.

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Be guided by the rubric

In sections where written responses are required, the questions are preceded by a *rubric*. The rubric provides general criteria for the section and is taken into account when marks are allocated. Students need to read the rubric for each section and address in their answers each of the guidelines stated.

Answering multiple-choice questions

There are 20 multiple-choice questions on the paper, each worth one mark. Questions are designed to assess knowledge of cores 1 and 2. The key to multiple-choice is understanding the stem, or question, and making the most

appropriate choice based on this. Remember to provide a response to every question even if you are unsure of the answer. Marks are not deducted for incorrect responses.

A simple technique for answering multiple-choice questions is as follows.

- Read the stem (question area/graphs/diagrams) and then re-read to ensure full understanding.
- Read the four possible answers.
- Choose one of the answers but do not record at this point.
- Re-read the stem and the answers again.
- Record your choice if you select the same answer as the first time.
- If unsure, re-read, make a choice and go on to the next question.

Answering questions that require short answer and extended responses

The HSC paper will require short answer and extended responses. It is important that you become familiar with what constitutes a quality response and that you develop skill in being able to communicate this using written expression. Some suggestions are:

- Be aware of the broad syllabus areas to which the question is related. The question may well provide the opportunity for you to recognise and incorporate much of this into your response.
- If the question is 'double barrelled', then both parts of the question need to be answered.
- Be logical in the development of your ideas. Try not to repeat information, as you have probably already gained marks and needless repetition denies you the chance to improve your answer or add to other answers in the time available.
- Answer the set question, not your own question. Continually refer to the question to ensure that your response is directly addressing what is required.
- If graphs/pictures/stimulus material are used in the question, they need to be acknowledged, discussed or referred to in the response.

Planning your answers

Planning answers is extremely important and should begin when you are reading the paper. Although you cannot put pen to paper during the five-minute reading time, your thoughts will begin to develop. It is essential that when the writing period begins, you begin to record your points on the paper so that they will not be forgotten. Some suggestions for planning are as follows.

- Develop a time-management plan well before the exam. Although there is a suggested plan indicated on the HSC paper, you may need to vary it according to your reading/writing speed. It is absolutely essential that you do not spend all your time on some questions at the expense of others.
- Write your planning points in the margin (use small print) adjacent to the lines where the answer will be recorded. You can then work the points into a logical format.
- Spread your planning points down the page. This will allow space for other points to be inserted as they come to mind, and will provide the basis for a logical answer.
- Answer every question and try to use all lines provided.



A PRACTICE EXAM PAPER

Personal development, health and physical education

General instructions

- Reading time — 5 minutes
- Working time — 3 hours
- Write using black or blue pen.
- Write your centre number and student number at the top of each page or where indicated.

Total marks — 100

Section I

60 marks
This section has two parts, part A and part B.

Part A — 20 marks

- Attempt questions 1–20.
- Allow about 40 minutes for this part.

Part B — 40 marks

- Attempt questions 21–28.
- Allow about one hour and 10 minutes for this part.

Section II

40 marks

- Attempt TWO questions from questions 29–33.
- Allow about one hour and 10 minutes for this section.

Section I

Part A — 20 marks

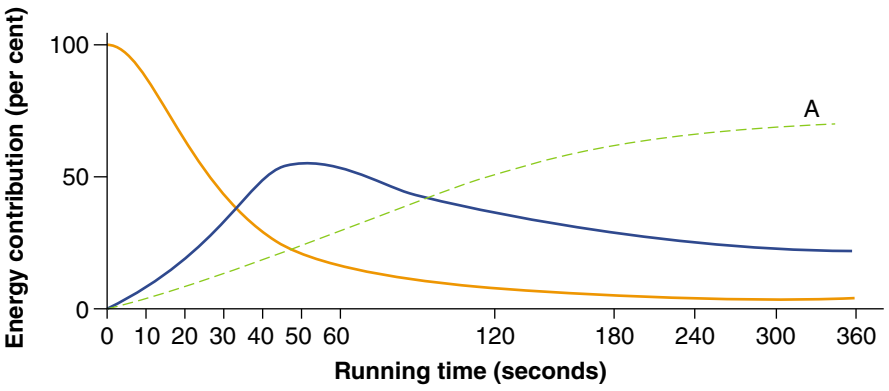
Attempt questions 1–20.
Allow about 40 minutes for this part.

Select the alternative A, B, C or D that best answers the question.

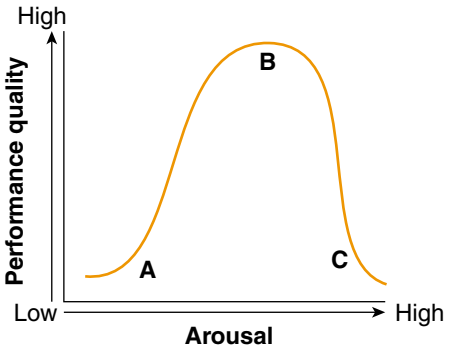
Multiple-choice questions

1. Which of the following is the leading cause of death in Australia?
   (A) Lung cancer
   (B) Diabetes
   (C) Injury
   (D) Cardiovascular disease
2. What is the leading cause of death for children and young people in Australia?
   (A) Cardiovascular disease
   (B) Asthma
   (C) Injury
   (D) Suicide
3. What would a comparison between the health status of indigenous Australians and non-indigenous Australians reveal?
   (A) Indigenous Australians have a lower life expectancy.
   (B) Non-indigenous Australians have a poorer health status.
   (C) Non-indigenous Australians are more likely to die in infancy.
   (D) Hospital admission rates are lower for indigenous Australians.
4. Which of the following does social justice within a health context support most?
   (A) Equal access to health services for all Australians
   (B) The provision of health education only to those who can afford it
   (C) A focus on individual behaviour change
   (D) Increased government spending on medicine to treat disease
5. Which of the following is the most important consideration in determining Australia's health priorities?
   (A) The prevalence of the condition in indigenous populations only
   (B) The cost of the condition to the individual and the community
   (C) The cost to change the occurrence of disease
   (D) The prevalence of the condition within the non-indigenous population
6. Which of the following highlights the impact of social determinants on health?
   (A) Development of obesity due to a lack of regular physical activity and a high-fat diet
   (B) Overexposure to UV rays, causing skin cancer
   (C) Inability to access health services due to low income and poor knowledge
   (D) Drinking alcohol and driving
7. Which of the following is a government response to the issue of an ageing Australian population?
   (A) Increased funding for acute care hospitals
   (B) Improved access to mental health care in rural and remote communities
   (C) Reduction in numbers of trained doctors and nurses
   (D) Promotion of good health through life and active ageing

8. Which of the following best characterises community empowerment in health promotion?
   (A) A local doctor providing free health-screening services
   (B) Increased government taxes on cigarettes
   (C) Police enforcement of speeding laws around schools to increase the safety of schoolchildren
   (D) School staff, students and P and C at a local primary school working together to raise awareness of and support for improved road safety around their school
9. Which of the following is provided by Medicare?
   (A) Choice of doctor and hospital
   (B) Cover of dentist and physiotherapy services
   (C) Public hospital cover
   (D) Private hospital cover
10. Providing counselling support for people suffering from depression is one strategy used in health promotion in the area of mental health. Which Ottawa Charter action area is being implemented in this example?
   (A) Creating supportive environments
   (B) Building public health policy
   (C) Reorienting health services
   (D) Developing personal skills
11. Which fuel provides energy for the functioning of the alactacid energy system?
   (A) Creatine phosphate
   (B) Carbohydrate
   (C) Protein
   (D) Lactic acid
12. Which of the following principles of training when applied to a strength improvement program would ensure the biggest gains?
   (A) Reversibility
   (B) Variety
   (C) Overload
   (D) Specificity
13. Examine the figure below.



Which athlete would benefit most from the development of the energy system illustrated by line A?
   (A) A gymnast
   (B) A triathlete
   (C) A diver
   (D) A 200-metre runner



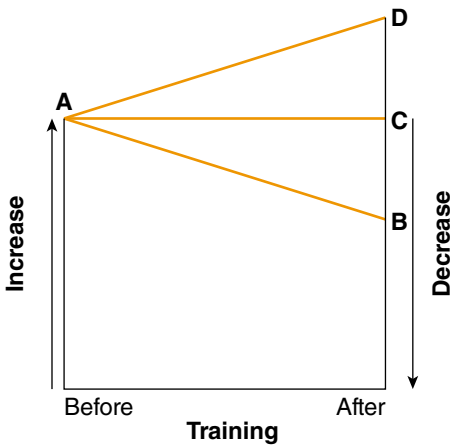
14. Examine the arousal curve on the left.
Which of the following statements about arousal and performance is correct?
(A) Athlete A's level of arousal would be best if the task was considered easy.
(B) Athlete B has the best level of arousal for that specific task.
(C) For that task, athlete B's level of arousal would always be optimal.
(D) Athlete C's performance will be best because the level of arousal is highest.

15. What is the most important practice in a recovery nutritional plan following endurance activity?
(A) Load with carbohydrate until body weight returns to normal
(B) Provide immediate use of cryotherapy to repair damaged tissue
(C) Administer dietary supplements to replace lost energy
(D) Replenish muscle and liver glycogen stores immediately

16. Which of the following descriptions is most appropriate for a player in the associative stage of skill learning?
(A) There is a high degree of temporal patterning evident.
(B) The player has a clear picture of the task and is ready for practice.
(C) Practice results in observable improvement.
(D) Pressure drills and game strategies are used frequently during training.

17. Which of the following best exemplifies performance of a rhythmic gymnastic routine in accordance with the music?
(A) An internally paced skill
(B) An externally paced skill
(C) A fine motor skill
(D) A discrete skill

18. Which of the following physiological adaptations will be most significant in fast-twitch muscle fibres in response to a sprint training program?
(A) A significant reduction in glycolytic enzymes
(B) The conversion of red fibres to white fibres
(C) Increased blood haemoglobin levels
(D) Improved lactic acid tolerance



19. Examine the figure on the left.
The figure indicates a physiological change as a result of training. What change is indicated by the line AB?
(A) Resting heart rate
(B) Cardiac output
(C) Stroke volume
(D) Oxygen uptake

20. How is ATP restoration achieved when the alactacid energy system is the predominant supplier of energy?
(A) Resynthesis of lactic acid
(B) Carbohydrate loading
(C) Energy from the breakdown of creatine phosphate
(D) Oxygen from the metabolism of carbohydrate and fat

Section I (*continued*)

Part B — 40 marks

Attempt questions 21–28.
Allow about 1 hour and 10 minutes for this part.

Question 21 — (3 marks)

Describe the main measures of epidemiology used to measure the health status of populations.

Question 22 — (7 marks)

Discuss the nature of health inequities experienced by Aboriginal and Torres Strait Islander peoples.

Question 23 — (4 marks)

Explain why cancer is a health priority issue in Australia.

Question 24 — (6 marks)

Identify ways to make informed consumer decisions about the use of complementary and alternative health care.

Question 25 — (3 marks)

(a) Identify the causes of fatigue for each of the energy systems.

Question 26 — (4 marks)

(b) Describe recovery strategies that might be used to benefit performance.

Question 27 — (7 marks)

(c) Discuss psychological strategies used to manage anxiety.

Question 28 — (6 marks)

(d) Clarify the role of feedback in improving performance.

Section II

Total marks (40)

Attempt TWO questions from questions 29–33.
Answer each question in a SEPARATE writing booklet.

In your answers, you will be assessed on how well you:

- demonstrate knowledge and understanding of health and physical activity concepts
- apply the skills of critical thinking and analysis
- communicate ideas and information using relevant examples
- present a logical and cohesive response.

Question 29 — The health of young people (20 marks)	**Marks**
(a) Discuss the risk factors and protective factors that relate to ONE of the major health issues that impact on young people.	8
(b) 'Young people can use a range of skills to change their health behaviours and attain better health.' Critically analyse this statement, using realistic examples.	12

Question 30 — Sport and physical activity in Australian society (20 marks) **Marks**

(a) Discuss the influence of the mass media on sport in Australia in terms of coverage and economic considerations. 8

(b) Choose one sport and analyse the ways in which it has adopted a business focus. 12

Question 31 — Sports medicine (20 marks) **Marks**

(a) Discuss the use of RICER as an effective soft tissue management procedure. 8

(b) Critically analyse return-to-play readiness issues in terms of the well-being of athletes. 12

Question 32 — Improving performance (20 marks) **Marks**

(a) Choose ONE of the following training regimes. 8

- Strength
- Aerobic
- Anaerobic
- Flexibility
- Skill

Discuss how different training methods are used to improve performance requirements.

(b) Critically analyse the planning of a training year in terms of fitness, skill-specific requirements and avoidance of overtraining. 12

Question 33 — Equity and health (20 marks) **Marks**

(a) Discuss how a social justice framework can be applied in developing a plan for improving the health status of a disadvantaged group. 8

(b) Choose *either* Aboriginal and Torres Strait Islander peoples *or* another population group experiencing health inequities in Australia that you have studied. Critically analyse the significant factors that contribute to their health inequity compared with other Australians. 12

Appendix 2

Ottawa Charter for Health Promotion

First International Conference on Health Promotion, Ottawa, 21 November 1986

WHO/HPR/HEP/95.1

The first International Conference on Health Promotion, meeting in Ottawa this 21st day of November 1986, hereby presents this charter for action to achieve health for all by the year 2000 and beyond.

This conference was primarily a response to growing expectations for a new public health movement around the world. Discussions focused on the needs in industrialised countries, but took into account similar concerns in all other regions. It built on the progress made through the Declaration on Primary Health Care at Alma-Ata, the World Health Organization's Targets for Health for All document, and the recent debate at the World Health Assembly on intersectoral action for health.

Health promotion

Health promotion is the process of enabling people to increase control over, and to improve, their health. To reach a state of complete physical, mental and social well-being, an individual or group must be able to identify and to realise aspirations, to satisfy needs, and to change or cope with the environment. Health is, therefore, seen as a resource for everyday life, not the objective of living. Health is a positive concept emphasising social and personal resources, as well as physical capacities. Therefore, health promotion is not just the responsibility of the health sector, but goes beyond healthy lifestyles to well-being.

Prerequisites for health

The fundamental conditions and resources for health are:

- peace
- shelter
- education
- food
- income
- a stable ecosystem
- sustainable resources
- social justice, and equity.

Improvement in health requires a secure foundation in these basic prerequisites.

Advocate

Good health is a major resource for social, economic and personal development and an important dimension of quality of life. Political, economic, social, cultural, environmental, behavioural and biological factors can all favour health or be harmful to it. Health promotion action aims at making these conditions favourable through advocacy for health.

Enable

Health promotion focuses on achieving equity in health. Health promotion action aims at reducing differences in current health status and ensuring equal opportunities and resources to enable all people to achieve their fullest health potential. This includes a secure foundation in a supportive environment, access to information, life skills and opportunities for making healthy choices. People cannot achieve their fullest health potential unless they are able to take control of those things which determine their health. This must apply equally to women and men.

Mediate

The prerequisites and prospects for health cannot be ensured by the health sector alone. More importantly, health promotion demands coordinated action by all concerned: by governments, by health and other social and economic sectors, by non-governmental and voluntary organisations, by local authorities, by industry and by the media. People in all walks of life are involved as individuals, families and communities. Professional and social groups and health personnel have a major

responsibility to mediate between differing interests in society for the pursuit of health.

Health promotion strategies and programs should be adapted to the local needs and possibilities of individual countries and regions to take into account differing social, cultural and economic systems.

Health promotion action means:

Build healthy public policy — health promotion goes beyond health care. It puts health on the agenda of policy makers in all sectors and at all levels, directing them to be aware of the health consequences of their decisions and to accept their responsibilities for health.

Health promotion policy combines diverse but complementary approaches including legislation, fiscal measures, taxation and organisational change. It is coordinated action that leads to health, income and social policies that foster greater equity. Joint action contributes to ensuring safer and healthier goods and services, healthier public services, and cleaner, more enjoyable environments.

Health promotion policy requires the identification of obstacles to the adoption of healthy public policies in non-health sectors, and ways of removing them. The aim must be to make the healthier choice the easier choice for policy makers as well.

Create supportive environments — our societies are complex and interrelated. Health cannot be separated from other goals. The inextricable links between people and their environment constitutes the basis for a socio-ecological approach to health. The overall guiding principle for the world, nations, regions and communities alike, is the need to encourage reciprocal maintenance — to take care of each other, our communities and our natural environment. The conservation of natural resources throughout the world should be emphasised as a global responsibility.

Changing patterns of life, work and leisure have a significant impact on health. Work and leisure should be a source of health for people. The way society organises work should help create a healthy society. Health promotion generates living and working conditions that are safe, stimulating, satisfying and enjoyable.

Systematic assessment of the health impact of a rapidly changing environment — particularly in areas of technology, work, energy production and urbanisation — is essential and must be followed by action to ensure positive benefit to the health of the public. The protection of the natural and built environments and the conservation of natural resources must be addressed in any health promotion strategy.

Strengthen community actions — health promotion works through concrete and effective community action in setting priorities, making decisions, planning strategies and implementing them to achieve better health. At the heart of this process is the empowerment of communities — their ownership and control of their own endeavours and destinies.

Community development draws on existing human and material resources in the community to enhance self-help and social support, and to develop flexible systems for strengthening public participation in and direction of health matters. This requires full and continuous access to information, learning opportunities for health, as well as funding support.

Developing personal skills — health promotion supports personal and social development through providing information, education for health, and enhancing life skills. By so doing, it increases the options available to people to exercise more control over their own health and over their environments, and to make choices conducive to health.

Enabling people to learn, throughout life, to prepare themselves for all of its stages and to cope with chronic illness and injuries is essential. This has to be facilitated in school, home, work and community settings. Action is required through educational, professional, commercial and voluntary bodies, and within the institutions themselves.

Reorient health services — the responsibility for health promotion in health services is shared among individuals, community groups, health professionals, health service institutions and governments. They must work together towards a health care system which contributes to the pursuit of health.

The role of the health sector must move increasingly in a health promotion direction, beyond its responsibility for providing clinical and curative services. Health services need to embrace an expanded mandate which is sensitive and respects cultural needs. This mandate should support the needs of individuals and communities for a healthier life, and open channels between the health sector and broader social, political, economic and physical environmental components.

Reorienting health services also requires stronger attention to health research as well as changes in professional education and training. This must lead to a change of attitude and organisation of health services which refocuses on the total needs of the individual as a whole person.

Moving into the future — health is created and lived by people within the settings of their everyday life; where they learn, work, play and love. Health is created

by caring for oneself and others, by being able to take decisions and have control over one's life circumstances, and by ensuring that the society one lives in creates conditions that allow the attainment of health by all its members.

Caring, holism and ecology are essential issues in developing strategies for health promotion. Therefore, those involved should take as a guiding principle that, in each phase of planning, implementation and evaluation of health promotion activities, women and men should become equal partners.

Commitment to health promotion — the participants in this conference pledge:

- to move into the arena of healthy public policy, and to advocate a clear political commitment to health and equity in all sectors;
- to counteract the pressures towards harmful products, resource depletion, unhealthy living conditions and environments, and bad nutrition; and to focus attention on public health issues such as pollution, occupational hazards, housing and settlements;
- to respond to the health gap within and between societies, and to tackle the inequities in health produced by the rules and practices of these societies;
- to acknowledge people as the main health resource; to support and enable them to keep themselves, their families and friends healthy through financial and other means, and to accept the community as the essential voice in matters of its health, living conditions and well-being;
- to reorient health services and their resources towards the promotion of health; and to share power with other sectors, other disciplines and, most importantly, with people themselves;
- to recognise health and its maintenance as a major social investment and challenge; and to address the overall ecological issue of our ways of living.

The conference urges all concerned to join them in their commitment to a strong public health alliance.

Call for international action

The conference calls on the World Health Organization and other international organisations to advocate the promotion of health in all appropriate forums and to support countries in setting up strategies and programs for health promotion.

The conference is firmly convinced that if people in all walks of life, non-governmental and voluntary organisations, governments, the World Health Organization and all other bodies concerned join forces in introducing strategies for health promotion, in line with the moral and social values that form the basis of this charter, Health For All by the year 2000 will become a reality.

Charter adopted at an international conference on health promotion*
The move towards a new public health, November 17–21 1986, Ottawa, Ontario, Canada

* Co-sponsored by the Canadian Public Health Association, Health and Welfare Canada, and the World Health Organization.

Source: World Health Organization.

Glossary

ability: ease with which an individual is able to perform a movement or routine. p. 245
acquisition: gaining possession of something. p. 238
acuity: sharpness. p. 245
ad hoc: means impromptu or for a single purpose rather than a coordinated one. p. 116
adaptation: refers to a change in form or structure to suit new conditions or a new environment. p. 450
adenosine triphosphate (ATP): high energy compound that stores and transfers energy to body cells, allowing them to perform their specialised functions, such as muscle contraction. p. 134
adolescence: transition period from childhood to adulthood. p. 274
advertise: to endorse particular brands or products in order to increase the sales for the sponsor company. p. 360
advocating: in relation to health is a combination of individual and social actions designed to speak up for specific groups, gain political commitment, policy support, social acceptance and systems support for a particular health goal or program. p. 559
advocacy: act of championing or arguing for a particular issue or cause. p. 84
aerobic interval training: alternating sessions of work and recovery. The rest period is important in differentiating aerobic interval training from anaerobic interval training. p. 151
aerobic metabolism: breakdown of fuel in the presence of oxygen to produce energy (ATP). p. 144
aerobic threshold: refers to a level of exercise intensity that is sufficient to cause a training effect. This is approximately 70 per cent of a person's maximal heart rate (MHR). p. 166
aerobic training zone: level of intensity that causes the heart rate to be high enough to cause significant training gains. p. 167
agility: ability to move the body from one position and direction to another with speed and precision. p. 245
Alzheimer's disease: progressive mental illness that results in communication blockage between nerve cells, disrupting brain function and corroding memory. p. 59
amateur: someone who participates in a sport or activity without being paid for it. p. 351
amputation: surgical removal of all or part of a limb. p. 66
anaemia: condition in which there is an abnormally low level of haemoglobin, resulting in less oxygen being available to tissues. p. 416
anaerobic: means that the reaction occurs in the absence of oxygen. p. 140
anaerobic glycolysis: process where glucose is broken down in the absence of oxygen to produce energy. p. 140
anaerobic system: functions to enable energy production during the absence of oxygen. p. 467
anaerobic threshold: level of intensity in physical activity where the accumulation of lactic acid in the blood increases very quickly. p. 167
aneurysm: ballooning of the arterial wall due to thinning and weakening. It often results from constant high blood pressure and can lead to a stroke. p. 38
angina pectoris: chest pain that occurs when the heart has an insufficient supply of oxygenated blood. p. 38
anorexia nervosa: an eating disorder accompanied by a progressive loss of appetite and consequent weight reduction beyond acceptable health levels (15 per cent less than normal for age and height). It is accompanied by an intense fear of gaining weight. p. 310
anxiety: predominantly a psychological process characterised by fear or apprehension in anticipation of confronting a situation perceived to be potentially threatening. p. 191
apartheid: (meaning 'separation') was a policy of discrimination by white South Africans against black and coloured African people that was enforced in South Africa from 1948 to 1994. p. 375
appraisal: judgement about the quality of something or somebody. p. 266
arousal: specific level of anxiety and can be experienced prior to and during a performance. p. 194
arteriosclerosis: hardening of the arteries whereby artery walls lose their elasticity. p. 37
associative: connecting or linking ideas. p. 239
asthma: condition characterised by breathing difficulty where there is a reduction in the width of the airways leading to the lungs, resulting in less air being available to them. p. 407

atheroma: thickened area of fatty and fibrous deposits on the inside surface of arteries, resulting in atherosclerosis. p. 37
atherosclerosis: build-up of fatty and/or fibrous material on the interior walls of arteries. p. 36
atrophy: wasting away or decrease in size. p. 176
autonomous: being in full control of actions so they become automatic. p. 239
autonomy: freedom to determine one's own actions or behaviour. p. 296
ballistic stretching: involves repeated movements such as punching and bouncing to gain extra stretch. It should be practised only by elite athletes, and with care. p. 477
basal cell carcinoma: surface skin cancer that originates from the basal cells that underlie the surface cells. It is the most common type of skin cancer. p. 49
body image: attitude or feelings we have about our body and the way we look or the way we think others see us. A person's body image can be positive or negative. p. 308
boycotts: result when a person, organisation or country refuses to deal with another country as a means of protest. p. 373
breast self-examination: preventative action that involves palpating the breast with flat fingers to detect changes or abnormalities in the breast tissue. p. 48
bulimia nervosa: an eating disorder where large quantities of food are ingested at one time (bingeing) and then purged from the body by self-induced vomiting. p. 310
bulk billing: payment option in the Medicare system. The service provider (doctor) bills Medicare directly for the consultation fee, thereby accepting the Medicare benefit as full payment for the service, and the patient pays no fee to the doctor. p. 100
cancer: large group of diseases that are characterised by the uncontrolled growth and spread of abnormal cells. p. 44
capillaries: tiny blood vessels that connect the smallest arteries to the smallest veins. p. 146
carbohydrate loading: technique of loading the muscles with glycogen in preparation for a high-intensity endurance activity of more than 90 minutes. p. 214
carcinogens: cancer-causing agents such as chemicals, pollutants, radiation, cigarette smoke and alcohol. p. 45
cardiac output: amount of blood pumped by the heart per minute. p. 172
cardiovascular disease (CVD): damage to, or disease of, the heart, arteries, veins and/or smaller blood vessels. p. 36
carer: person who, through family relationship or friendship, looks after an older person or someone with a disability or chronic illness. p. 78
chemical energy: energy stored in bonds between atoms. p. 134
chemotherapy: treatment of cancer using chemical agents or drugs that are selectively toxic to malignant cells. p. 98
chiropody: involves diagnosis and treatment of disorders of the foot, ankle and lower leg. p. 87
cholesterol: fatty substance contained in all animal cells. p. 37
chronic disease: one that is ongoing or characterised by long suffering. p. 15
circuit training: requires participants to move from one 'station' to another, performing specified exercises at each until they complete the circuit. p. 151
closed skills: occur in an environment that is stable and predictable. p. 246
cognitive: mental processing of information, thinking and understanding. p. 238
concentration: ability to link movement and awareness to the extent that the individual can focus on doing, rather than on thinking about doing. p. 199
concentric contractions: occur when a muscle shortens, causing movement at a joint. p. 453
concurrent feedback: received during the performance of a skill. p. 257
connectedness: sense of belonging and feeling valued and supported. p. 288
constructs: concepts that have a shared meaning and understanding. p. 391
continuous skills: have no distinct beginning or end. p. 248
contusion: caused by a sudden blow to the body; a bruise. p. 400
cool-down: period of time following physical activity where the body temperature, circulation and respiratory rates are returned to their pre-exercise state (or as close to this state as possible). p. 492
coronary arteries: blood vessels that supply blood to the heart muscle. p. 37
coronary occlusion: heart attack (or myocardial infarction) caused by the sudden and complete blockage of blood and oxygen to the heart muscle, leaving the heart muscle damaged. p. 37
coronary thrombosis: formation of an obstructing clot within a coronary artery that is narrowed by atherosclerosis, possibly leading to a heart attack. p. 37
creatine phosphate (CP): an energy-rich compound that serves as an alternative energy source for muscular contraction. p. 137
cryotherapy: use of cooling to treat injury or quicken recovery from performances, particularly those that involve collisions and/or sustained intensity. p. 232
cyberbullying: deliberate harassment of a person using communications technology, such as texting on mobile phones, by email, on MySpace, Facebook or other chat room sites and websites. p. 324
dehydration: excessive loss of water. pp. 217, 434
delayed feedback: received after the skill has been executed. p. 257
dementia: condition characterised by a significant loss of intellectual abilities such as memory capacity. p. 33

demographic data: arise from statistical studies of the population — its size, structure, distribution and habits. p. 384
determinant: factor that can have an impact on a person's or group's health status, either positively (protective factors) or negatively (risk factors). p. 25
diabetes: (*See also* diabetes mellitus) disease in which the body does not produce or properly use insulin. p. 408
diabetes mellitus: condition affecting the body's ability to take glucose from the bloodstream to use it for energy. p. 64
direct costs: relate to expenditure for construction of venues, wages for workers, technology etc. p. 361
direct injuries: caused by an external force applied to the body, such as a collision with a person or object. p. 396
disability: defined in terms of the lack of ability to perform everyday functions or activities. It refers to limitations in functional abilities. p. 33
discrete skills: have a distinctive beginning and end that can be identified. p. 248
discrimination: unfair treatment of a person or group based on factors such as their sex, race, cultural origins, age and disability. p. 521
disengaging: process of letting go of one's personal or emotional involvement with a situation or belief. p. 332
dislocation: displacement of a bone at a joint. p. 405
distress: pain, anxiety, sorrow or suffering that a person experiences in reaction to a stressful situation. p. 306
distributed practice: (or spaced practice) involves a broken practice session, with the intervals of rest or alternative activities being longer than the practice intervals. p. 253
diuretic: drug that increases the amount of fluid (water and urine) passing from the body. pp. 226, 503
diversity: comprises the differences among individuals and among groups of people. p. 16
drink spiking: intentional addition of alcohol or another drug to a person's drink without their knowledge or consent. p. 326
dynamic flexibility: ability to perform extensive muscular movements causing joints to go through a full range of motion. p. 476
dynamic stretching: uses speed and momentum with movements experienced in a game to increase flexibility. p. 156
eating disorders: characterised by behaviour such as purging, binge eating and starving. The most common eating disorders are anorexia nervosa and bulimia nervosa. p. 415
eccentric contractions: occur when the muscle lengthens while under tension. The action often happens with the assistance of gravity. p. 453
elective procedures: operations that are not classified as emergencies. p. 85
electrocardiogram: graphical recording of the cardiac cycle produced by an electrocardiograph. p. 42
electrolytes: salts and minerals, such as sodium, potassium, calcium and magnesium, that are important for many body functions such as chemical breakdown and nerve conduction. Electrolytes can be lost through perspiration during exercise. p. 217
empathy: ability to understand another person's feelings, or to 'stand in their shoes'. p. 334
empowering: giving people the support needed to achieve a goal. p. 116
empowerment: an individual's ability to make decisions about, or have personal control over, their life. p. 338
enabling: allowing or giving the means for something to be carried through. Forming partnerships with individuals or groups to empower them, through mobilising human and material resources, and using knowledge and skills in order to promote and protect their health. pp. 115, 559
environmental determinants: of health include geographical location, and access to health services and technology. p. 25
epidemiology: study of disease in groups or populations through the collection of data and information, to identify patterns and causes. pp. 4, 522
epilepsy: disruption to brain function, causing a brief alteration to the level of consciousness and resulting in seizures or fits. p. 410
equity: allocation of resources according to the needs of individuals and populations. The goal is to achieve equality of outcomes. p. 85
ergogenic aid: substance or practice that improves or is believed to improve physical performance. p. 226
erythropoietin (EPO): natural hormone that stimulates red blood cell production. p. 501
exercise prescription: specifies what we need to do to achieve a desired level of fitness. p. 420
explosive strength: ability to extend the 'turned on' period of explosiveness. p. 468
external feedback: all feedback other than that which occurs as a normal consequence of performing a skill. It includes various forms of external information, such as suggestions from the coach, video replays, judges' scores and race results. p. 256
externally paced skills: movements for which an external source controls the timing. p. 249
extrinsic or **external motivation:** occurs when the individual's internal state is modified by sources originating from outside the person. p. 189
Fartlek training: (or 'speed play' training), participants vary their speed and the terrain on which they are working, ultimately engaging both anaerobic and aerobic energy systems. p. 150
fast-twitch muscle fibres: (or type II fibres) reach peak tension quickly and are recruited for power and explosive movements such as throwing and lifting. p. 176
feedback: information provided to the learner about the nature or result of their performance. p. 255

fine motor skills: require the use of only small muscle groups to perform the movement. p. 247
flexibility: range through which joints and body parts are able to move. pp. 153, 473
flight or fight response: body's physical and psychological reaction to a dangerous or threatening situation; human instinct is to run away or stay and fight. p. 304
fracture: break in a bone. p. 397
game-centred approach: aims to focus on the whole game and all components, rather than a sequence of basic skills assembled within a game format. The emphasis is on integrating thinking and learning rather than skill development in isolation. p. 250
glycemic index: ranking system for carbohydrates based on how they affect blood sugar level. p. 220
glycogen: storage form of glucose and is used for fuel when blood glucose levels decline. p. 140
glycolysis: process of using glycogen or glucose as fuel. p. 140
goals: are targets that we direct our efforts towards. They can relate to either performance or behaviour. p. 204
gross motor skills: require the use of large muscle groups for execution. p. 247
haemoglobin: substance in blood that binds to oxygen and transports it around the body. p. 174
hard tissue injuries: cause damage to bones and teeth. p. 397
health literacy: ability to understand and interpret health information and use it to promote and maintain good health. pp. 335, 518
health policy: set of formal government statements that define priorities and plans in response to health needs, available resources and other political pressures. p. 559
health priority: issues are those health issues that are of greatest concern to governments and support organisations due to the effect they have on the overall health of Australians and the burden of health on the economy. p. 4
health promotion: combination of science, medicine, practical skills and beliefs aimed at maintaining and improving the health of all people. pp. 112, 558
health status: pattern of health of the population in general over a period of time. p. 4
health-care expenditure: allocation of funding and other economic resources for the provision and consumption of health services. p. 93
heredity: genetic characteristics inherited from our parents. p. 241
holistic: means focusing on the whole patient. Treatments involve the balance and interrelationship between a patient's physical, social, emotional and spiritual needs. p. 104
homophobia: irrational fear of and hostility towards homosexual people. p. 286
hormones: chemical messengers in the body. They are essential for physical growth and maintenance. p. 274
human growth hormone: naturally occurring substance that increases the rate at which amino acids are transported to skeletal muscle cells. p. 499
hydration: supplying sufficient water to the body's cells. p. 212
hyperthermia: excessively high body temperature that is usually experienced in hot, humid conditions in which evaporation is unable to take place. p. 432
hypertrophy: enlargement of muscle fibres in response to exercise. pp. 157, 311
hypothermia: body heat loss that far exceeds body heat gain, resulting in subnormal body temperature. p. 432
immobilisation: restricting movement in the injured area by using splints and bandages. p. 405
impairment: loss or abnormality of body structure or of a physiological or psychological function. p. 5
impunity: sense of being immune from the consequences of certain actions, believing that 'it won't happen to me'. p. 299
incidence: number of new cases of disease occurring in a defined population over a period of time. p. 5
indirect costs: secondary expenditures on transport systems, medical treatment, drug testing etc. p. 361
indirect injuries: injuries caused by an intrinsic force — that is, a force within the body. p. 396
inequities: unfair differences in levels of health status between groups in a society. p. 24
infant mortality: number of infant deaths in the first year of life, per 1000 live births. pp. 10, 523
infrastructure: technical structures that support a society, such as roads, railways, water supply, sewerage, public transport, schools and power grids. pp. 18, 293
inpatient care: care of patients whose condition requires hospitalisation. p. 12
instruments: methods or devices for recording, measuring or controlling. p. 6
insulin: hormone produced by the pancreas that helps glucose to enter the body cells and be used for energy. p. 64
internal feedback: occurs as a normal consequence of performing a skill. It embodies feelings, together with sensory information such as seeing the ball and hearing the sound of a ball hitting the bat. p. 255
intrinsic motivation: motivation that comes from *within* the individual. p. 188
inverted U hypothesis: suggests that performance improves with increasing arousal to a point beyond which performance will deteriorate. p. 194
isometric training: (or static training), muscles develop tension but do not change in length. p. 459
isotonic movements: characterised by muscle shortening and lengthening against resistance. p. 452
keyhole surgery: surgery performed through a very small incision (usually 0.5–1.5 cm), usually using a laparoscope or endoscope, devices for viewing inside the body. p. 97

kilojoule: (or calorie), measures the energy value of food. A calorie is the equivalent of 4.2 kilojoules. p. 134
kinaesthesis: (or kinaesthetic sense), refers to the system of sensitivity that exists in the muscles and their attachments. p. 260
kinship: blood relationship. p. 378
knowledge of performance: information about the pattern of the movement during execution. p. 257
knowledge of results: information about the outcome of a movement. p. 257
lactate inflection point (LIP): point beyond which a given power output cannot be maintained. It is characterised by lactic acid accumulation and decreased time to fatigue. p. 167
lactate threshold: point at which lactic acid accumulates rapidly in the blood. p. 142
lactic acid: by-product of the incomplete breakdown of carbohydrate in the absence of oxygen. p. 137
levy: payment collected by the government from a person's income. p. 101
life expectancy: length of time a person can expect to live. More specifically, it refers to the average number of years of life remaining to a person at a particular age, based on current death rates. p. 13
living conditions: people's everyday environments, including the places where they live, play and work. p. 514
lung capacity: amount of air that the lungs can hold. p. 174
macrocycles: long-term planning periods or overviews. p. 487
malignant melanoma: cancer of the body cells that contain pigment (melanin) and mainly affects the skin. p. 49
mammographic screening: using a special x-ray of glands, fat and blood vessels under the skin of the breast to identify any variations from the normal or healthy tissue. p. 48
manliness: tendency to show particularly male characteristics. p. 350
massed practice: continuous practice session, with the rest intervals being shorter than the practice intervals. p. 253
mechanical energy: motion or movement energy. p. 134
mediating: working to bring about consensus and reconciling the different interests of individuals, communities and sectors in a way that promotes and protects health. p. 559
medicare: Australia's public-funded universal health-care system, ensuring all Australians have access to free or low-cost medical, optometric and hospital care. pp. 12, 100
mental rehearsal: technique of picturing the performance or skill before executing it. p. 202
mentor: wise or trusted adviser. p. 331
metabolism: sum of all chemical processes within cells that transforms substances into energy. p. 141
metastases: secondary or new tumours, which may develop some distance from the original malignant tumour. p. 44
microcycles: short training cycles containing specific details and usually cover a period of about 7–10 days. p. 487
minerals: inorganic substances found in the body that are necessary for it to function adequately. p. 223
mole: gram-molecular weight of a substance. 1 mole (mol) = 1000 millimoles (mmol). p. 141
morbidity: incidence or level of illness or sickness in a given population. pp. 11, 280, 523
mortality: number of deaths in a given population from a particular cause and/or over a period of time. pp. 7, 280
motivation: an internal state that activates, directs and sustains behaviour towards achieving a particular goal. p. 186
multiculturalism: coexistence of groups in a society representing different cultural and linguistic backgrounds. p. 16
muscle hypertrophy: term that refers to muscle growth together with an increase in the size of muscle cells. pp. 157, 175
muscular Christianity: was a concept of a healthy body combined with fine morals including sportsmanship, playing by the rules, and leading an actively Christian life. p. 350
myocardial infarction: heart attack that is usually due to the complete blockage of a coronary artery and results in the death of some heart tissue. p. 37
natural increase: difference between the number of live birth and deaths over a year. p. 73
negative motivation: characterised by an improvement in performance out of fear of the consequences of not performing to expectations. p. 187
negotiation: process in which two or more parties rationally discuss a problem and, through compromise, come to an agreement that adequately satisfies the needs of all those involved. p. 333
neoplasm: abnormal mass of cells that forces its way among healthy cells and interferes with their normal functioning. p. 44
net overseas migration: difference between total arrivals and total departures. p. 73
norms: standards and behaviours accepted by society. These norms can vary between different cultures. p. 297
objectivity: extent to which a measure or test is independent of the observer. p. 263
open skills: occur in an environment that is unpredictable and frequently changing. p. 246
optometry: health-care profession that addresses problems with eyes and vision. p. 87
organic foods: foods produced without using commercial chemicals such as pesticides and fertilisers. p. 104

osteoporosis: type of musculoskeletal condition in which there is deterioration in the bone structure. The bones become thin and weak, leading to an increased risk of bone fracture. p. 414
Ottawa Charter for Health Promotion: document that represents a global approach to health promotion by the World Health Organization. It aims to enable people to increase control over and improve their health. It outlines prerequisites for health. p. 562
overtraining: chronic psychological and physiological condition caused by training loads that are too demanding for an athlete to manage. p. 496
overuse injuries: injuries caused by overuse of specific body regions over long periods of time. p. 398
oxygen uptake: ability of the working muscles to use the oxygen being delivered. p. 173
pap smears: screening tests to detect cervical cancer cells by taking a sample of cells from the cervix. p. 29
parasuicide: an attempted suicide that is not fatal and is often impulsive. p. 60, 284
part practice method: applied when a skill is broken into smaller components and each discrete subskill (subroutine) is practised separately. p. 254
party crashes: or 'gatecrashers' are unwanted and uninvited individuals or groups at a social gathering. p. 325
patriotism: devotion to one's country and a willingness to defend it. p. 350
PBS Safety Net: scheme that caps the amount a family will pay for PBS subsidised medications in a calendar year. p. 87
peaking: phase of training in which performance is optimised to meet the demands of a race, competition or series. p. 490
periodisation: process of structuring training into manageable phases. p. 485
peripheral vascular disease: result of reduced blood flow to the legs and feet, usually due to atherosclerosis and/or arteriosclerosis. p. 39
personal criteria: preconceived ideas or expectations that an individual brings to judge a performance. p. 265
personality: an individual's characteristic way of behaving. p. 241
Pharmaceutical Benefits Scheme (PBS): Commonwealth Government program that provides subsidised prescription drugs to Australian residents, ensuring affordable access to a range of essential medicines. p. 87
plyometrics: special range of exercises in which a muscle is lengthened using an eccentric contraction. This is rapidly followed by a shortening or concentric contraction. pp. 166, 469
pNF stretching: progressive cycle incorporating a static stretch, an isometric contraction and a period of relaxation in the lengthened position. It is aimed at stretching and strengthening muscle in a safe movement. p. 155
positive motivation: occurs when an individual's performance is driven by previous reinforcing behaviours. p. 187
power: rate at which force is produced per unit of time. p. 467
pre-screening: assessment of the health status of a person before they become involved in a training program. p. 420
prescribed criteria: established by a sports organisation or body and form the basis of assessment for competitions in that sport or activity. p. 265
prevalence: number of cases of disease that exists in a defined population at a point in time. p. 5
proactive recovery: immediate refuelling and rehydration that continues until a pre-event state is obtained. p. 220
professionals: players who receive payment for playing a sport or make it their livelihood. p. 351
propaganda: organised release of ideas, information or arguments in order to further a cause or damage an opposing cause. p. 373
psychiatric hospitals: hospitals that care for patients diagnosed with mental illness. p. 86
puberty: stage in the life cycle when rapid physical changes occur that signify that a person has reached sexual maturity. p. 274
rehabilitation: process of restoring a part of the body or a person to near normal function after an injury or disease. p. 20
relaxation techniques: techniques that seek to control the body's response to stress. p. 203
reliability: degree of consistency of a test — that is, the ability of the test and tester to produce the same results on successive occasions. p. 265
reorienting: adjusting a position, direction or approach to suit particular circumstances. p. 121
residential care: care given to a patient away from their home. It takes into account the needs and wishes of the person. An example of high level residential care is a clinic that provides help and treatment to sufferers of anorexia. p. 89
resilience: capacity to recover quickly from depression, illness or misfortune, ability to 'bounce back' after difficult times or bad experiences. pp. 62, 274
respiration: process of breathing. p. 146
resting heart rate: number of heartbeats per minute while the body is at rest. p. 170
resynthesis: process of restoring ATP to its former state. p. 136
sanitation: relates to cleanliness and involves action taken to protect people from illness, the transmission of disease or loss of life due to unclean surroundings or practices. p. 11
scenario: situation or scene. p. 251
schizophrenia: affects the normal functioning of the brain. It is characterised by psychotic symptoms and a reduced range of expressions of emotion. p. 57
self-confidence: firm belief in one's own ability. p. 243

self-efficacy: person's degree of confidence in being able to carry out a particular task. p. 327
self-esteem: feeling or opinion (negative or positive) one has about oneself. p. 297
self-harm: can include attempted suicides that did not result in death, self-mutilation, substance abuse or general risk taking. p. 288
self-identity: picture you have of yourself, and it is made up of your thoughts, feelings, emotions and past experiences. p. 296
self-paced skills: movements for which the performer determines the timing and speed of execution. p. 249
self-sufficiency: ability to provide for oneself without help from others. p. 298
self-worth: value a person places on his or her own importance. p. 296
serial skills: involve a sequence of smaller movements that are assembled to make a total skill. p. 248
sexism: upholding of attitudes that stereotype people according to their gender, rather than judging them on individual merits. p. 356
silent infarction: heart attack without the typical symptoms. p. 38
slow-twitch muscle fibres: or type I fibres contract slowly and for long periods of time. They are recruited for endurance-type activity such as marathons. p. 176
social action: any deliberate activity aimed at enhancing the well-being of others and oneself by acting collectively and bringing about change. p. 342
social exclusion: occurs when a community or group shows bias against particular individuals, which results in them being excluded or feeling left out. p. 520
social justice: value that favours the reduction or elimination of inequity, the promotion of inclusiveness of diversity, and the establishment of environments that are supportive of all people. pp. 15, 559
socialisation: lifelong process of learning through which we inherit the culture of our society — norms, values, gender roles and expectations. p. 297
sociocultural determinants: of health include family, peers, media, religion and culture. p. 25
socioeconomic determinants: of health include employment, education and income. p. 25
socioeconomic status: measure of an individual's place in society, based on their income, education, employment and other economic factors such as house and car ownership. pp. 28, 91, 290
soft tissue injuries: injuries to all tissue other than bones and teeth. p. 397
somatotype: person's body type or shape (ectomorphic, mesomorphic or endomorphic). p. 242
sponsorship: involves an organisation covering all or part of the costs of the competition or activity in return for advertisement of their product and other rights. p. 358
sprains: arise from the stretching or tearing of a ligament. p. 399
squamous cell carcinoma: surface skin cancer that originates in the squamous or surface cells. It is the fastest growing form of skin cancer. p. 49
starting strength: ability to 'turn on' as many muscle fibres as possible in the performance of a movement. p. 468
static stretching: safe form of stretching in which the stretch is held for a period of 10–30 seconds. pp. 154, 476
steroids: derivatives of the male sex hormone testosterone and cause development of masculine characteristics. p. 500
stigma: mark of shame or disapproval. p. 334
strains: occur when a muscle or tendon is stretched or torn. p. 399
strength: ability of a muscle or muscle group to exert a force against a resistance. pp. 157, 450
strength training: general term that encompasses all types of exercise designed to improve strength and increase muscle size. p. 450
stress: physiological or psychological influence that produces a state of tension in a person. pp. 193, 303
stress fractures: small incomplete bone fractures caused by repeated pounding, usually on hard surfaces. p. 398
stretch reflex: an involuntary muscle contraction that prevents fibre damage if muscles are lengthened beyond their normal range. p. 155
stroke: results from a blockage of the blood flow to the brain. p. 38
stroke volume: amount of blood ejected by the left ventricle of the heart during a contraction. It is measured in mL/beat. p. 171
subjective observation: judgement of performance quality based on feelings, impressions or opinions rather than a measurement system. p. 263
subroutines: individual components that collectively comprise a skill. p. 479
suicide: an intended self-inflicted injury that is fatal. pp. 60, 306
support structures: people, places and programs that increase an individual's ability to make health-promoting choices. p. 299
supportive environments: places in which people live, work and play and that protect them from threats to health and allow them to make health-promoting choices. p. 342
tapering: period immediately before competition when the volume and intensity of training is reduced. pp. 215, 490
temporal patterning: ability to execute the subroutines in correct sequence. p. 479
thermoregulation: maintenance of a stable internal temperature independent of the temperature of the environment. p. 411
traits: characteristics or observable features of a person. p. 241
tumour: swelling or enlargement caused by a clump of abnormal cells. p. 44
validity: honesty of a test — that is, the degree to which it measures what it is supposed to measure. p. 264

vasoconstriction: decrease in blood vessel size, causing less blood to be supplied to the area that is serviced by that blood vessel. p. 432

vitamins: inorganic compounds that are essential to maintaining bodily functions. p. 222

volunteer: person who offers to perform a service for the community on a voluntary basis. p. 78

whole practice method: applied when a skill is practised in its entirety. p. 254

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