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LEVEL 1/2
TECHNICAL
AWARD

HEALTH AND FITNESS

SECOND
EDITION

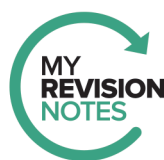
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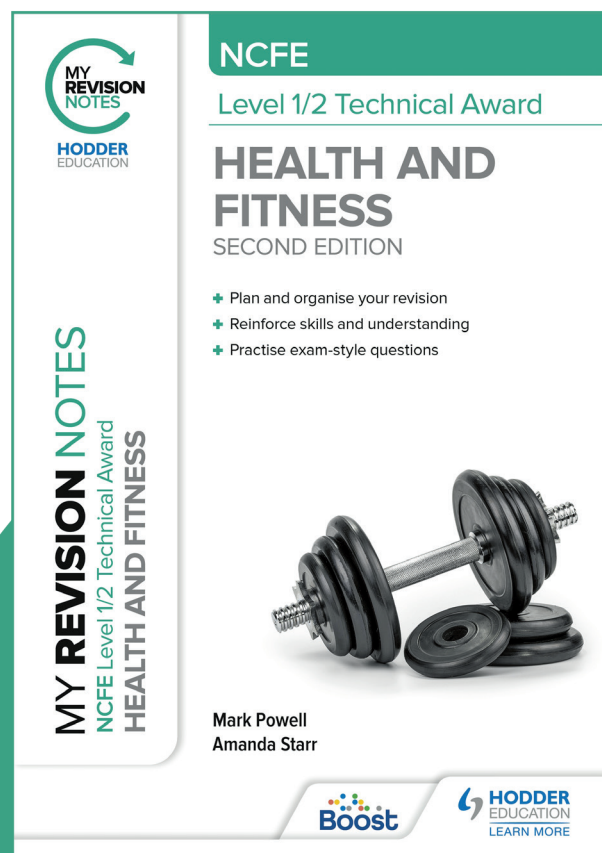
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INTRODUCTION

The NCFE Level 1/2 Technical Award in Health and Fitness focuses on the health and fitness sector. It will help you to build the knowledge, understanding and skills you will need to pursue a career in the sector or move on to further study. It combines the study of core knowledge with practical experience and hands-on learning.

In this course you will learn about the structure and function of body systems as well as gaining an understanding of the principles of training and how fitness activities affect the body. You will learn how to develop and test components of fitness (including health and skill-related fitness), carry out a health and fitness analysis and how to create a fitness programme.

Content areas

You must study each of the eight different content areas as part of the qualification:

- Content area 1: Structure and function of body systems
- Content area 2: Effects of health and fitness activities on the body
- Content area 3: Health and fitness and the components of fitness
- Content area 4: Principles of training
- Content area 5: Testing and developing components of fitness
- Content area 6: Impact of lifestyle on health and fitness
- Content area 7: Applying health and fitness analysis and setting goals
- Content area 8: Structure of a health and fitness programme and how to prepare safely

How will I be assessed?

You will complete two assessments:

- 1 **Non-exam assessment (NEA):** this is an externally-set project that is worth 60 per cent of your total grade for the qualification. You will be assessed on your ability to draw together and apply the knowledge, understanding and skills you have learned throughout the course. Your teacher will provide you with a brief set by NCFE, which will be based on a real-world situation. You will have 22 hours to complete this assessment.
- 2 **Written exam:** the written exam will last 1 hour and 30 minutes and will include a mixture of multiple-choice, short-answer and extended-response questions, which will assess your knowledge and understanding of all content areas. The paper will be worth 80 marks in total and the exam is worth 40 per cent of your overall grade. You will complete the written exam at the end of the course.

You will be assessed against the following assessment objectives:

Assessment Objectives (AOs)	Approximate NEA weighting (%)	Approximate exam weighting (%)
A01 Recall knowledge and show understanding	7%	40–45%
A02 Apply knowledge and understanding	17%	35–40%
A03 Analyse and evaluate knowledge and understanding	23.5%	20–25%
A04 Demonstrate and apply relevant technical skills, techniques and processes	36%	N/A
A05 Analyse and evaluate the demonstration of relevant technical skills, techniques and processes	16.5%	N/A
TOTAL	60%	40%

The following grades are available for the qualification:

- Level 1 Pass, Merit and Distinction
- Level 2 Pass, Merit, Distinction and Distinction*

You will need to achieve a minimum of a Level 1 Pass in both the NEA and the written exam to achieve the overall qualification.

HOW TO USE THIS BOOK

This book is designed to help you develop the knowledge, understanding and practical skills you will need during the NCFE Level 1/2 Technical Award in Health and Fitness course.

A range of different features appear throughout the book to support your learning.

Getting started

Short activities at the start of each content area introduce you to the topic.

1 Structure and function of body systems

About this content area

In this content area you will learn about the body's systems, their structures and how they function.

This will include:

1.1 Skeletal system	1.4 Cardiovascular system
1.2 Muscular system	1.5 Energy systems
1.3 Respiratory system	

Getting started

Work with a partner. Take it in turns to name and point to any of the following on the body:

- any bone
- any joint
- any major muscles.

1.1 Skeletal system

The skeletal system forms the framework of the body. It includes the bones of the skeleton and the joints between bones that allow movement.

1.1.1 Structure of the skeleton

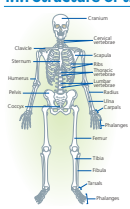


Figure 1.1 The skeleton

About this content area

At the start of each content area you will find an introduction to the content area and a list of the topics you will learn about.

Activities

Short activities appear throughout the book. These may be individual, group or research tasks which will help you to develop your understanding of an idea. Some activities have extension tasks or research tasks to develop your understanding further.

Read about it

Throughout each content area you will find references to further reading and links to other sources of useful information.

Case studies

Case studies show how health and fitness concepts can be applied to real-world situations. They include questions to help you think about the ideas covered.

Test your knowledge

At the end of sections in a content area you will find short questions to test your knowledge and understanding. Answers are provided online at hoddereducation.co.uk/vcerts-2022/answers.

Remember

A bullet list summary appears at the end of sections to help you remember the most important points and to help with revision.

Practice questions

Practice questions at the end of each content area help you to prepare for the written exam. Answers are provided online at hoddereducation.co.uk/vcerts-2022/answers.

Key terms

Definitions for all of the important terms are provided.

Assignment practice

This feature appears at the end of each content area and will help you to prepare for the non-examined assessment (NEA). Answers are provided online at hoddereducation.co.uk/vcerts-2022/answers.

1 Structure and function of body systems

Remember

- Arteries mainly carry oxygenated blood away from the heart.
- Veins mainly carry deoxygenated blood towards the heart.
- Veins have valves.
- Capillaries are thin-walled to allow for gaseous exchange.

Read about it

Read about blood and vessels etc. www.bbc.co.uk/1/health/2012/03/120312_blood_vessels.shtml

Test your knowledge

- List the main features of arteries, veins and capillaries.
- Describe the different functions of arteries, veins and capillaries.

Key terms

Vasodilation: reducing the diameter of small arteries to increase blood flow to tissues.

Vasoconstriction: increasing the diameter of small arteries to increase blood flow to tissues.

Vascular shunt mechanism: a function that directs blood to where there is greater demand.

1.4.2 Blood redistribution

Small arteries have muscular walls that can adjust their diameter to increase or decrease blood flow to a particular part of the body. When the rings of smooth muscle in the small arteries contract, it narrows those arteries and reduces the flow of blood through that artery. This is called vasoconstriction.

The small arteries can also widen (vasodilate) to allow more blood to flow through that artery to the tissues. Vasodilation occurs during exercise to allow more blood to flow to the exercising muscles. Moving blood to those parts of the body, such as the muscles, that have a greater demand for blood is called the vascular shunt mechanism.

The vascular shunt mechanism will direct the flow of blood to those muscles of the body involved in health and fitness activities, such as the leg muscles during running. At the same time, less blood will be directed towards other parts of the body where demand for blood is not as great, for example inactive muscles and organs such as the kidneys and the stomach.

Remember

- The vascular shunt mechanism redirects blood to where it is in demand through vasoconstriction and vasodilation.

1.4.3 Structure of the heart

The heart is a muscular organ about the size of a closed fist that pumps blood around the body. It is divided into separate left and right sides and each side has an upper and a lower chamber. The upper chambers are the atria, which collect blood from veins, and the lower chambers are the ventricles, which pump out blood through the arteries.

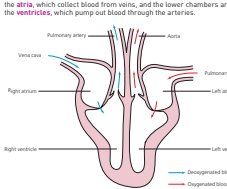


Figure 1.4.3 Structure of the heart

The right side of the heart takes in deoxygenated blood from the vena cava and passes the blood into the right atrium. This blood then flows into the right ventricle before it is pumped out of the heart, along the pulmonary artery to the lungs for oxygenation.

The newly oxygenated blood returns from the lungs in the pulmonary vein and the blood flows into the left atrium. The blood travels down into the left ventricle before it is pumped out of the heart through the aorta to provide oxygen and nutrients to the body tissues.

The left and right sides of the heart are separated by the septum which means that the oxygenated blood on the left side of the heart cannot mix with the deoxygenated blood on the right side of the heart.

In general, blood flows into the heart from a vein, goes into an atrium, then a ventricle and out through an artery. Blood is prevented from flowing in the wrong direction by valves at the exit from each chamber. There is a tricuspid valve on the right side of the heart preventing blood going from the right ventricle back into the right atrium.

Key terms

Atrium: upper chamber of the heart that receives blood from veins.

Ventricles: lower chambers of the heart which pump blood out of the heart to the arteries.

Vena cava: blood vessel carrying deoxygenated blood from the body to the right atrium.

Right atrium: heart chamber receiving oxygenated blood from the pulmonary vein.

Right ventricle: heart chamber pumping deoxygenated blood into the pulmonary artery.

Pulmonary artery: blood vessel carrying deoxygenated blood from the right ventricle to the lungs.

Pulmonary vein: blood vessel carrying oxygenated blood from the lungs to the left atrium.

Left atrium: heart chamber receiving deoxygenated blood from the vena cava.

Left ventricle: heart chamber pumping oxygenated blood into the aorta.

Aorta: blood vessel carrying oxygenated blood from the left ventricle to the body.

Septum: separates the right and left sides of the heart.

Tricuspid valve: prevents backflow of blood from the left ventricle.

6

Impact of lifestyle on health and fitness

About this content area



In this content area you will learn what is meant by the term lifestyle and the impact that lifestyle has on a person's health and fitness.

This will include:

- 6.1** Lifestyle factors
 - 6.1.1** Activity levels
 - 6.1.2** Diet
 - 6.1.3** Rest and recovery
 - 6.1.4** Other factors

6.1 Lifestyle factors

Lifestyle is the way in which a person chooses to live their life. Choices are available in how a person lives their life, but sometimes some factors are outside their control.

6.1.1 Activity levels

A person's lifestyle involves a series of choices. For example, their lifestyle can be either active, healthy and sociable, or the complete opposite, inactive, unhealthy and unsociable. It is largely a person's choice how they choose to lead their life.

There are, of course, many factors that could affect a person's lifestyle choices. Some of these are suggested below:

- how much disposable income (spare money to spend after essentials) a person has
- where they live
- family and friends and their lifestyle choices
- opportunities and facilities available
- education levels.

Lifestyle and National Health Service guidelines

A person who has a lifestyle that involves little or no exercise is adopting a **sedentary lifestyle**. A person who adopts a sedentary lifestyle increases their chances of developing illness and/or poor health and wellbeing.

Getting started

Consider how active you are in your life. Do you exercise regularly and do you manage to eat a healthy and balanced diet? How well do you sleep?

Key terms



Lifestyle: refers to the choices we make about how we live our lives.

Sedentary lifestyle: when a person gets little or no exercise.

Key terms



National Health Service (NHS): a medical and healthcare service funded by the UK government.

Active lifestyle: when a person gets suitable levels of exercise.

Moderate aerobic exercise: activity that involves getting warmer and breathing harder; the heart beats faster, but it should still be possible to talk to other people comfortably.

Vigorous exercise: activity that involves getting warmer and breathing much harder; the heart beats much faster, making it very difficult to talk to other people.

Strength exercise: activity that involves resistance against muscles to cause strength gains.

The **National Health Service (NHS)** gives guidelines on exercise and how to follow an **active lifestyle**.

All NHS guidelines are based on four different age ranges:

- early childhood (under 5 years old)
- children and young people (5–18 years old)
- adults (19–64 years old)
- older adults (65 and over)

The NHS guidelines advise that adults need to do two types of physical activity each week in order to stay healthy or improve their health. These include:

- **moderate aerobic exercise** or **vigorous exercise**
- **strength exercise**.

The amount of aerobic and strength exercise depends on a person's age and physical condition.

Examples of aerobic exercise include:

- brisk walking
- hiking
- pushing a lawn mower
- playing team sports recreationally
- cycling.



Figure 6.1 Going for a long ride on a bicycle is an example of moderate to vigorous exercise

Examples of strength exercises include:

- lifting weights
- using resistance bands (stretchy rubber bands)
- heavy gardening
- using your own body weight, for example sit-ups or press-ups.



Figure 6.2 Using resistance bands to improve strength

NHS guidelines suggest that vigorous exercise, which makes a person breathe faster and makes their heart work harder, may have twice as many health benefits as moderate aerobic exercise. Examples include swimming, running, martial arts or team sports. One example of an NHS initiative towards planning a vigorous workout is called 'Couch to 5k', which aims to slowly improve a person's cardiovascular fitness over a period of nine weeks.

The NHS sets out suggested amounts of exercise that people should follow for their age. These can be found at: www.nhs.uk/live-well/exercise/. There is also a factsheet available on the NHS website at: www.nhs.uk/Livewell/fitness/Documents/adults-19-64-years.pdf.

For adults aged 19–64 years, there are several suggested variations of exercise for a suitable active lifestyle. These are shown in Figure 6.3.

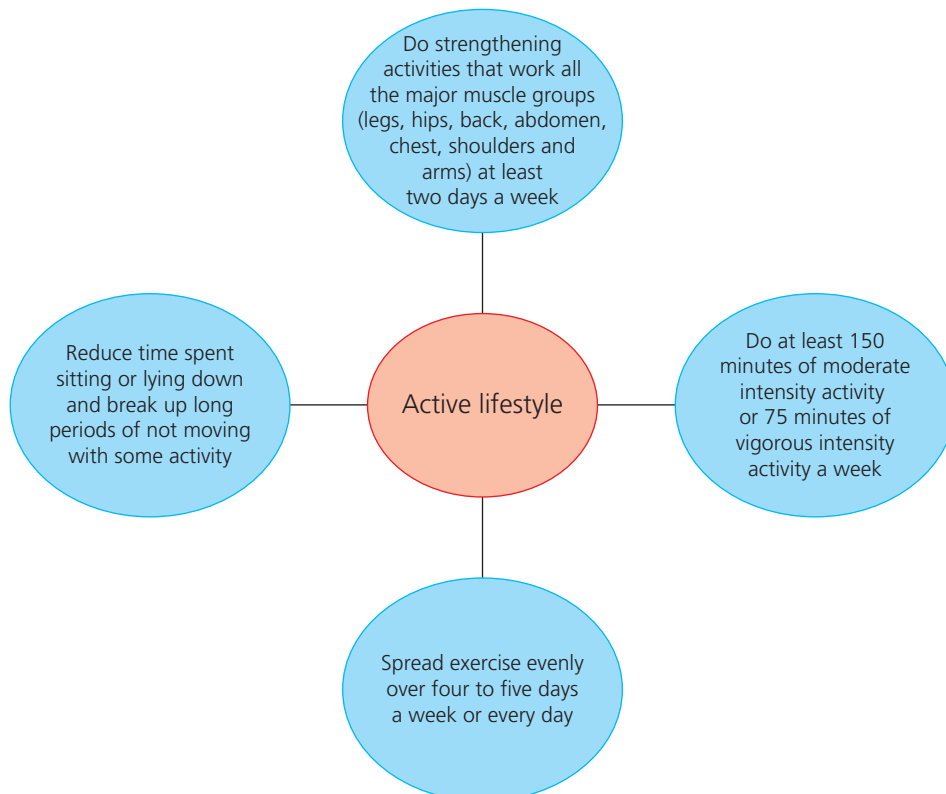


Figure 6.3 Following an active lifestyle (adults)

Read about it



Read about the benefits of vigorous exercise: <https://www.healthline.com/health/strenuous-exercise>

Activity



Read the NHS guidelines for 5–18-year-olds: www.nhs.uk/live-well/exercise/physical-activity-guidelines-children-and-young-people/

Make a poster to display in your classroom that summarises how much activity a typical 5–18-year-old should achieve in a week.

Then, keep a week-long diary of how much exercise you complete and compare your activity levels against the suggested guidelines.

Do you meet the NHS guidelines for your age range?

Remember



- The NHS suggests how much activity should be completed per week for different age groups.
- Suggested activity levels are designed to help people to live a healthy lifestyle.

Test your knowledge

- 1 What is meant by the terms: 'lifestyle', 'active lifestyle' and 'sedentary lifestyle'?
- 2 Give examples of moderate aerobic exercise, vigorous exercise and strength exercise.

6.1.2 Diet

Key term



Balanced diet: a diet that contains all of the nutrients that the body needs.

A person's diet is simply what they eat and drink. Their diet can be altered and controlled for specific purposes, such as improving health, losing or gaining weight, or ensuring that enough energy will be available for activity. Ideally, a person should eat a **balanced diet**, which gives the body the nutrients it needs.

Nutrients

A nutrient is a substance that is essential for our bodies to grow, repair and work properly. It provides nourishment to the body.

A breakdown of what each nutrient contributes within the body is shown in Table 6.1 on the next page. The table also shows food sources for each nutrient.

Table 6.1 Nutrients and their contributions to the body

Nutrient	Specific needs	Food sources
Carbohydrates	<p>Main and preferred energy source for all types of activity</p> <p>Works as a fuel for muscular contractions, acting as the main fuel for medium- to high-intensity exercise (anaerobic activity [see Section 1.5], at 80% or higher of maximal heart rate)</p> <p>Provides energy for lower-intensity exercise (aerobic activity, at 60% or lower of maximal heart rate)</p> <p>Particularly useful for exercise lasting anything between one minute and two hours</p>	Provided by bread, pasta, rice, potatoes and starch-based foodstuffs
Fats	<p>Energy source</p> <p>Required for low-intensity energy (aerobic activity, at 60% or lower of maximal heart rate)</p> <p>Provides insulation</p> <p>Comes in two forms:</p> <ul style="list-style-type: none"> ■ saturated fat (usually animal fat) ■ unsaturated fat (vegetable fat/oils) <p>Remember: saturated fats are not as good as unsaturated fats. Saturated fats in the bloodstream can stick to arteries and clog them up, making it harder for blood to flow freely and unobstructed.</p>	Saturated fats are provided by butter, cheese, cakes, sausages, bacon, etc. Unsaturated fats are provided by avocados, nuts, seeds, etc.
Protein	<p>Has a small part to play in energy</p> <p>Required for tissue growth and repair</p>	Provided by fish, meat, eggs, dairy products and nuts
Vitamins	<p>Organic substances that are vital for essential processes in the body</p> <p>Vitamin A helps with the structure and function of the skin</p> <p>Vitamin B helps with energy levels, brain function and cell metabolism</p> <p>Vitamin C helps the immune system, skin elasticity and blood vessel function</p>	Provided by fruit, vegetables and other elements of a balanced diet (for example, Vitamin A is found in milk and yoghurt; Vitamin B is found in wholegrain breads and nuts; Vitamin C is found in citrus fruit, broccoli and peppers)
Minerals	<p>Inorganic substances that are required for bone growth and the maintenance of regular body functions</p> <p>Calcium is good for bone formation</p> <p>Iron is good for growth and development</p> <p>Magnesium is good for muscle and nerve function</p>	Provided by dairy, cereals, meat, fish, bread, fruit and vegetables
Fibre	<p>Required to reduce cholesterol and helps to soften stools to prevent constipation</p>	Provided by foods that come from plants (for example, oats, barley, wholemeal bread, potatoes and cereals)
Water	<p>Required to prevent dehydration</p> <p>Approximately six to eight glasses should be drunk in an average day – around 1.2 litres</p>	

Key terms

Vitamins: organic substances required for many of the body's essential processes.

Minerals: inorganic substances that assist the body with many of its functions.



Read about it



Read about the importance of fibre in the diet: www.nhs.uk/live-well/eat-well/how-to-get-more-fibre-into-your-diet/



Figure 6.4 Fruit and vegetables provide the body with vitamins and minerals

Activity



Write down what you consumed in your last full meal. Label each foodstuff or liquid, such as carbohydrate, fat, protein, fibre or water, according to what they mainly contain.

Balanced diet in relation to NHS guidelines

The NHS suggests that a truly balanced diet is one where all the nutrients are obtained in the correct quantities from a range of different foodstuffs. To have a balanced diet, an individual should consume approximately:

- 55–60 per cent carbohydrates
- 25–30 per cent fat
- 15–20 per cent protein.

The Eatwell Guide

It is important to include all the necessary nutrients in a diet. The Eatwell Guide, published by Public Health England – see Figure 6.5 on the next page – recommends that all adults eat:

- at least five portions of fruit and vegetables a day
- two portions of oily fish a week
- starchy carbohydrates that amount to approximately one-third of the daily intake
- only very small amounts of chocolate and sweets.



Figure 6.5 The Eatwell Guide. Crown copyright

Current recommended daily allowance

General NHS guidelines recommend that the average adult male should consume approximately 2500 **kcal** per day and the average adult female 2000 kcal per day. This is known as the **recommended daily allowance (RDA)**. As a term, the recommended daily allowance also refers to the recommended amount of nutrients the body needs. An average adult (19–64 years old) is recommended to eat:

- less than 70g of fat per day
- less than 20g of saturated fat per day
- at least 260g of carbohydrate
- no more than 90g of sugars (although no more than 30g of 'free sugars' included in sweets, fizzy drinks and so on)
- approximately 50g of protein
- less than 6g of salt.

Key terms

Kcal: kilocalorie, the term used to represent one unit of food energy.

Recommended daily allowance (RDA): the number of calories or nutrients it is recommended that a person consumes on an average day. The recommended daily allowance of calories for men is 2500 kcal per day and 2000 kcal per day for women.

Activity

Create a poster to display a suitably healthy and balanced meal, labelling each foodstuff and why it is important.



The food pyramid in Figure 6.6 shows the varying nutrients that are required in a diet. It can be used to point out to someone what nutrients may need to be increased or decreased in order to follow a truly balanced diet. Items like foods and drinks high in fat, sugar or salt should not be consumed every day.



Figure 6.6 The food pyramid

There are some very simple suggestions that often help change dietary routines. For example, portion sizes in meals should be appropriate and not too large. The NHS provides guidelines on portion sizes which can be viewed here: www.nhs.uk/Livewell/Goodfood/Pages/reference-intakes-RI-guideline-daily-amounts-GDA.aspx

Hydration

Key term



Hydration: having enough water within the body to enable it to function normally.

Hydration refers to having enough water within the body to enable it to function normally. Being hydrated means that the body has a suitable water balance and helps with lubrication and temperature control within the body. Most adults need to consume approximately eight large glasses of water a day; however, the amount of water a person needs to consume will depend on:

- what activity they take part in
- how hot and humid the climate is.



Figure 6.7 It is recommended that adults drink eight glasses of water a day

Dehydration

When someone suffers from excessive loss of water in the body, it can lead to **dehydration**. This can interrupt the functioning of the body and can cause harmful effects, such as:

- blood thickens and slows down
- heart rate increases (the heart works harder)
- body temperature rises and overheating can occur
- reaction time increases (your reaction is slower)
- decision-making becomes slower
- muscle fatigue and cramps.

If dehydration occurs, a performer must **rehydrate** (consume water to restore hydration).

Energy expenditure

A balanced diet involves consuming a suitable number of calories to satisfy energy demands.

The **energy balance** refers to the relationship between the calories consumed and the calories burned (used). The amount of calories consumed can result in the following outcomes:

- Energy is balanced: the calories consumed equal the amounts needed and no weight is put on or lost.
- Positive energy balance: the calories consumed are greater than those needed, resulting in weight gain.
- Negative energy balance: the calories consumed are fewer than those needed, resulting in weight loss.

Key terms



Dehydration: excessive lack of water in the body.

Rehydrate: consumption of water to restore hydration.

Energy balance: the relationship between the amount consumed and the amount required.

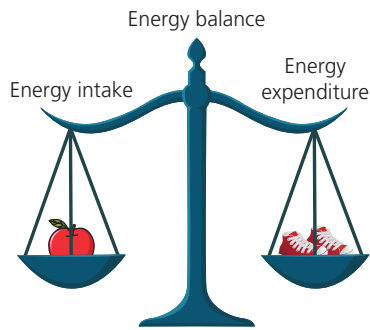


Figure 6.8 Energy balance refers to the balance of what a person consumes (calories) compared to what they use

The required energy intake depends on what kind of lifestyle a person leads. For example, a job that requires manual labour (such as a construction worker) requires more energy, whereas a sedentary office-based job requires less.

Similarly, suitable nutrition and a balanced diet can be different for different types of physical activity. For example:

- Carbohydrates are consumed in larger quantities than normal before endurance events like a long run. This is called carbohydrate loading.
- Protein is consumed after exercise to assist in muscle growth and repair, for example after a training workout.
- Water needs to be consumed in greater quantities by people doing exercise or leading an active lifestyle.

Activity

Look at the following list of jobs. Which jobs do you think would require the highest consumption of calories to maintain an energy balance? Justify your answers to a partner.

Jobs

PE teacher
Office worker
Checkout assistant
Electrician
Gardener



Figure 6.9 Manual jobs tend to require more calories than jobs where someone is sitting down

Test your knowledge

- 1 What are carbohydrates, fats and proteins for?
- 2 Carbohydrates are particularly important as a source of energy for which one of the following:
 - a low-intensity activities
 - b low- to medium-intensity activities
 - c medium-intensity activities
 - d medium- to high-intensity activities
- 3 Why is it important to include minerals in a balanced diet?
- 4 What is meant by RDA?

6.1.3 Rest and recovery

Rest

Rest is vital for everyone, but it becomes even more important after periods of exercise, because it allows for **recovery**. Rest is when a person undertakes little or no exertion, while recovery is what a person does to allow the body to repair. Therefore, rest can be an intended action to allow recovery.

Sleep

Sleep is a vital component of a person's rest. The NHS suggests that people should aim to get from six to nine hours of sleep per night and try to relax before going to bed.

There are many aspects of a person's health and wellbeing affected by the amount of sleep they get. The acronym HEAL will remind you of the main variables affected by good or bad sleep. HEAL stands for:

- **Health:** mental health can be affected by a lack of sleep. People who worry a lot tend to not sleep well. Equally, physical health is affected by sleep, as a good night's sleep helps the body to recover and repair, ready for the day and exercise ahead: micro-tears in muscles are repaired and lactic acid is gradually broken down.
- **Environment:** temperature, noise levels and light all play a part in a person's ability to sleep. Most people sleep better when it's dark and not too hot or noisy.
- **Attitude:** people with a positive attitude towards sleep tend to sleep better. Also, a good night's sleep makes people have a better attitude towards what they are doing in the day.
- **Lifestyle:** what a person eats and drinks can affect their sleep. Alcohol and caffeinated drinks do not help sleep patterns.

Cool-down

A cool-down after exercise helps with the initial stages of recovery. This involves maintaining an elevated breathing rate and heart rate, before slowly reducing the intensity. An example is jogging where you slow down to a light jog and then to a walking pace. Cooling down should also include some stretching. The main benefits include:

- the body starts to recover after exercise
- waste products like carbon dioxide and lactic acid start to be removed from the body
- a reduction in the effects of delayed onset of muscle soreness (DOMS).

Key terms



Rest: a time when a performer undertakes little or no exertion.

Recovery: what a performer does to allow repair of the body.



Figure 6.10 Stretching should form part of a cool-down

Key terms



Dietary manipulation: changing diet to improve performance or recovery.

Isometric contractions: held contractions.

Massage: involves rubbing and 'kneading' of the muscles to reduce pain and encourage blood flow through the muscles.

Ice bath: recovery method that makes use of cold temperatures.

Diet, rehydration and food intake

Dietary manipulation involves changing diet to improve performance or to facilitate recovery. This includes the intake of fluid to rehydrate (see rehydration in section 6.1.2). Protein may be consumed to allow for growth and repair after exercise. Performers may also need to replenish food stores, for example, carbohydrate stores that have been used during exercise.

Static stretching

Static stretches are held stretches. They involve **isometric contractions** (held contractions). They help to develop flexibility and form a vital part of a cool-down to prevent muscle cramp or stiffness.

Massage

Massage involves rubbing and 'kneading' of the muscles. It reduces pain and encourages blood flow through the muscles, which helps to flush out waste products and improves recovery.

Ice baths

Ice baths can also be used, where the performer stays in the ice bath for a few minutes. During this time, many of the body's blood vessels to the muscles/extremities reduce in diameter, forcing blood to the body's core (for example, to the vital organs). When the performer leaves the ice bath, the vessels increase in diameter allowing oxygen-rich blood to flush the muscles. This helps to remove waste products and prevent DOMS – the delayed onset of muscle soreness. Many performers use ice baths although their benefits are not scientifically proven.

Rest between physical activity repetitions

The amount of rest required between physical activity repetitions will vary depending on the type and intensity of the exercise and the intent behind it. The correct ratio of work to rest allows the correct energy system in the body to be stressed, while allowing the body's systems to recover in between the work periods. A 'full' rest between repetitions would be used if the person does not want to overload and cause adaptation (changes to the body as a result of training). It would also be used if the repetition is so hard that the stress placed on the body requires full rest before trying the repetition again. Rest periods, however, may be deliberately cut short to ensure the next repetition is under more stress and to achieve overload, thereby causing a greater adaptation of the body. Here are two examples of different rest periods:

A performer sprints for 100 metres. The body naturally takes approximately 2–3 minutes to recover fully from such a sprint.

- 1 The performer takes the full 2–3 minutes to ensure they are fully recovered for the next sprint. They may be purely concentrating on technique.
- 2 The performer takes only 45 seconds' rest, so that the next sprint is harder than the first, leading to adaptation of the body.

Other factors which determine the amount of rest between repetitions include:

- fitness level – trained individuals recover more quickly
- age – elderly people take longer to recover.

When weight training, the work-to-rest ratio is crucial in achieving the main objective. The aim is to put an appropriate amount of stress on the muscle/s, using the correct energy system, while allowing the muscle/s to recover appropriately in between sets of activity. If a performer lifts very heavy weights, the stress on the muscles would be huge. It is recommended, therefore, that a suitable period of rest be placed between each set, so that the muscles are ready to carry out another repetition.

For example, a common heavy weights training programme for strength would guide the performer to:

- lift 85 per cent or more of their 1RM (one repetition maximum)
- do from two to six repetitions
- do from two to six sets, with two to five minutes of rest in between each set.



Figure 6.11 Rest and rehydration help the body to recover after exercise

Read about it



Read about rest between repetitions in the gym here:
<https://greatist.com/fitness/how-long-should-i-rest-between-sets#So,-how-long-should-i-rest-between-sets?>

Read about the importance of sleep here:
<https://www.healthline.com/nutrition/10-reasons-why-good-sleep-is-important>

Activity



After completing some exercise, tick which aspects included in the table form part of your recovery process.

Explain the importance of some of these aspects to a partner.

Factor affecting recovery	Tick
Sleep 6–9 hours	
Rehydration	
Cool-down	
Static stretching	
Dietary manipulation – eat to recover	
Massage	

Test your knowledge

- 1 What is the difference between rest and recovery?
- 2 How much sleep should an average adult have per night?
- 3 Describe one way to recover other than simply resting.

6.1.4 Other factors

Many factors affect a person's health and fitness. Nutrition from a balanced diet and appropriate training can provide positive effects, but other factors can result in negative effects. These factors include drugs, smoking, alcohol and stress. The negative effects are shown in Table 6.2.

Table 6.2 The negative effects of drugs, smoking, alcohol and stress

Factor	Negative effect
Performing-enhancing drugs (PEDs): taken purely to enhance performance.	<p>PEDs, such as, diuretics, anabolic steroids and human growth hormone (HGH), are illegally taken by some performers.</p> <p>Drugs like diuretics can help performers (for example, boxers) to lose weight, but they can lead to dehydration, low blood pressure and muscle cramps.</p> <p>Anabolic steroids can help performers to increase muscle mass, but they can lead to high blood pressure and cause damage to the liver, kidneys and heart. They can also cause hormonal imbalance, such as testicles shrinking or women developing more body hair.</p> <p>HGH can help performers to increase lean body mass (muscle), but can lead to joint pain, vision problems and muscle weakness.</p>
Recreational drugs: taken for recreational rather than performance-enhancing purposes.	<p>Recreational drugs include, for example, cannabis, cocaine and ecstasy. These can lead to muscle wastage and cardiovascular problems.</p> <p>Cannabis has been linked to mental health problems and can be a factor in the development of asthma and concentration problems.</p> <p>Cocaine can cause damage to the cartilage of the nose and can increase blood pressure. Cocaine can also suppress appetite, leading to excessive and unhealthy weight loss.</p> <p>Ecstasy has links to depression, anxiety and problems associated with regulating body temperature.</p>
Smoking	Smoking can irritate the respiratory system. It reduces the lungs' ability to function efficiently and causes breathlessness. Gaseous exchange at the alveoli in the lungs is negatively affected, as mucus builds up on the lung passages, causing a person to cough.
Alcohol	Alcohol is relatively harmless in small quantities, but in larger quantities it can cause behavioural changes, addiction and liver damage. Excessive alcohol consumption can lead to decreased concentration levels and impaired balance (not being able to balance well). It can also lead to dehydration, which slows reactions and makes decision-making less effective.
Stress	Some stress can be good. This is called eustress, for example, being stressed enough to get out of bed or to go to work. Most stress, however, is bad for a person's health. It can increase blood pressure, put stress on the heart, weaken the immune system and affect hormone balance. Excessive stress can also make a person feel anxious (worried) and can lead to feelings of irritability and tiredness/fatigue.

Key terms



Performance-enhancing drugs (PEDs): taken illegally to enhance performance rather than for recreational reasons.

Human growth hormone (HGH): a peptide hormone that stimulates growth and cell regeneration.

Recreational drugs: taken for recreational rather than performance-enhancing purposes.

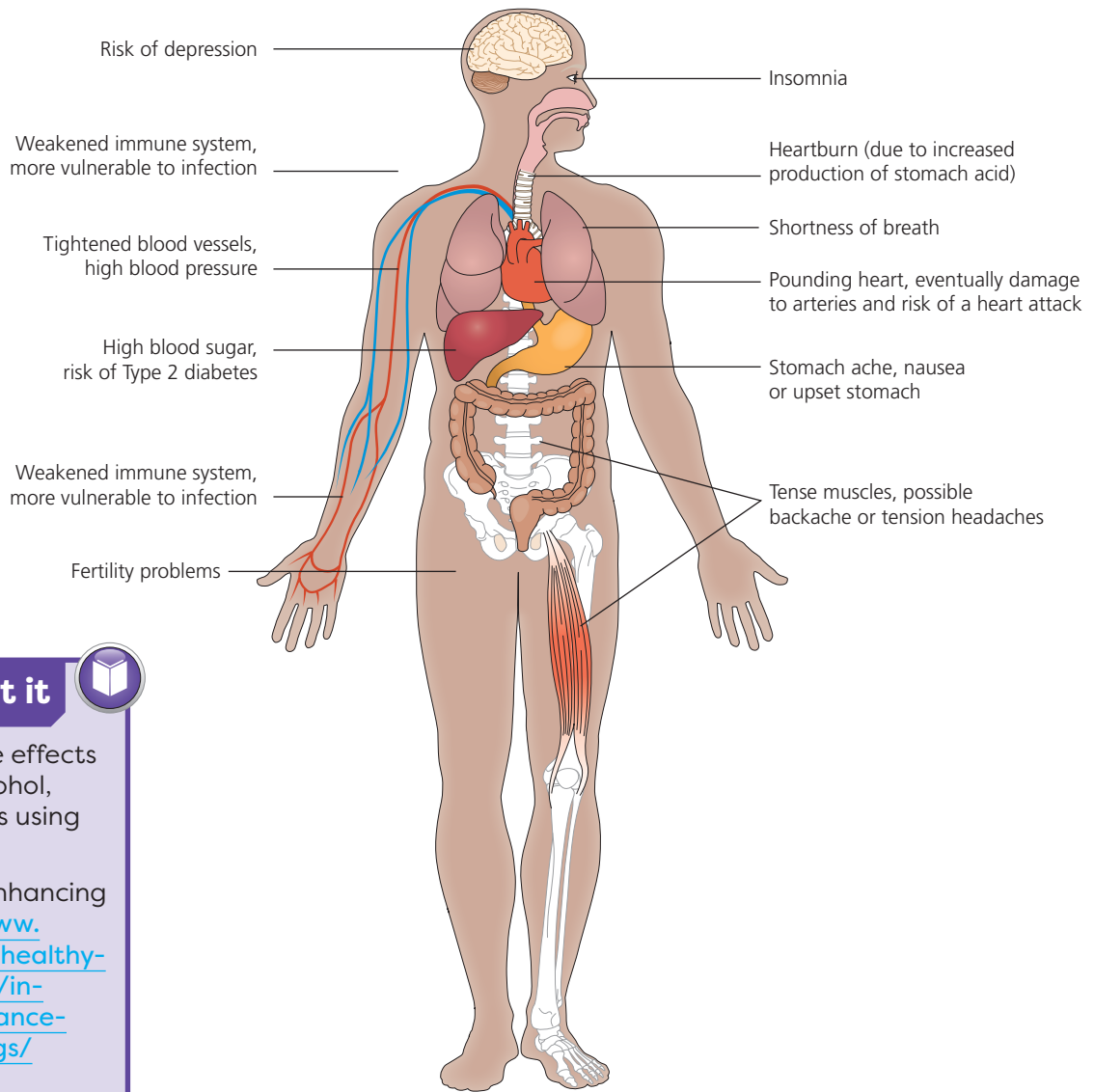


Figure 6.12 The negative effects of too much stress on the body

Read about it

Read about the effects of smoking, alcohol, drugs and stress using the links below:

Performance-enhancing drugs (PEDs): www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/performance-enhancing-drugs/art-20046134

Smoking: www.healthline.com/health/smoking/effects-on-body

Alcohol: www.drinkaware.co.uk/facts/health-effects-of-alcohol

Drugs: www.nhs.uk/live-well/healthy-body/drug-addiction-getting-help/

Stress: www.healthline.com/health/stress/effects-on-body

Case study

Jamal is a teenage boy who is preparing for his examinations in Year 11. He is a keen football player and plays for the school team and a local club. Recently, Jamal has been getting stressed about schoolwork and has started to smoke cannabis occasionally with a group of boys who hang out in his neighbourhood. He has also started to drink alcohol at weekends and regularly stays up late during the week to watch videos on his phone.

- 1 Do you think Jamal's lifestyle choices might start to affect his performance when playing football? If so, in what way?
- 2 What negative side effects might the cannabis, alcohol and the lack of sleep cause for Jamal?

Activity

Using the internet, identify the negative consequences of the factors in the left column of the table and complete the right column.

Factors to consider	Negative consequences
Recreational drugs	
Performance-enhancing drugs	
Smoking	
Excessive consumption of alcohol	
Increased stress levels	

Activity

Create an audio file to be used as a podcast to warn students at your school or college of the dangers of smoking.

Activity

Design a poster to display at a local gym to warn performers of the dangers of taking PEDs.

Remember

- Lifestyle is a choice that is affected by factors such as disposable income, facilities available and time.
- The NHS has guidelines for the amount of physical activity that a person should do. These guidelines are divided into four different age categories.
- A balanced diet contains a suitable amount of all the nutrients the body requires.
- Energy balance is achieved when the calories consumed equal the calories burned.
- Carbohydrates are the body's major energy source.
- Recovery methods are intended to help the body to recover and repair. Rest forms part of the recovery process.
- A person should aim for six to nine hours of sleep per night.
- PEDs and recreational drugs (including smoking tobacco and drinking alcohol) result in side effects that negatively affect a person's performance.

Test your knowledge

- 1 State two negative effects of smoking on the body.
- 2 What is the difference between a recreational drug and a PED?
- 3 Why should we keep our stress levels low?
- 4 Why should alcohol consumption be kept to a minimum?

Practice questions

- 1 Which one of the following describes the term 'active lifestyle'?
 - a A lifestyle in which the person includes suitable levels of exercise for their age and current fitness level.
 - b A lifestyle in which the person chooses to do little or no exercise.
 - c A lifestyle in which the person includes a small amount of exercise every now and then.
 - d A lifestyle in which the person exercises all day, every day.
- 2 Which one of the following describes a sedentary lifestyle?
 - a The choices we make about how we live our lives.
 - b The choice to take little or no exercise.
 - c The choice to include suitable levels of exercise.
 - d The choice to exercise two to three times per week.
- 3 Explain how an appropriate amount of sleep helps physical and mental health.
- 4 State the percentage of carbohydrates, fat and protein in a balanced diet.
- 5 With reference to a sport of your choice, discuss why the choice to adopt a sedentary lifestyle could affect an individual's level of performance.
- 6 Describe the relationship between rest and recovery.
- 7 Explain the relationship between rest and repetitions of physical activity.
- 8 Give one reason why a performer may decide to take a diuretic as an illegal PED. Also, state one side effect.
- 9 Describe two negative effects on the body of smoking cigarettes.
- 10 State three negative consequences of suffering from stress.
- 11 Justify why performance-enhancing drugs should continue to be banned at sports events.
- 12 Explain why the number of calories required each day will differ for performers in two different activities.

Assignment practice

Consider a sport of your choice. Imagine that you train twice a week for that sport and compete once every weekend. Compile a weekly schedule that details the following four factors:

- the sport you compete in
- the nights of the week you train
- the day of the weekend you compete
- what you will eat and drink for breakfast, lunch, evening meal and snacks.

Consider your diet plan for the week. Explain how some of your meals will prepare you for your training/competition schedule.



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