



Manual

Level 2 Certificate in Gym Instructing

Introduction

Gym instructors provide a key role within health and fitness settings and are considered by many as the 'face' of the organisation.

Following a successful membership sale, gym instructors are normally the next person a new customer will interact with, therefore they need to be welcoming and professional, building a positive rapport and making them feel at ease.

Gym instructors provide valuable technical input, therefore their knowledge and understanding of how the body reacts to exercise must be strong. This will help them to support client's with their goals and guide them through positive behaviour change, whilst also ensuring the health and safety of all members is maintained throughout their visit.

This manual aims to cover all of these areas in depth, providing you with the knowledge and understanding needed to have a successful career in the health and fitness industry.

The manual is broken up into 5 units:

- 1.** Principles of anatomy, physiology and fitness
- 2.** Professionalism and customer care for fitness instructors
- 3.** Health and safety in the fitness environment
- 4.** Conducting client consultations to support positive behaviour change
- 5.** Planning and instructing gym-based exercise

Towards the back of the manual, you will find a glossary, which explains any unfamiliar terms you might come across, and a reference list of reputable sources, which identifies where the information contained within has been found.

Best of luck with your studies!

Active IQ wishes to emphasise that whilst every effort is made to ensure accuracy, the material contained within this document is subject to alteration or amendment in terms of overall policy, financial or other constraints. Reproduction of this publication is prohibited unless authorised by Active IQ Ltd. No part of this document should be published elsewhere or reproduced in any form without prior written permission.

Principles of anatomy, physiology and fitness

Aim

A basic understanding of anatomy and physiology in relation to exercise is essential foundation knowledge for all fitness professionals.

Exercise affects all body systems. An understanding of the benefits of exercise and the demands it places on the body will help with the programming of safe and effective exercise.

Learning outcomes

At the end of this unit you will:

- Understand the skeletal system and the effects of exercise.
- Understand the neuromuscular system and the effects of exercise.
- Understand the cardiovascular and respiratory systems and the effects of exercise.
- Understand how energy is produced in the body and the effects of exercise on energy production.
- Understand the structure and function of the digestive system.
- Understand health and wellbeing.
- Understand the components of fitness and the effects of exercise.



Unit Contents

Principles of anatomy, physiology and fitness

| | |
|----------------------------------------------------------------|----|
| Section 1: The skeletal system | 3 |
| Section 2: The neuromuscular system..... | 13 |
| Section 3: Cardiovascular and respiratory systems..... | 27 |
| Section 4: Energy systems | 37 |
| Section 5: The digestive system | 43 |
| Section 6: Health and wellbeing | 47 |
| Section 7: Components of fitness and special populations | 51 |

Please see end of manual for Glossary and References

Section 1: The skeletal system

Without the skeleton, we would be a heap of tissues all over the floor. It makes up almost one fifth of body weight to give us a flexible framework with which to move, protect and support internal and external systems.

Structure of the skeleton

The skeletal system can be classified as two main structures:

Bone

Calcified connective tissue that forms most of the adult skeleton. There are around 206 bones in the body and they are connected via a series of different types of joint.

Cartilage

Dense, durable, tough fibrous connective tissue that is able to withstand compression forces. There are three types of cartilage found in the body, each fulfilling a separate function.

Types of cartilage

The three types of cartilage found in the human body are:

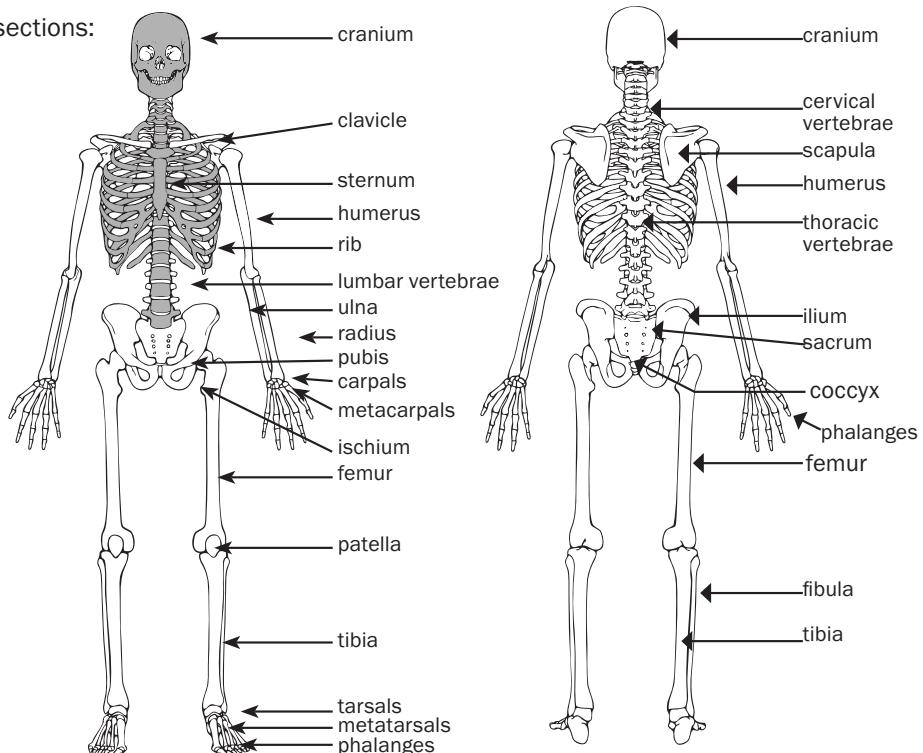
- Hyaline cartilage:** This is the tissue that forms the temporary skeleton of the foetus, which is eventually replaced by bone when calcium is deposited. It is found at the end of the long bones that meet to form the synovial joints.
- Elastic cartilage:** This is similar to hyaline cartilage, except that it has more fibres and most of these are made up of elastin as opposed to collagen. Elastic cartilage has the ability to regain and return to its original shape. It is found in the ear, the walls of the Eustachian tube and the epiglottis, which are all places that require a specific shape to be maintained.
- Fibrocartilage:** This cartilage is thicker and stronger than the other types and has limited distribution within the body. It forms various shapes depending on its role and acts like a shock absorber in cartilaginous joints.

The skeleton

The skeleton is split into two main sections:

Axial skeleton

Bones that form the main frame or axis:
The spine, ribs and skull.



Appendicular skeleton

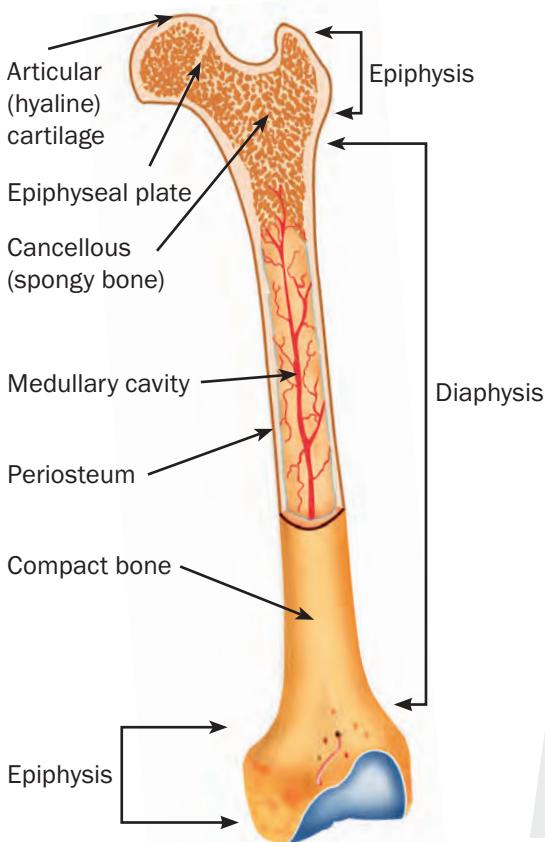
Bones that attach to the main frame (the appendages):
The upper and lower limbs, the pelvic and shoulder girdles.

Classification of bones

Bones can be classified according to their formation and shape.

| Classification | Description | Examples |
|----------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| Long bones  | <ul style="list-style-type: none"> Have a greater length than width. Consist of a main shaft (diaphysis) and usually two extremities (epiphysis). Principally act as levers. Contain mostly compact bone in their diaphysis. Contain more cancellous bone in their epiphyses. | Humerus, femur, fibula, tibia, ulna, radius, metacarpals, metatarsals and phalanges. |
| Short bones  | <ul style="list-style-type: none"> Normally about as long as they are wide (cube-shaped). Usually highly cancellous, which gives them strength with reduced weight. | Carpals and tarsals. |
| Flat bones  | <ul style="list-style-type: none"> Thin layer of cancellous bone sandwiched between two plate-like layers of compact bone. Provide protection and large areas for muscle attachment. | Scapula, cranial bones, costals (ribs), sternum and ilium. |
| Irregular bones  | <ul style="list-style-type: none"> Form very complex shapes and cannot be classified within the previous groups. | Vertebrae and calcaneus (heel bone). |
| Sesamoid ('seed-like')  | <ul style="list-style-type: none"> Develop within particular tendons at a site of considerable friction or tension. Serve to improve leverage and protect the joint from damage. | Patella (kneecap). |

Structure of a long bone



Epiphysis: This is the expanded portion located at each end of the bone. It contains the cancellous bone tissue.

Diaphysis: This is the shaft of the bone. It contains a thick layer of compact bone with a hollow centre (the medullary cavity).

Epiphyseal plates: These are the growth plates located between the diaphysis and epiphysis that allow the former to increase in length until adulthood.

Hyaline cartilage: This covers the end of the bone (the epiphysis), where the bones meet to form joints.

Periosteum: A tough, fibrous sheath covering the whole bone.

Compact bone: This is solid and strong to help the long bone withstand weight-bearing stress.

Cancellous bone: This is spongy bone tissue that contains red marrow. Flat, short and irregular bones are formed mainly from cancellous bone.

Medullary cavity: This is the hollow tube which runs down the centre of the diaphysis (the marrow cavity).

Yellow marrow: This functions for the storage of fat. It is found in the medullary cavity.

Red marrow: This functions in the production of various types of blood cell. It is found in cancellous bone tissue.

Functions of the skeletal system

The skeletal system performs a range of functions. These include:

Shape

The skeletal bones give the body its basic shape.

Protection

For example, the skull protects the brain and the ribs protect the heart and lungs.

Attachment

Ligaments, tendons and muscles attach to bones to create stability and movement.

Movement

Muscles pull on long bones to create movement, e.g. the tibia and fibula are pulled backwards to flex the knee.

Production

Some bones produce red (to carry oxygen) and white (to fight infection) blood cells from their marrow.

Storage

Bones store important minerals, such as calcium and phosphorus, which support growth and development.

Joints in the skeletal system

A joint is the junction where two or more bones meet.

Joint classification

There are three main types of joint, which are classified according to potential range of movement. These include:

| Joint name | Movement range | Examples |
|-----------------------|--------------------|----------------------------------------------------|
| Fibrous. | Fixed/immovable. | Cranium (skull). |
| Cartilaginous. | Slightly moveable. | Vertebrae. |
| Synovial. | Freely moveable. | Ankle, knee, hip, elbow, shoulder, neck and wrist. |

Structure of synovial joints

Synovial, freely moveable joints are the most commonly found in the human body; each one has the same physical characteristics to allow it to function efficiently. These characteristics are:

Hyaline/articular cartilage: This covers the ends of the bones to absorb shock and prevent friction.

Ligaments: These connect bone to bone to stabilise joints and align bones.

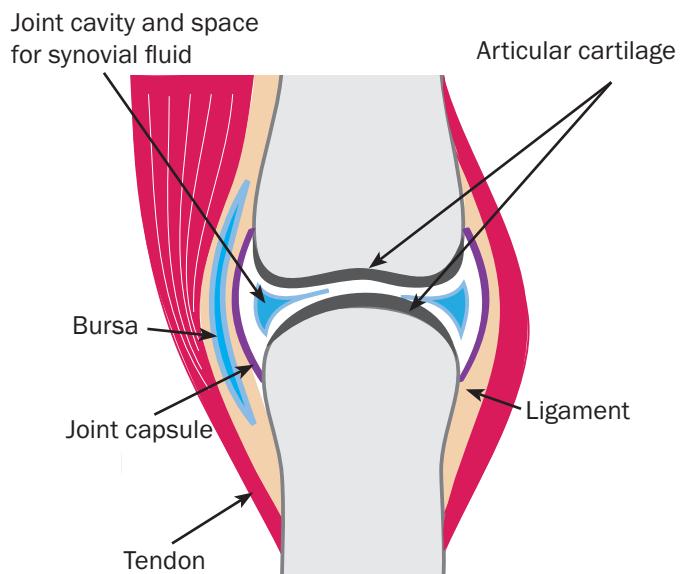
Synovial membrane: This stores and secretes synovial fluid when required.

Synovial fluid: This lubricates the joint during movement.

Joint capsule: This holds all of the properties of the synovial joint in place.

Joint cavity: This is the space inside the synovial joint.

Tendons: These connect muscle to bone to create movement.



A little extra on cartilage, ligaments and tendons

Cartilage

Cartilage is a dense, durable, tough fibrous connective tissue that is able to withstand compression forces (e.g. when jumping and running). Cartilage does not have a blood supply, so it has limited ability to repair itself.

The two main types of cartilage are:

- **Articular/hyaline cartilage.**
- **Fibrocartilage.**

Considerations for exercise

- Cartilage is dependent on regular activity for health, e.g. release of synovial fluid.
- Cartilage can be worn or torn, e.g. through overuse, repetitive movement (high-impact) and ageing.

Ligaments

Ligaments are made of tough, white, non-elastic fibrous tissue which is strung together in a cord or strap-like formation. They can withstand a lot of tension, but prolonged tension (e.g. repetitive incorrect movement patterns) will permanently damage the fibres.

Ligaments have four main functions within the body:

- Attaching and connecting bone to bone in all joints.
- Enhancing joint stability.
- Guiding joint motion and alignment.
- Preventing excessive or unwanted motion in the joint.

Tendons

Tendons attach muscle to bone across the joint and transmit the force produced by the muscle. They are formed from all the muscle fibres and connective tissue of the muscle. For example, the Achilles tendon attaches the calf muscles to the heel bone and the quadriceps tendon crosses the knee joint and attaches to the tibia.

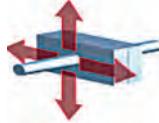
Injury and healing

Blood supply is one of the major determinants in the healing process of any injury. Bone and muscle tissue often heal fairly easily and quickly because they have a healthy blood supply. By contrast, ligaments, tendons and cartilage have a poor blood supply and this limits their healing potential and the speed of recovery.

Healing is particularly unlikely for cartilage, which has a lower nutrient supply. Fibrocartilage may need surgical removal when torn (e.g. the menisci in the knee).

Types of synovial joints

There are six main types of synovial joints, each allowing varying degrees and directions of movement:

| Joint type | Example picture | Range of motion (ROM), examples and actions |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ball-and-socket. |   | ROM: Allows for movement in almost any direction. Examples: The shoulder and hip joint. Actions: Flexion, extension, horizontal flexion and extension, internal (medial) and external (lateral) rotation, circumduction, adduction and abduction. |
| Hinge. |   | ROM: Allows flexion and extension of an appendage. Examples: The knee and elbow joint. Actions: Flexion and extension. |
| Pivot. |   | ROM: Allows rotation around an axis. Examples: In the neck, the atlas (the uppermost cervical vertebra – C1) rotates around the axis (second cervical vertebra – C2). In the forearms, the radius and ulna twist around each other. Action: Rotation. |
| Saddle. |   | ROM: Allows movement back and forth and side-to-side. Example: The carpometacarpal joint (thumb). Action: Adduction and abduction, flexion and extension. |
| Gliding (plane). |   | ROM: Allows two bones to slide past each other. Examples: The acromioclavicular joint. The mid-carpal and mid-tarsal joints of the wrist and ankle. Action: Elevation and depression of the shoulder girdle. |
| Ellipsoid/condyloid. |   | ROM: Similar to a ball-and-socket joint – it allows the same type of movement but to a lesser magnitude. Example: The metacarpophalangeal joints (knuckles). Action: Flexion, extension, adduction, abduction and circumduction but no rotation. |

Joint movements

Muscles pull on bones to create joint movements. There is specific terminology for describing the different actions of the joints, which is important to understand when exploring the actions of muscles (covered in Section 2).

The joint actions are described in the table below:

| Movement terminology | |
|------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| Normal terms (general) | Description |
| Flexion. | The angle of the joint decreases, or the return from extension (e.g. bending the knee or elbow). |
| Extension. | The angle of the joint increases, or the return from flexion (e.g. straightening the elbow or knee). |
| Rotation. | A bone rotating on its own long axis – this may be internal or external (e.g. twisting the neck or trunk to the right or left). |
| Abduction. | Away from the midline of the body (e.g. taking the leg or arm out to the side). |
| Adduction. | Towards the midline of the body (e.g. drawing the leg or arm in towards and across the front of the body). |

| Specific terms (regional) | Description |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Horizontal flexion. | Moving the upper arm towards the midline of the body in the horizontal plane (e.g. bringing the arms in front of the body – a hugging action). |
| Horizontal extension. | Moving the upper arm away from the midline of the body in the horizontal plane (e.g. drawing the arms backward in a horizontal position). |
| Lateral flexion. | Bending to the side (e.g. bending the spine or neck to the right or left). |
| Circumduction. | A circular or cone-shaped movement that occurs at ball-and-socket joints (e.g. moving the arm in a full circle, like a cricket bowling action). |
| Elevation. | Upward movement of the shoulder girdle (e.g. lifting the shoulder girdle towards the ears). |
| Depression. | Downward movement of the shoulder girdle (e.g. lowering the shoulder girdle down and further away from the ears). |
| Protraction. | Forward movement of the shoulder girdle (e.g. rounding the shoulder girdle forward). |
| Retraction. | Backward movement of the shoulder girdle (e.g. squeezing the shoulder blades together). |
| Pronation. | Turning the palm of the hand to face downward. This action occurs between the radius and ulna (e.g. turning the palm down). |
| Supination. | Turning the palm of the hand to face upward. This action occurs between the radius and ulna (e.g. turning the palm up to hold something in the hand). |
| Dorsiflexion. | When the foot moves towards the shin. This action only occurs at the ankle (e.g. lifting the toes towards the knees). |
| Plantarflexion. | Moving the foot away from the shin (tiptoe action). This only occurs at the ankle (e.g. pointing the toes away from the knees or rising onto the balls of the feet). |
| Inversion. | When the sole of the foot faces the midline (e.g. turning the foot inwards). |
| Eversion. | When the sole of the foot faces away from the midline (e.g. turning the foot outwards). |

The spine

The spine plays a vital role in muscle attachment to allow stability and movement, and protection of the spinal cord, which sends important messages to and from the brain.

Structure of the spine

An adult spine has four natural curves: two convex (thoracic and sacral) and two concave (lumbar and cervical). These are formed over time from birth to support posture and balance during movement.

The spine is comprised of **33 irregular bones (vertebrae)**, which make up the vertebral column. Each region of the spine has a different number of bones and the bones are shaped differently to allow different ranges of motion and absorb various levels of shock, as identified in the diagram below:

Cervical: 7 vertebrae

This region allows large movements of rotation, lateral flexion/extension and flexion/extension. The skull sits on top of the atlas bone to enable flexion/extension (nodding the head) and lateral flexion, while the axis bone sits underneath to create a pivot joint with the atlas bone to enable rotation (shaking the head).

Thoracic: 12 vertebrae

This region allows the same movements as the cervical vertebrae but in smaller ranges (upper thoracic bones are limited to flexion and extension).

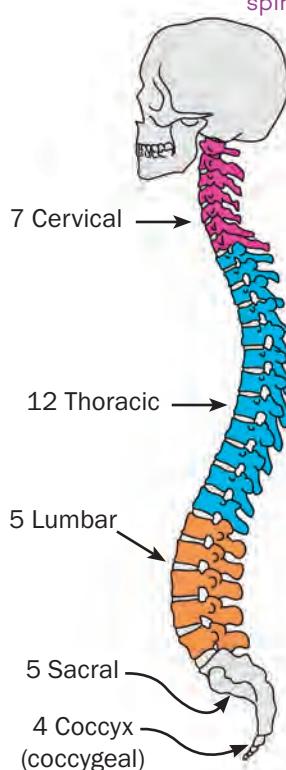
Lumbar: 5 vertebrae

This region allows the same movements as the cervical and thoracic vertebrae but they are very limited. The lumbar vertebrae are the largest as they absorb the most shock through the spine.

Sacral: 5 vertebrae

The bottom two sections are fused together and allow no movement.

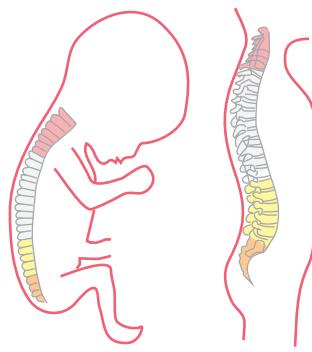
Figure 1.4
Regions of the spine



Neutral spine

The term 'neutral spine' describes the natural, gentle s-shaped spinal position that is formed when each spinal vertebrae is loaded one on top of the other without any uneven deformation of the intervertebral discs (see figure 1.4).

When the spine is in this position, the stress on the passive structures (vertebrae and ligaments) is minimal and the risk of strain or injury to the lower back is minimised. It is therefore the ideal and essential position to maintain during daily activities and exercise.



Postural abnormalities

Deviations from neutral spine can happen for a number of reasons, including:

- Sustained poor postures (e.g. driving, excess sitting and desk-based work) that result in changes in opposing muscle length and strength.
- Exercise or sport imbalances, e.g. a golfer or an exerciser who only trains 'mirror muscles', i.e. pectorals and biceps.
- Age-related conditions, such as osteoporosis.
- Medical conditions, such as spina bifida and cerebral palsy.

These abnormalities increase stress on the spine and surrounding soft tissue structures, while decreasing the efficiency with which the body moves. It is thought that the normal thoracic and lumbar curves should be approximately 20–45° when in a static neutral position. A minor lateral deviation of the spine is considered fairly normal, but a curve of more than 10° would be considered a scoliosis.

The image below shows the difference between optimal posture and some common postural abnormalities.

Hyperkyphosis

The muscles at the front of the chest (pectoralis) and upper back (upper trapezius) are shortened and the muscles of the mid back (rhomboids and lower trapezius) are lengthened. This gives a hunched back appearance.

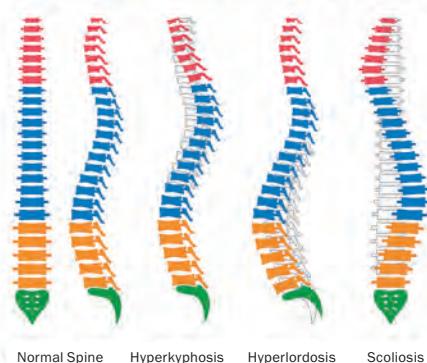
Hyperlordosis

The abdominal muscles (rectus abdominis) and trunk stabilising muscles (transversus abdominis) are lengthened and the back extensor muscles (erector spinae) are shortened. This gives a hollow back appearance.

Scoliosis

Scoliosis refers to a sideways or lateral curving of the spine which often occurs simultaneously with a laterally altered pelvic position and/or uneven shoulder girdle position. A spinal bend to the left side is often compensated for elsewhere in the spine with a bend to the right side or vice versa. Alterations in muscle length will occur throughout the body to control and stabilise this spinal position.

SPINAL DEFORMITY TYPES



Something extra

It is not uncommon for posture to alter during pregnancy. The growing baby causes the abdominal muscles to lengthen and weaken and the extra weight can cause alterations to the position of the pelvis, leading to a hyperlordotic posture.

Other postural deviations may also present. For example, scoliosis can develop following childbirth as a result of the mother carrying the child on their hip to one side, which may cause a lateral deviation to the spine. Hyperkyphosis can develop from holding and cradling the baby.

The lifecycle of the skeletal system

The basic shape and size of an individual's skeleton is genetically determined, but their final shape is influenced greatly by the environment in which they develop. Environmental influences include mechanical factors, such as muscle forces acting on the developing bone, and metabolic factors, such as the supply of nutrients to the skeleton.

Something extra

Human infants are born with about 270 bones, some of which fuse together as the body develops. By the time we reach adulthood, we have 206 bones.

Bone development

In a fully developed skeleton, bone contains both living and non-living tissue.

Ossification

Ossification is the process by which bone is formed in the body from the activity of osteoblasts and osteoclasts with the addition of minerals and salts. Calcium compounds must be present for ossification to take place. Osteoblasts take calcium compounds from the blood and deposit them in the bone.

The living tissues are the blood vessels, nerves, collagen and bone cells, including:

Osteoblasts Cells that deposit calcium to help form bone.

Osteoclasts Cells that help to eat away old bone.

Osteocytes Mature osteoblasts that have ended their bone-forming role.

Stages of bone growth

Foetal stage

In the foetus, most of the skeleton is made up of cartilage: a tough, flexible connective tissue containing no minerals or salts. As the foetus grows, osteoblasts and osteoclasts slowly replace cartilage cells and ossification begins. Many of the bones have been at least partly formed (ossified) by the time we are born.

Birth to adulthood

In long bones, the growth and elongation (lengthening) continue from birth through adolescence.

Bone lengthening is achieved through the activity of two cartilage plates (called epiphyseal plates) located between the shaft (the diaphysis) and the heads (epiphyses) of the bones. The epiphyseal plates expand, forming new cells and enabling the diaphysis to lengthen. The length of the diaphysis increases at both ends and the heads of the bone move progressively apart.

As growth continues, the thickness of the epiphyseal plates gradually decreases and the bone lengthening process ends. Different bones stop lengthening at different ages, but ossification is fully complete between the ages of 18 and 30. During this lengthening period, the stresses of physical activity result in the strengthening of bone tissue.

Bone thickness and strength must be continually maintained. Old bone must be replaced by new bone to maintain strength and mass.

Adulthood to later life

Calcium is progressively lost from the bones as the skeleton ages; this happens earlier in women. Loss of calcium and bone mass can lead to osteoporosis. Osteoporosis increases the risk of fractures and is responsible for loss of height and changes in posture (hunched back) in senior years.

Factors affecting bone formation

Bone development and health are influenced by a number of factors, including:

- Nutrition.
- Exposure to sunlight.
- Hormonal secretions.
- Physical activity and exercise.

Nutrition

A nutritious diet is essential for bone health; the mineral, calcium, is especially important. Calcium-rich foods include dairy products (e.g. milk and cheese), oily fish (e.g. sardines) and green vegetables (e.g. spinach and kale).

Bone health can be compromised by excessive intake of caffeine, alcohol and carbonated drinks, as these inhibit the absorption of calcium.

Sunlight

Exposing the skin to the ultraviolet portion of sunlight is favourable to bone development because the skin can produce vitamin D when exposed to such radiation.

Vitamin D is necessary for the proper absorption of calcium in the small intestine. If calcium is poorly absorbed, the bone matrix will be deficient in calcium and the bones are likely to be deformed or very weak.

Hormonal secretions

Hormones produced by the endocrine system have a significant role to play in bone development and growth.

The growth hormone secreted by the pituitary gland is responsible for general development in childhood and adolescence (bone reformation in adulthood is driven by testosterone and oestrogen).

Short-term effects and long-term benefits of exercise on the skeletal system

| Short-term, immediate effects | Long-term benefits |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none">• Increased secretion of synovial fluid in joints, which reduces wear-and-tear.• Increase in blood flow and nutrients to bones and joints.• Muscles pull on bones to increase ROM. | <ul style="list-style-type: none">• Increased bone density and bone strength.• Increased joint stability due to stronger ligaments and tendons.• Improved posture.• Improved cartilage health.• Increased ROM, leading to improved flexibility.• Reduced risk of osteoporosis (brittle bone disease).• Reduced risk of fractures. |

Answer the following questions and make notes to revise this section.

- What are the two main structures that make up the skeleton?
- List the bones found in the axial skeleton.
- List the bones found in the appendicular skeleton.
- Give an example of a long, short, irregular, flat and sesamoid bone.
- What is the name of the structure found at the end of long bones, which prevents friction and absorbs shock?
- Where are red and white blood cells produced?
- List the functions of the skeletal system.
- What are the three main joint types?
- List the characteristics of a synovial joint.
- Which structure joins bone to bone?
- Which structure joins muscle to bone?
- Where would you find a hinge joint?
- What movements are possible at a hinge joint?
- Where would you find a ball-and-socket joint?
- What movements are possible at a ball-and-socket joint?
- List the five sections of the vertebral column and identify how many vertebrae are in each.
- Describe hyperlordosis.
- Describe hyperkyphosis.
- Describe scoliosis.
- What is the difference between an osteoblast and an osteoclast?
- What are the long-term benefits of exercise of the skeletal system?

Section 2: The neuromuscular system

All of the internal and external muscles in the body and the nerves serving them make up the neuromuscular system. Every movement your body makes requires communication between the brain and muscles, some of which you don't even have to think about, such as your digestive muscles breaking down ingested food.

The muscular system

There are over 600 muscles in the body, making up around 40% of a person's total weight.

The bones and joints create the framework of levers (bones) and pivots (joints) which give the body the potential to move, but this framework cannot move on its own. It is the contraction and relaxation of muscles that bring about movement.

The muscular system produces a continuous and wide-ranging number of actions, such as bodily movements (e.g. walking and jumping) and the powering of internal processes (e.g. contraction of the heart muscle and focussing of the eye).

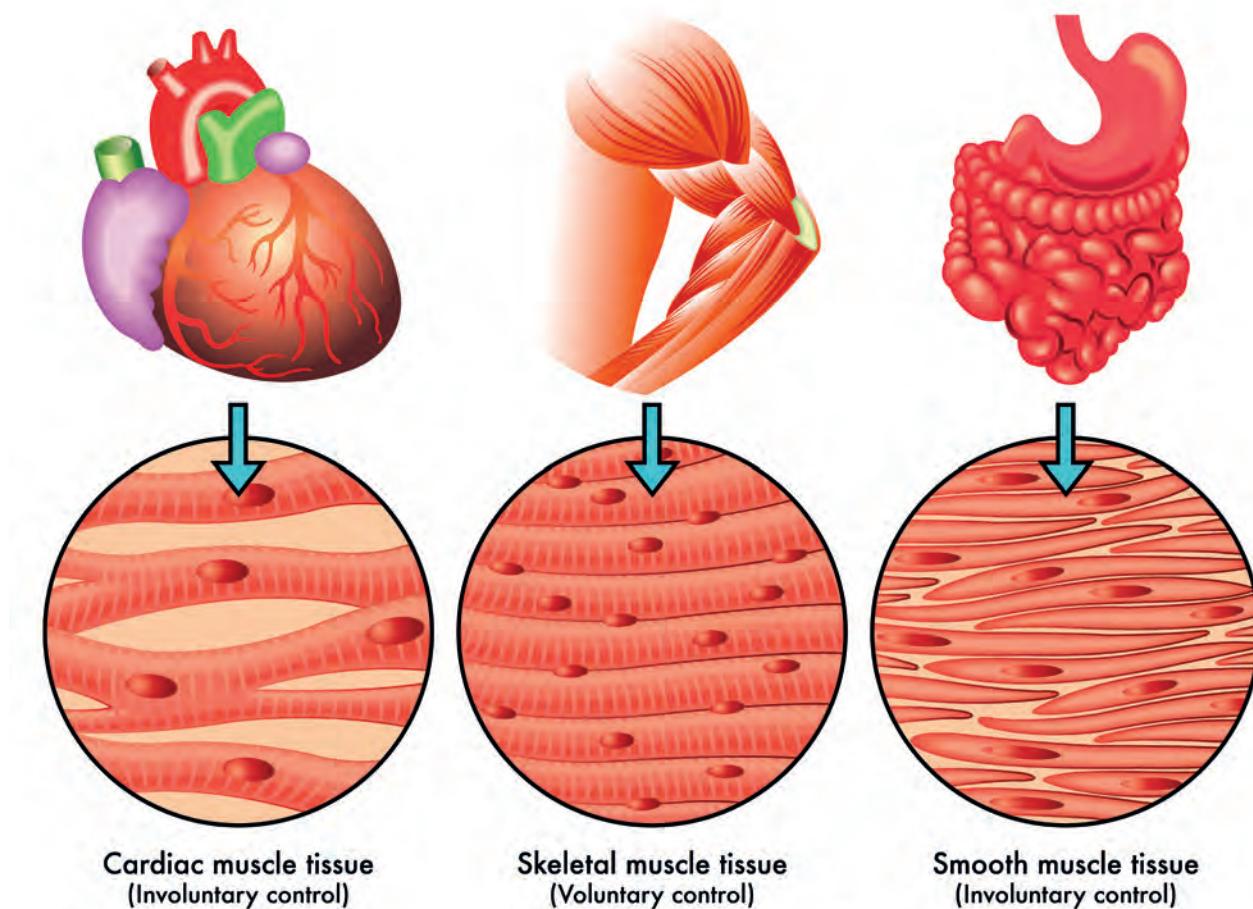
Types of muscle tissue

There are three types of muscle tissue and each one has a different function. The three types are:

- Cardiac muscle (myocardium), e.g. the heart.
- Smooth muscle, e.g. the walls of the small intestine.
- Skeletal muscle (striated), e.g. the hamstrings or triceps.

KEY POINT

Contraction of the heart is controlled by the sinoatrial node (SAN). The set rhythm of the heart (on average, 72bpm at rest) is called autorhythmicity.



The table below describes the key characteristics of the different types of muscle tissue:

| | Cardiac | Smooth | Skeletal |
|---------------------------------------|-------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| Control | Involuntary, not under conscious control (autonomic nervous system). | Involuntary, not under conscious control (autonomic nervous system). | Voluntary, under conscious control (somatic nervous system). |
| Appearance | Striated (striped or streaked). | Smooth, spindle-shaped. | Striated (striped or streaked). |
| Location examples and function | The heart, to ensure continuous rhythmic beating in order to push oxygen around the body. | The digestive system, to break down ingested food and drink. The walls of blood vessels, to control the volume of blood flow. | Biceps, triceps, quadriceps, etc. to create bodily movement. Some muscles contract to stabilise the body and prevent unwanted movement. |

Characteristics of muscle tissue

Muscle tissue has four key characteristics:

Contractility Ability to shorten.

Extensibility Ability to stretch and lengthen.

Elasticity Ability to return to its original size and shape.

Excitability Ability to respond to stimuli from the nervous system.

The heart contracts to pump blood and relaxes to fill with blood. The skeletal muscles work in pairs and contract and relax to create movement of the skeleton.

Muscle contraction occurs in response to different stimuli, such as neurotransmitters and hormones. Skeletal muscle is controlled by the somatic nervous system. Smooth muscle is controlled by the autonomic nervous system. Contraction of the heart is controlled by the SAN.

Muscle is elastic; it can stretch and then recoil to its original shape. Skeletal muscle is like an elastic band; if the muscle is pulled too far it can tear.

Skeletal muscle

Skeletal muscles make the human body move. They sit just underneath the skin, shortening and lengthening by pulling on bones; this is normally achieved using a tendon to pull them in different directions.

Structure of a skeletal muscle

Each bundle of individual muscle fibres (fasciculi) is wrapped in connective tissue called perimysium, and each single fibre within the bundle is wrapped in connective tissue called endomysium.

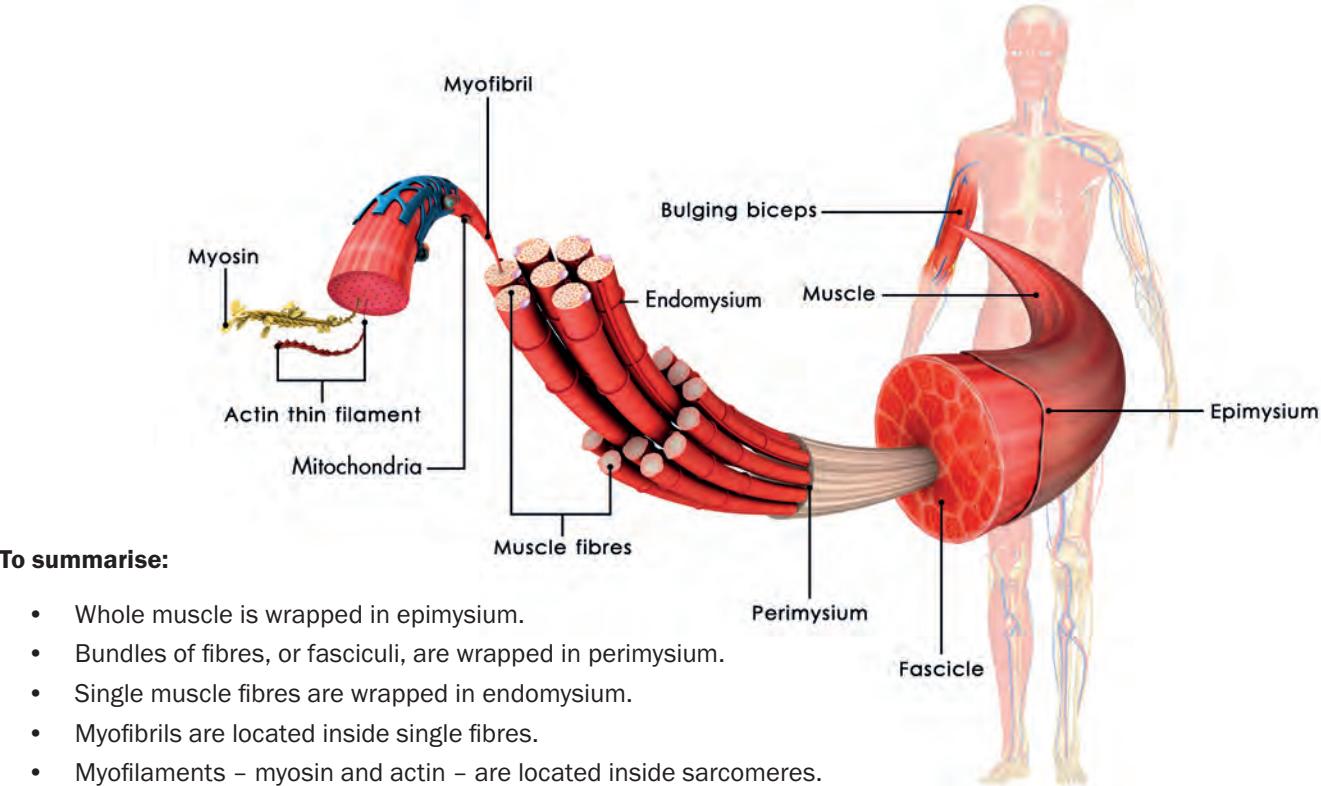
Inside the individual fibres, there are smaller myofibrils and within each myofibril are strands of myofilaments (actin and myosin). It is the action of myosin and actin working together that brings about movement.

The numerous fibres and connective tissues continue throughout the length of the muscle. Layers of connective tissue converge to form tendons, which are strong, inelastic and strap-like. The tendon attaches to the periosteum, which is the sheath that surrounds the bone.

Something extra

The main constituents of skeletal muscle are:

- 70% water.
- 23% protein, e.g. actin and myosin (elastin) and connective tissue (collagen).
- 7% minerals (e.g. calcium, potassium and phosphorus) and substrates (e.g. glycogen, glucose and fatty acids).

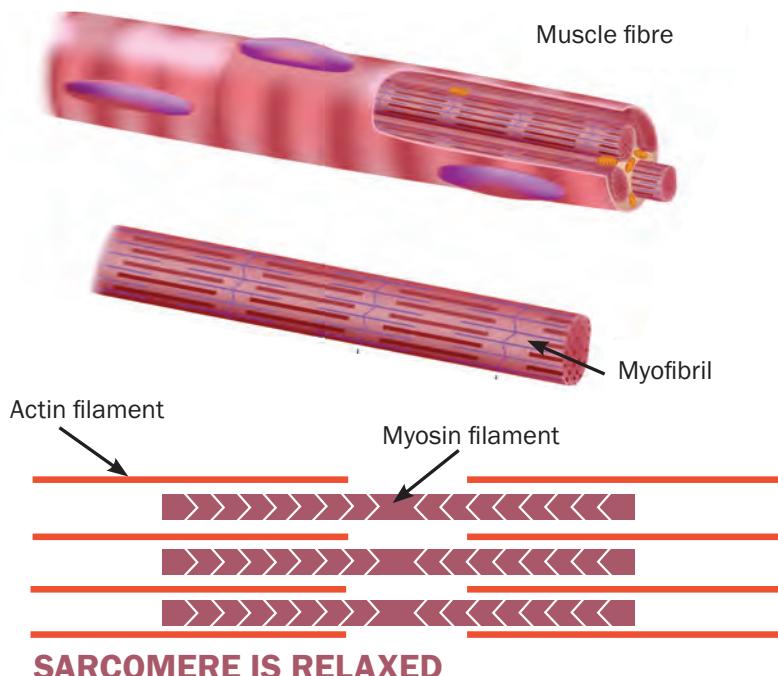


Sliding filament theory

The sliding filament theory was proposed by Huxley in 1954 to explain the contraction of skeletal muscle. The theory states that the myofilaments, actin (a thin protein strand) and myosin (a thick protein strand) slide over each other, creating a shortening of the sarcomere (the contractile units in the muscle where myosin and actin are found), which causes the shortening or lengthening of the entire muscle. The myofilaments do not decrease in length themselves.

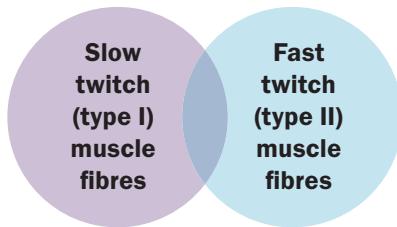
This proposed action is accomplished by the unique structure of the protein, myosin. The myosin filaments are shaped like golf clubs and form cross bridges with the actin filaments. Each myosin molecule (there are many) has two projecting heads. These heads attach to the actin filaments and pull them in closer.

Stimulus from the nervous system and the release of adenosine triphosphate (ATP) – the high-energy molecule stored on the myosin head – provide the impetus for the head to ‘nod’ in what is termed the ‘power stroke’. It is this nodding action which ‘slides’ the thin actin filaments over the thick myosin filaments. The myosin head then binds with another ATP molecule, causing it to detach from the actin-binding site, which is known as the ‘recovery stroke’. It is then able to attach to the next binding site and perform the same routine.



Skeletal muscle fibres

Skeletal muscle fibres vary in terms of structure and function. Two distinct fibre types have been identified and classified by their contractile and metabolic characteristics:



The table below highlights the key structural and functional features of both muscle fibres, as well as examples of activities through which they are more effectively utilised:

| Fibre type | Structural features | Functional features | Activities |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Slow twitch or type I. | <ul style="list-style-type: none"> Smaller diameter. Large myoglobin content. Many mitochondria (cells where aerobic energy is produced). Many capillaries to deliver blood and oxygen. Red in colour. | <ul style="list-style-type: none"> Increased oxygen delivery. Produce less force. Long-term contractions. Resistant to fatigue. Aerobic. | <ul style="list-style-type: none"> Maintaining posture, i.e. stabilisation. Endurance-based activities. Lower-intensity, aerobic activities. |
| Fast twitch or type II. | <ul style="list-style-type: none"> Larger diameter. Smaller myoglobin content. Fewer mitochondria. Fewer capillaries. White (pale) in colour. | <ul style="list-style-type: none"> Decreased oxygen delivery. Generate more force. Short-term contractions. Less resistant to fatigue. Anaerobic. | <ul style="list-style-type: none"> Rapid, intense movements. Strength training. Sprinting. Anaerobic training. |

Muscle fibre considerations

Most people have a mixture of different fibres in their skeletal muscles. The actual percentage of fibre types for each individual is determined by genetics and heredity. This means that different people may have relatively more of one variety in a specific area. These genetic differences significantly contribute to athletic abilities.

For example, the large leg muscles of marathon runners have a higher percentage of slow twitch fibres (about 80%), while those of sprinters contain a higher percentage of fast twitch fibres (about 60%).

The proportion of slow and fast twitch fibres is also determined by the role of the muscle. The muscles of the neck and back, for example, have a key role to play in the maintenance of correct posture and so they have a high proportion of slow twitch fibres. By contrast, the muscles of the shoulders and arms are often called upon to generate considerable force and are not continually active in posture; consequently, these muscles have a higher proportion of fast twitch fibres. Leg muscles often have large numbers of both fast and slow twitch muscles, since they need to continually support the body and play a role in movement.

Effects of exercise on muscle fibres

Exercise and the type of training undertaken also affect muscle fibre proportions. Specific types of training will increase the size and capacity of certain types of muscle fibres:

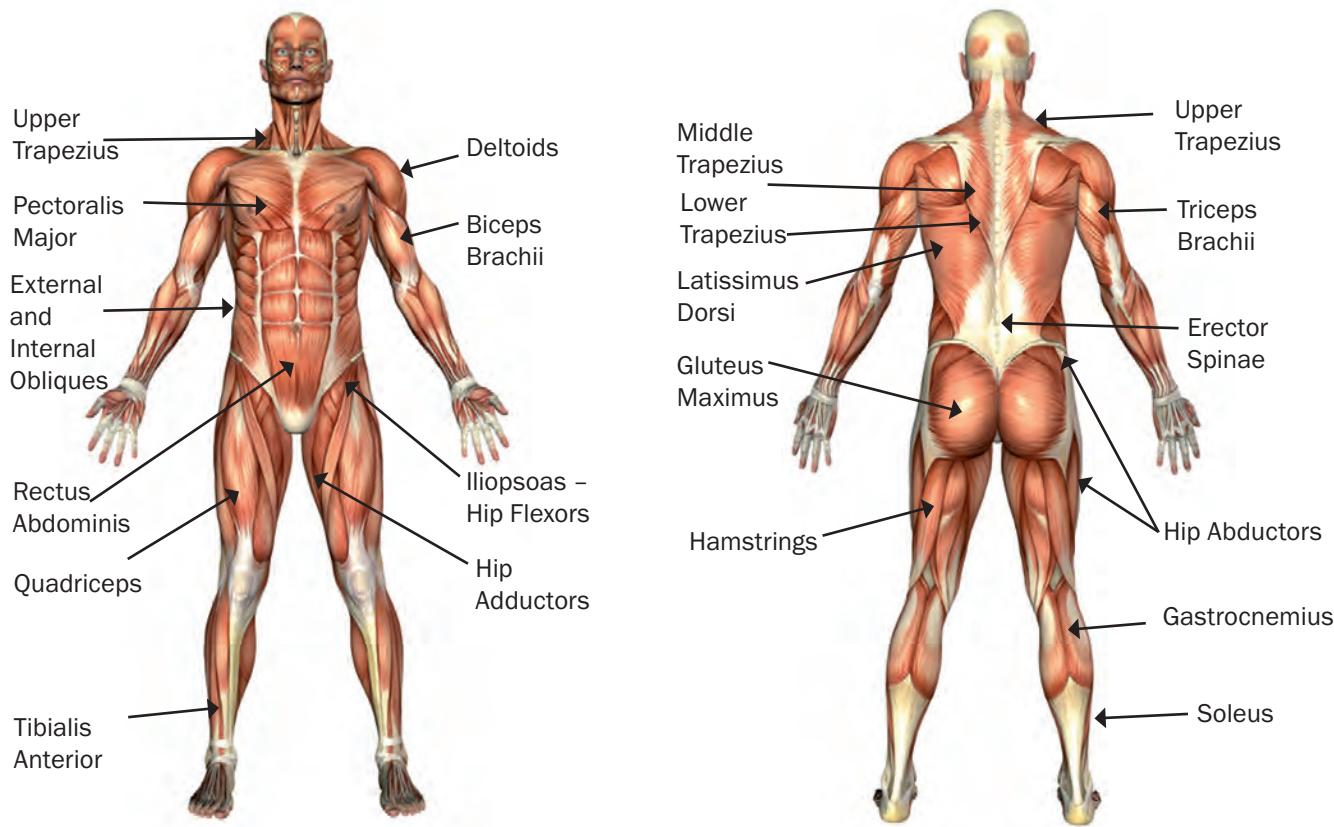
- Intense exercise that brings about anaerobic metabolism will boost muscular strength and mass, and increase the size of fast twitch fibres.
- Moderate-intensity, aerobic endurance exercise that increases the volume of blood and oxygen to the muscle will develop the aerobic capacity of slow twitch fibres.

Intermediate fibres

Fast and slow twitch muscle fibres cannot be converted into each other. However, there is one type of fast twitch fibre (intermediate fibres) that can adapt in different ways depending on the type of training performed. In response to cardiovascular training, intermediate fibres will adapt and respond like slow twitch fibres. In response to resistance training, they will adapt and respond like other fast twitch fibres.

Location of skeletal muscles

The main anterior and posterior skeletal muscles are shown below:



Muscle actions and movement

When standing upright and erect, a range of skeletal muscles are in a state of continuous tone or tension. Muscles are contracting, resisting the force of gravity and preventing the body from falling to the floor. For example, the muscles in the neck keep your head upright to prevent it from dropping to the front, back or side. Skeletal muscles with a postural role typically have a higher proportion of slow twitch fibres.

How skeletal muscles create movement

To create specific movement of the joints, the following has to happen:

- Muscles receive a message from the brain to shorten.
- Muscles exert a force and pull on the bones.
- As one muscle contracts and shortens, it works in pairs with an opposing muscle, which relaxes and lengthens.

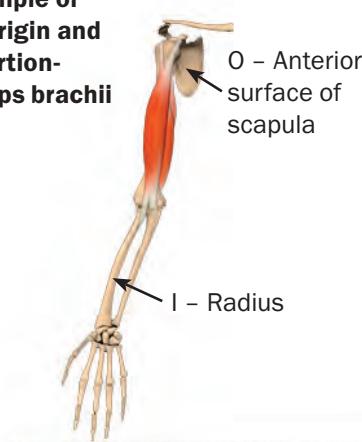
Origins and insertions

Each muscle has a start and end point known as the origin and insertion.

Origin

The muscle attachment site on a bone(s) that serves as a relatively fixed, motionless anchor point. This end is called the origin of a muscle and is described as the proximal attachment, i.e. the one nearest to the centre midline of the body. Muscles may have more than one origin, e.g. quadriceps (four) and triceps (three).

Example of an origin and insertion- biceps brachii



Insertion

The end of the muscle attached to the bone that usually moves during contraction is called the muscle insertion. The insertion is described as the distal attachment, i.e. the one furthest away from the centre midline. Muscles usually have a single insertion.

Types of muscle contractions

Muscles work and contract in different ways. They can contract and shorten, contract and lengthen or contract and stay the same length, with no movement occurring. A number of terms are used to help distinguish between these different types of muscular activity:

| | |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Isotonic | Muscles move under tension by either shortening or lengthening. These terms are known as: <ul style="list-style-type: none"> Concentric contraction: the muscle shortens under tension, i.e. the insertion moves towards the origin, for example the curling/upward phase of the bicep curl. Eccentric contraction: the muscle lengthens under tension, i.e. the insertion moves away from the origin, for example the straightening/downward phase of the bicep curl. |
| Isometric | The muscle remains the same length under tension, for example, holding a squat at the bottom of the movement. |

KEY POINTS

During the eccentric phase of an exercise (e.g. the lowering phase of a bicep curl), the working muscle still has to contract in order to control the movement, otherwise the triceps muscle would fire into action and potentially injure the elbow joint due to the strain placed upon it.



Roles of different muscles during movement

Efficient human movement is dependent on the coordinated activity of whole groups of muscles and will involve varying combinations of different muscle actions happening simultaneously. During any movement, different muscles can be working in the following ways:

- Agonist or prime mover:** This is the muscle(s) that contracts and causes a desired action, e.g. the biceps brachii contracts during a bicep curl or the quadriceps contract during a leg extension.
- Antagonist:** This is the opposing muscle(s) to the agonist that is relatively relaxed, e.g. the triceps brachii during a bicep curl or the hamstrings during a leg extension.
- Synergist:** This is the muscle(s) that contracts to assist or modify the movement of the prime mover, e.g. during hip extension the hamstrings act as synergists for the gluteus maximus.
- Fixators:** These are the muscles that contract to stabilise the part of the body that remains fixed, e.g. shoulder girdle muscles stabilise the scapula to allow for efficient movement at the shoulder joint when the arm moves.

Joint movements caused by concentric contractions

When specific muscles contract and shorten (concentric muscle work) they pull on bones to create an action or movement at the joints they cross. The table below identifies the different joint actions and movements that are brought about when specific muscles contract and shorten (concentric muscle work) while working in the role of a prime mover.

| Muscle | Location | Origin (start point) | Insertion (end point) | Primary concentric actions |
|---------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Deltoids. | Shoulder. | Clavicle and upper scapula. | Upper humerus. | Abduction, flexion and extension, horizontal flexion and extension and internal and external rotation of the shoulder joint. |
| Biceps brachii. | Front of the upper arm. | Anterior surface of the scapula. | Upper radius. | Flexion of the elbow and supination of the forearm. |
| Triceps brachii. | Back of the upper arm. | Posterior upper humerus and the scapula. | Upper ulna. | Extension of the elbow. |
| Latissimus dorsi. | Sides of the back. | Lower seven thoracic vertebrae, inferior angle of the scapula, thoracolumbar fascia and the iliac crest. | Anterior upper humerus. | Adduction, extension and internal rotation of the shoulder joint. |
| Trapezius. | Upper back. | Base of skull and spinous processes of C7-T12. | Lateral clavicle and upper surface of the scapula. | Elevation, retraction and depression of the shoulder girdle; extension, lateral flexion and rotation of the neck. |
| Rhomboids. | Mid-back. | Spinous processes of C7-T5. | Medial border of the scapula. | Retraction and elevation of the scapula. |
| Pectoralis major. | Chest. | Medial clavicle and sternum. | Upper humerus. | Flexion, horizontal flexion, adduction and internal rotation of the shoulder joint. |
| Erector spinae. | Either side of spine. | Sacrum, ilium, ribs and vertebrae. | Ribs, vertebrae and base of the skull. | Extension and lateral flexion of the spine. |
| Rectus abdominis. | Along the centre of the abdomen. | Pubis. | Cartilage of 5 th -7 th ribs and base of the sternum. | Flexion and lateral flexion of the spine and tilting the pelvis posteriorly. |
| Internal obliques. | Sides of the abdomen, deeper to external obliques. | Iliac crest and thoracolumbar fascia. | Lower three ribs, pubic crest and the fascial connection to the linea alba. | Rotation and lateral flexion of the spine. |
| External obliques. | Sides of the abdomen, closer to the surface - superficial. | Outer surface of the 5 th -12 th ribs. | Iliac crest, the pubis and the fascial connection to the linea alba. | Rotation and lateral flexion of the spine. |

| Muscle | Location | Origin (start point) | Insertion (end point) | Primary concentric actions |
|--------------------------------------------------------|----------------------------------------|------------------------------------------------------------------------------------------------|------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| Transversus abdominis. | Abdomen. | Iliac crest, thoracolumbar fascia and lower six ribs. | Pubis and fascial connection to the linea alba. | Compressing and supporting the abdominal contents. Deep stabiliser of the spine. |
| Diaphragm. | Beneath the ribcage. | Base of the sternum, inner surface of the lower six ribs and the upper three lumbar vertebrae. | Central tendon of the diaphragm. | Drawing the central diaphragmatic tendon downwards and increasing volume of the thorax. |
| Intercostals. | Between ribs. | Inferior border of the ribs and costal cartilages. | Superior border of the rib below. | Elevate the ribs to aid inspiration and draw the ribs down to aid expiration. |
| Hip flexors. | Through the pelvis and onto the femur. | Iliac fossa and all lumbar vertebrae. | Lesser trochanter of the femur. | Flexion and external rotation of the hip. |
| Gluteus maximus. | Bottom – buttocks. | Coccyx, sacrum and iliac crest. | Upper femur and iliotibial band (ITB). | Extension, external rotation and abduction of the hip. |
| Abductor group. Gluteus medius and minimus. | Outside of the upper thigh/hip. | Outer surface of the ilium. | Upper femur and upper tibia (via the ITB). | Abduction of the hip. |
| Adductor group. | Inner thigh. | The pubis and ischium. | Upper, mid and lower femur. | Adduction and internal rotation of the hip. |
| Quadriceps group. | Front of the thigh. | Anterior inferior iliac spine (AIIS) and the femur. | Anterior, upper tibia via the patella. | Flexion of the hip and extension of the knee. |
| Hamstrings group. | Back of the thigh. | Ischium and posterior surface of the femur. | Head of the fibula and upper, medial surface of the tibia. | Extension of the hip, flexion of the knee and tilting the pelvis posteriorly. |
| Gastrocnemius. | Calf. | Posterior, lower femur. | Calcaneus. | Plantarflexion of the ankle and flexion of the knee. |
| Soleus. | Calf. | Upper, posterior tibia. | Calcaneus. | Plantarflexion of the ankle. |
| Tibialis anterior. | Front of the lower leg. | Lateral, upper tibia. | 1 st metatarsal and medial tarsal. | Dorsiflexion and inversion of the ankle. |

The nervous system

All internal communication and coordination is the responsibility of the nervous system. Its primary role is to maintain a constant balance of the internal environment, known as **homeostasis**. It achieves this with the help of the brain and a huge, complex network of electrical nerves and chemical messages that run throughout the body.

Something extra

It is estimated that if you could join every nerve end to end, it would stretch around the world two-and-a-half times.

How the nervous system functions

To sum up the role of the nervous system, it is quite simply to:

1. Gather information (sensation).
2. Analyse the gathered information (integration).
3. Respond appropriately to the information (response).



Sensation

The nervous system gathers information about the internal and external environment. A vast array of sensors throughout the body (including the eyes, ears and internal proprioceptors) gather information about the internal environment (e.g. carbon dioxide levels in the blood) and the external environment (e.g. air temperature and space available).

BARORECEPTORS: Detect changes in blood pressure.

PROPRIOCEPTORS: Detect changes in muscle length and tension.

CHEMORECEPTORS: Detect changes in chemicals, e.g. taste, smell.

THERMORECEPTORS: Detect changes in temperature.

Integration (interpretation and analysis)

The nervous system interprets and analyses the information gathered from the sensors and decides on the most appropriate action. Many of these 'decisions' are automatic (involuntary) without conscious control, e.g. digestion. Others are consciously controlled, e.g. voluntary muscle action.

Response

The nervous system responds to the information analysed by initiating an appropriate reaction. Responses may include muscle contraction to perform a movement or lift a weight, or glandular secretion. The nervous system works closely with the endocrine system, which is responsible for releasing hormones (chemicals) to maintain homeostasis.

Structure of the nervous system

The nervous system consists of two primary divisions:

Central nervous system (CNS)

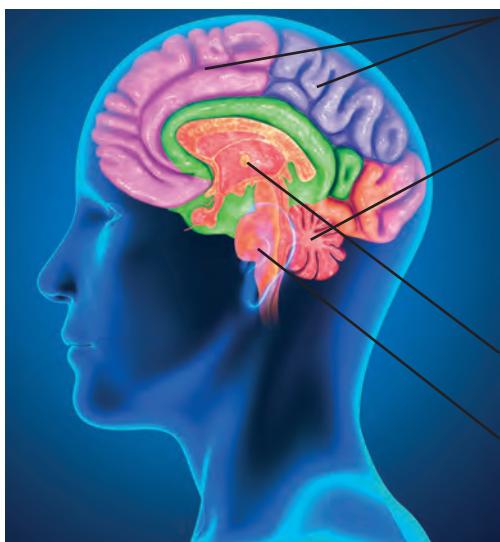
Peripheral nervous system (PNS)

Central nervous system (CNS)

The CNS is the control base for the whole nervous system. All nerve impulses that stimulate muscles to contract and create movement of the body originate from the CNS.

The CNS is comprised of the brain and the spinal cord.

The brain



Cerebrum

The largest and most superior aspect. This takes up most of the space in the skull.

Cerebellum

The smaller part; it is inferior to the cerebrum and posterior to the brain stem. The cerebellum acts as a memory bank for all learnt skills. The cerebellum is mainly responsible for controlling the group action of muscles. It communicates and works harmoniously with the cerebrum.

Diencephalon

Thalamus and hypothalamus.

Brain stem

Medulla oblongata, midbrain and pons – the stalk-like component at the inferior aspect of the brain. The lower portion is a continuation of the spinal cord.

The spinal cord consists of cervical, thoracic, lumbar and sacral segments, named according to the portions of the vertebral column through which they pass.

The spinal cord is the communication link between the brain and the peripheral nervous system (PNS). It integrates incoming information and produces responses via reflex mechanisms (reflex arc).

Peripheral nervous system (PNS)

The PNS consists of all the branches of nerves that lie outside the spinal cord. Its role is to transport messages through its network of nerve cells, to and from the CNS.

The peripheral nervous system subdivides into the:

- **Somatic system** which controls voluntary (conscious) movement of the skeletal muscles, e.g. standing, walking and lifting a weight.
- **Autonomic system** which controls involuntary functions, e.g. digestion and heart rate.



Neurons

Neurons (also called nerve cells) are responsible for transmitting electrical messages.

Spinal nerves are divided into motor and sensory neurons.

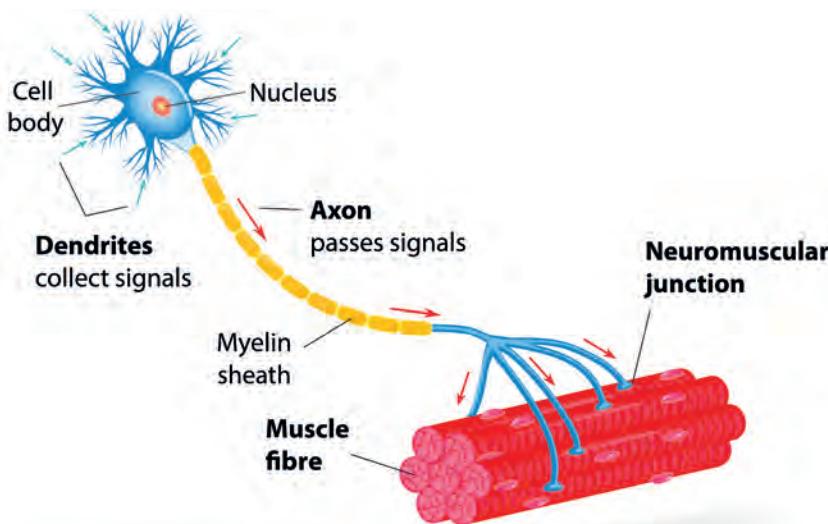
Sensory neurons

- These carry messages to the CNS from the sensory organs.
- Sensory nerves arrive on the posterior side of the spinal cord from a variety of sensory receptors spread throughout the body. For example, sensory receptors in the muscles are called proprioceptors; these relay information concerning the position of the body to the CNS, and this in turn helps improve movement efficiency and reduce the risk of injury by preventing overstretching.

Motor neurons

- These transmit impulses from the CNS to muscles and glands with specific instructions, such as causing muscles to contract and glands to secrete hormones.
- These exit on the anterior side of the spinal cord.

Structure of a neuron



An individual neuron consists of:

- The **cell body** which directs the activities of the neuron.
- The **nucleus**, which stores the cell's genetic information, i.e. DNA. In simple terms, it tells the cell 'what to do'.
- **Dendrites**, which pick up impulses and transmit these to the cell body.
- The **axon**, which transmits messages away from the cell body.
- The **myelin sheath**, which insulates the axon to speed up the transport of messages.

Something extra

The brain has over 100 billion neurons and the body contains millions. Neurons are highly specialised in terms of structure, function and the way in which they link together to communicate.

The combined work of the muscular and nervous systems

Without the nervous system, bodily movement would not occur as muscles quite simply would not know what to do.

To lift a weight, for example:

- The eyes gather information (estimate how heavy the weight is and where and how it is positioned). This information is sent to the CNS to be processed.
- The brain sends information on how to position the body, which muscles to contract and the number of motor units to recruit to perform the lift.
- Once they are stimulated to contract, the muscles pull on the bones and create appropriate movement of the joints, through the sliding action of the myofilaments (myosin and actin).

This, in effect, is the neuromuscular system at work.

Motor unit recruitment and the 'all or none' law

A motor unit consists of a single motor neuron and all the muscle fibres it innervates (activates). A single motor neuron may be responsible for innervating thousands of muscle fibres, depending on its location and function. This concept is known as the innervation ratio.

When an impulse is sent down a neuron, all the muscle fibres within that motor unit are innervated. The motor unit activates **all** of its fibres **or none** at all. This is known as the 'all or none' law.



The 'all or none' law applies to individual motor units, not the entire muscle. Only the muscle fibres stimulated by the motor unit(s) recruited will contract.

Number and size of motor units

The number and size of motor units in specific areas of the body depend on their role and function.

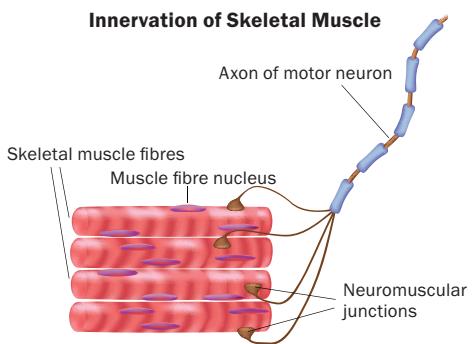
Muscles responsible for strength and large force generation, such as the quadriceps and gluteals, tend to have motor units with a larger innervation ratio e.g. 1:2000. Muscles involved in finer, intricate movement, such as the fingers, tend to have a much lower innervation ratio e.g. 1:50.

The hands, for example, have a lot of small motor units and these supply fewer fibres to enable finer, more intricate movement, e.g. playing a musical instrument or using a computer.

The legs and muscles involved in maintaining posture have fewer motor neurons, but these are larger and supply more muscle fibres. Maintaining posture and movement of the legs to walk, kick, run and jump is less intricate than the movement of the hands.

A motor unit is typically made up of one type of muscle fibre (slow or fast twitch) spread throughout the muscle:

- For tasks requiring less effort, smaller neurons controlling slow twitch fibres are recruited.
- For tasks requiring more effort, larger neurons controlling fast twitch fibres are recruited.



Neuromuscular sensory organs

There are different muscle sense organs that form part of the autonomic nervous system:

- **Joint receptors** are found in the ligaments and joint capsule. They inform the brain about the position of the joint.
- **Muscle spindles** are found in the muscle belly and inform the brain about the length of a surrounding muscle fibre – this helps to prevent overstretching and resultant damage.
- **Golgi tendon organs (GTOs)** are found in the tendons and tell the brain how much tension a muscle is under. In extreme cases, where the muscle cannot withstand the amount of tension, the GTOs will cause the muscle to relax to avoid injury.

The lifecycle of the neuromuscular system

Early years

This is the period of most significant growth for all of the body's systems, including the neuromuscular system.

Over this period, neural pathways (motor connections) increase rapidly in number to develop specific movement patterns and motor skills, such as coordination and balance. Postural and stabilising muscles also grow very quickly to progress a newborn baby from not having the ability to hold any body part upright, to having head control and being able to sit up on their own, and eventually walking within the first 12–18 months of life.

The two main factors that influence the rate of neuromuscular development in early years are:

- **Genetics:** Each individual has a genetic potential for maximum growth, which is shaped by the genes passed on by our parents and grandparents.
- **Environment:** Opportunities to support neuromuscular development, or restrictions that could hinder it, strongly affect the potential for neuromuscular development in early years. For example, a child that spends more time taking part in physical activity, especially if it has a particular focus on developing motor skills, will be much more likely to fulfil their genetic potential for growth than a child that is restricted to a more sedentary lifestyle.

Muscle, as a percentage of body mass, increases from about 42% to 54% in boys between the ages of 5 and 11; in girls, it increases from about 40% to 45% between the ages of 5 and 13 and thereafter declines (Malina et al., 2004).

Pubescent period

Up until puberty, neuromuscular development is fairly similar between girls and boys – this changes dramatically during adolescence. The growth of new neural pathways slows down significantly in both sexes, however the growth of muscle tissue (hypertrophy) increases at a much higher rate in boys than girls. This is due to a surge in sex hormones (testosterone in boys and oestrogen in girls); testosterone primarily stimulates muscle and bone growth in males, whereas in females, oestrogen stimulates increases in bone, muscle and female specific fat tissue in preparation for bearing children.

Adulthood and later years

It is commonly accepted that we continue to grow in different ways until our mid-20s, with many individuals finishing their development even earlier. The neuromuscular system is the same; neural pathways and muscular growth that aren't related to exercise come to a halt around the age of 25. If we continue to challenge the neuromuscular system, there is the potential for further growth beyond our mid-20s.

One of the effects of ageing on the nervous system is the loss of neurons. By the age of 30, the brain begins to lose thousands of neurons each day. The cerebral cortex can lose as much as 45% of its cells and the brain can weigh 7% less than in the prime of our lives. In conjunction with the loss of neurons comes a decreased capacity to send nerve impulses to and from the brain. Because of this, the processing of information slows down. Additionally, the voluntary motor movements slow down.

Loss of cells from the motor system occurs during the normal ageing process, leading to a reduction in the complement of motor neurons and muscle fibres. The latter age-related decrease in muscle mass has been termed 'sarcopenia' and is often combined with the detrimental effects of a sedentary lifestyle in older adults.

Clear evidence of this ageing effect is seen when voluntary or stimulated muscle strength is compared across the adult lifespan, with a steady decline of approximately 1–2% per year occurring after the sixth decade (Vandervoort, 2002).

Short-term effects and long-term benefits of exercise on the neuromuscular system

| Short-term, immediate effects | Long-term benefits |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Increased muscle temperature. Increased muscle pliability (ability to stretch further). Increased power output from muscles. Increased nerve-to-muscle link. Increased recruitment of muscle fibres. | <ul style="list-style-type: none"> Increased muscular endurance/hypertrophy/strength (depending on the intensity of training). Increased stores of glycogen and creatine phosphate in muscle. Increase in contractile proteins, actin and myosin. Increased basal metabolic rate (ability to burn calories at rest). Improved posture. Increase in the size and number of capillaries surrounding muscle fibres. Increased neuromuscular connections, leading to improvements in skill- and motor-related fitness (coordination, reaction time, agility, power, balance and speed). Increased recruitment of motor units, leading to a stronger force generation. |

END OF SECTION

Revision activities

Answer the following questions and make notes to revise this section.

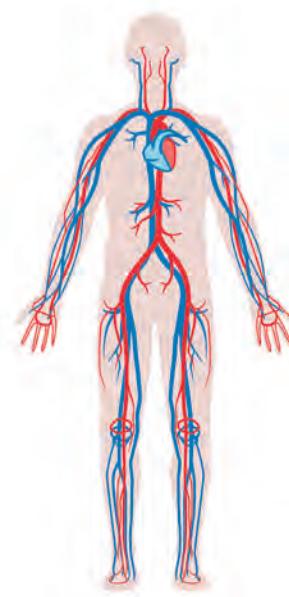
- What are the three types of muscle tissue found in the body?
- What are the four key characteristics of muscle tissue?
- What is the name given to the outer layer of a whole muscle?
- What is the name given to the covering of a bundle (fascicles) of muscle fibres?
- What is the name given to the covering of an individual muscle fibre?
- What is the name given to the two contractile filaments of a muscle?
- What are the key differences between slow and fast twitch muscle fibres?
- What is the name of the muscle at the front of the upper leg?
- What is the name of the muscle at the back of the lower leg?
- Where would you find the trapezius muscle?
- Where would you find the erector spinae muscle?
- Describe each of the following muscle contractions:
 - Isometric.
 - Isotonic.
 - Concentric.
 - Eccentric.
- Which muscle flexes the knee?
- Which muscle extends the elbow?
- Which muscle abducts the shoulder?
- Which muscle flexes the spine?
- Which muscle dorsiflexes the ankle?
- Name the antagonist of the following prime movers:
 - Rectus abdominis.
 - Biceps brachii.
 - Hamstrings.
 - Gastrocnemius.
 - Deltoids.
- What is the role of the nervous system?
- Which two structures make up the central nervous system (CNS)?
- Which two systems does the peripheral nervous system (PNS) subdivide into?
- Identify the two types of neuron that send messages to and from the brain.
- Identify the structures found in a neuron.
- What is the role of the myelin sheath?
- Describe the 'all or none' law.
- What are the long-term benefits of exercise on the neuromuscular system?

Section 3: Cardiovascular and respiratory systems

The cardiovascular and respiratory systems combine to draw oxygen into the body, transport it to the tissues that need it and then remove any waste products such as carbon dioxide. This process is vital for the survival, maintenance and functioning of all of the body's tissues.

The cardiovascular system

The cardiovascular system (sometimes called the circulatory system) is comprised of the heart, blood vessels and blood. It is responsible for transporting oxygen and other important nutrients to the body's tissues, including the working muscles, and for removing waste products, such as carbon dioxide.



Structure and function of the heart

The heart is essentially a muscular pump which pushes oxygen and nutrients around the body to the tissues. It is about the size of a man's clenched fist and lies behind the sternum, just left of the centre. It is positioned between the right and left lungs.

The heart is a cardiac muscle. It is made up of thick muscular walls (myocardium) and divided into halves:

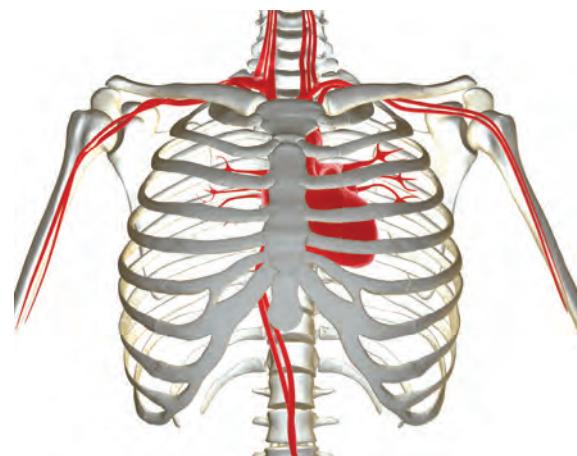
- The right half receives blood from the body and pumps it to the lungs.
- The left half receives blood from the lungs and pumps it to the body.

There are four heart chambers in total:

- The two upper chambers (atria) receive blood from the veins.
- The two lower chambers (ventricles) pump blood into the arteries.

Something extra

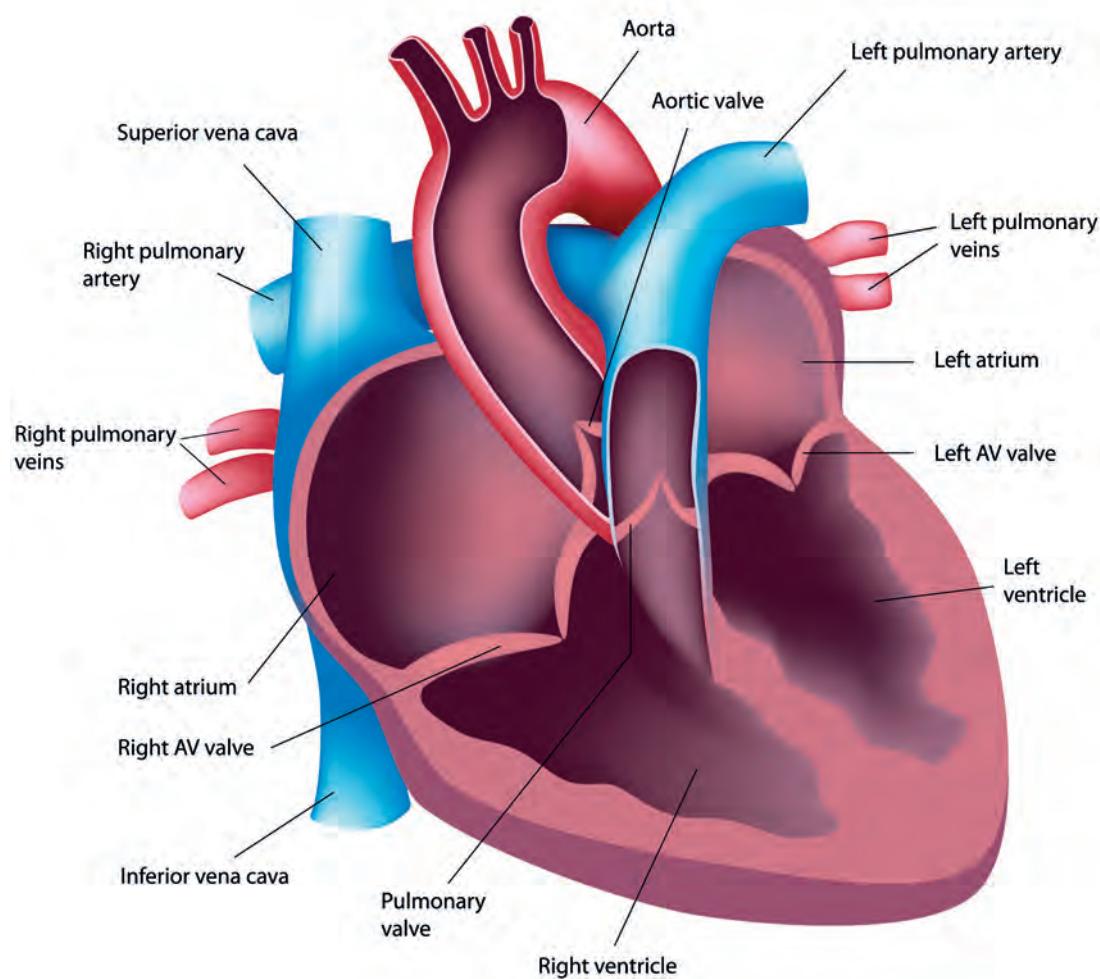
The intricate network of blood vessels in a human body would reach out for 100,000km, equivalent to almost two and a half times around the Earth.



The **atria** receive blood via the veins from different parts of the body and pump it down into the ventricles. They are smaller than the ventricles and do not require high levels of pressure to do their job. Even if the atria fail to contract properly, most of the blood inside them still flows into the ventricles passively.

The **ventricles** supply the force to push the blood to its various destinations. The left ventricle has larger muscular walls than the right ventricle. This is because the left side pumps its contents to the furthest parts of the body, whereas the right side only has to pump blood to the adjacent lungs.

Internal anatomy of the heart



Heart valves

There are a number of different valves around the heart, which all perform slightly different tasks.

The atrioventricular (AV) valves separate the atria and ventricles and prevent the flow of blood back into the atria during ventricular contraction.

The semilunar valves prevent the flow of blood back into the right (pulmonary valve) and left ventricles (aortic valve) during ventricular relaxation.

Heart rate

The heart is stimulated to contract by a complex series of integrated systems. The heart's pacemaker – the sinoatrial node (SAN) – initiates cardiac muscle contraction. The SAN is located in the wall of the right atrium. The myocardium (heart muscle) is stimulated to contract about 72 times per minute by the SAN as part of the autonomic nervous system.

Blood pressure

Blood pressure is a measure of the force that the blood applies to the walls of the arteries as it flows through them.

Blood pressure is measured in millimetres of mercury (mmHg) and is expressed using two numerical readings. The optimal blood pressure reading is written as 120/80mmHg. These two numbers represent the systolic and diastolic blood pressures, respectively.

Systolic blood pressure (SBP) is the pressure exerted on the artery walls when the cardiac muscle is contracting and pumping blood. This is the higher of the two numbers and is usually noted first. It is caused by the rise in volume of blood flowing through the arteries with each beat, which increases the pressure within the arteries.

Diastolic blood pressure (DBP) is the pressure exerted on the artery walls when the heart is in a relaxed state. The heart goes through this period of relaxation (or diastole) to allow the chambers to fill with blood prior to contraction. The diastolic blood pressure is always the lower of the two readings.

Control of circulatory blood flow

The blood vessels are able to narrow (vasoconstrict) or widen (vasodilate) because of the smooth muscle found in their walls. More or less blood will flow through them as a result. This enables the body to direct the flow of blood to different tissues, depending on where the oxygen and nutrients are required. It also plays a part in the regulation of blood pressure.

After a meal, the blood vessels that feed the digestive system are vasodilated and blood flow is increased to assist digestion, while blood vessels feeding the muscles are vasoconstricted, reducing local blood flow. During exercise the opposite happens; more blood is routed to the muscles and less is available to the digestive organs and smooth muscle of the digestive tracts.

Eating a large meal too close to a training session or match will not allow enough time for the food to be digested in the stomach, causing cramp and sometimes vomiting.

Blood pressure is an expression of the arterial blood flow and the peripheral resistance the blood encounters as it flows around the body. It can therefore be expressed in the following equation:

$$\text{Blood pressure} = \text{Cardiac output} \times \text{Total peripheral resistance}$$

Cardiac output is the volume of blood pumped out by the heart in one minute (ml/min). The greater the cardiac output, the higher the blood pressure.

Total peripheral resistance is the resistance the blood vessels offer to blood flow. The greater the resistance, the higher the blood pressure. Peripheral resistance is increased by constriction or decreased by dilation of the blood vessels (arterioles).

The blood circulation is a closed system in which the pressure varies constantly. It rises to a peak at the height of the contraction of each heartbeat as the heart pumps blood out. It then falls to a lower level, which it reaches just before each heartbeat.

Optimal blood pressure for reducing the risk of cardiovascular disease (CVD) is below 120mmHg for systolic and 80mmHg for diastolic pressure (ACSM, 2017). Readings much lower than this may have some clinical significance but are not associated with increased CVD risk.

Readings above optimal level pose an increased cardiovascular risk. Readings above 180mmHg systolic and 110mmHg diastolic are a contraindication for exercise.

| Category | Systolic (mmHg) | Diastolic (mmHg) |
|---------------------------------------|-----------------|------------------|
| Low | <100 | <60 |
| Optimal | <120 | <80 |
| Normal | <130 | <85 |
| High normal – Pre-hypertension | 130–139 | 85–89 |
| Stage 1 hypertension | 140–159 | 90–99 |
| Stage 2 hypertension | 160–179 | 100–109 |
| Stage 3 hypertension | >180 | >110 |

Circulation of blood

All mammals, including humans, have a double circulatory system. Blood passes through the heart on two occasions, once through the **pulmonary circulation** and once through the **systemic circulation**.

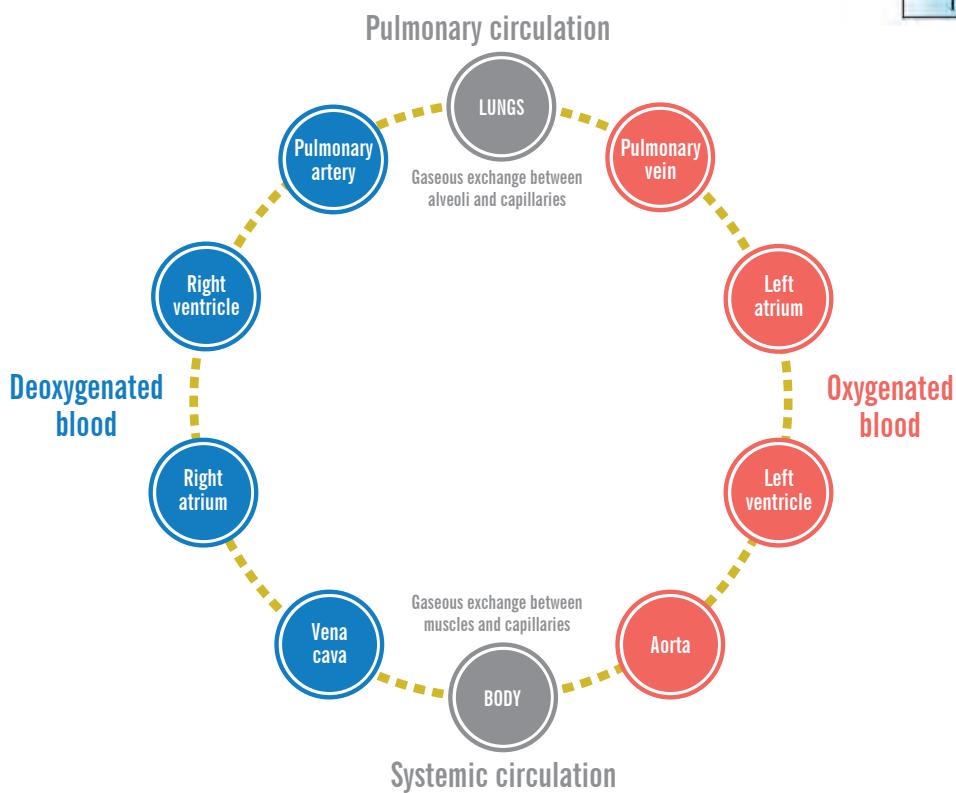
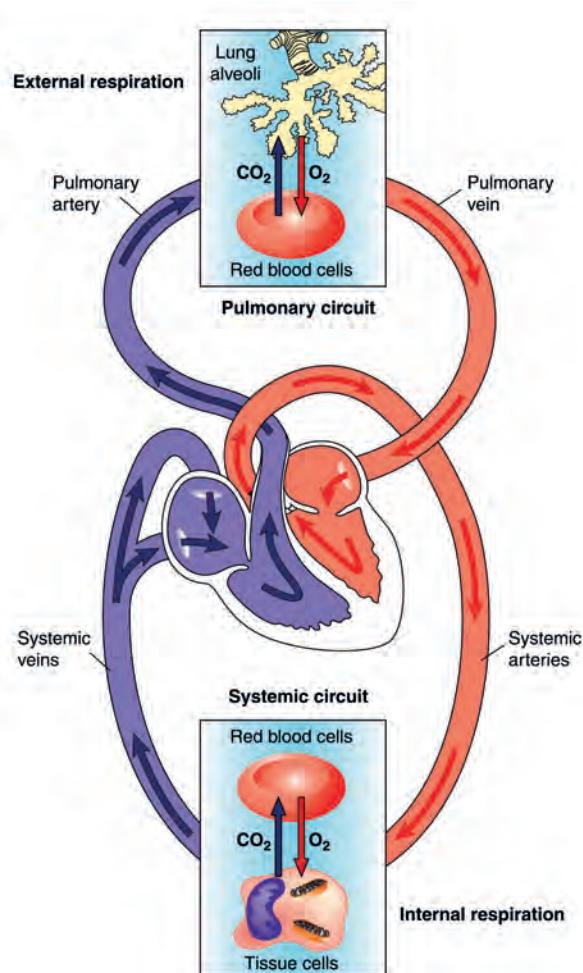
Pulmonary and systemic circulation

Pulmonary circulation is the circulation between the heart and lungs.

- The pulmonary heart chambers are the left atrium and right ventricle.
- The pulmonary blood vessels are the pulmonary artery and the pulmonary vein.

Systemic circulation is the circulation between the heart and the body.

- The systemic heart chambers are the left ventricle and right atrium.
- The systemic blood vessels are the aorta and the inferior and superior vena cava. The inferior vena cava carries blood from the lower body. The superior vena cava carries blood from the upper body.



Something extra

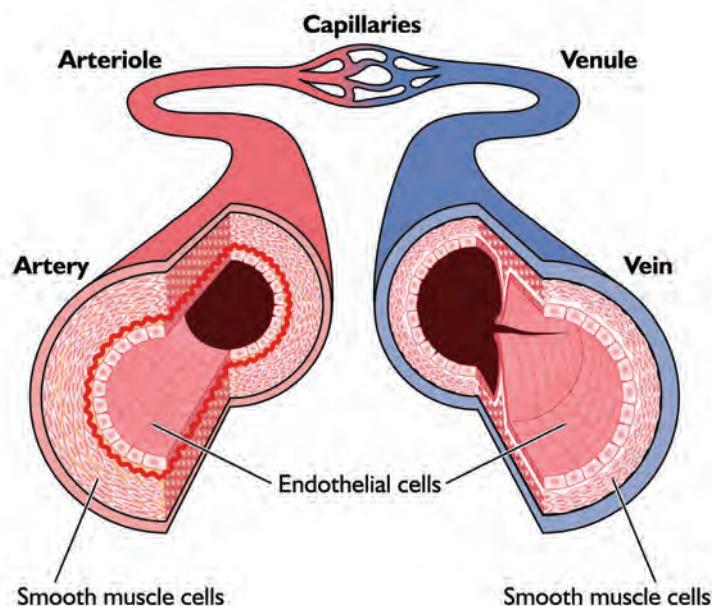
Deoxygenated blood is dark red in colour, but may appear bluish when viewed through blood vessel walls. It is normally coloured blue when shown in diagrams of the heart.

Oxygenated blood is bright red in colour. It is normally coloured red when shown in diagrams of the heart.

Structure and function of blood vessels

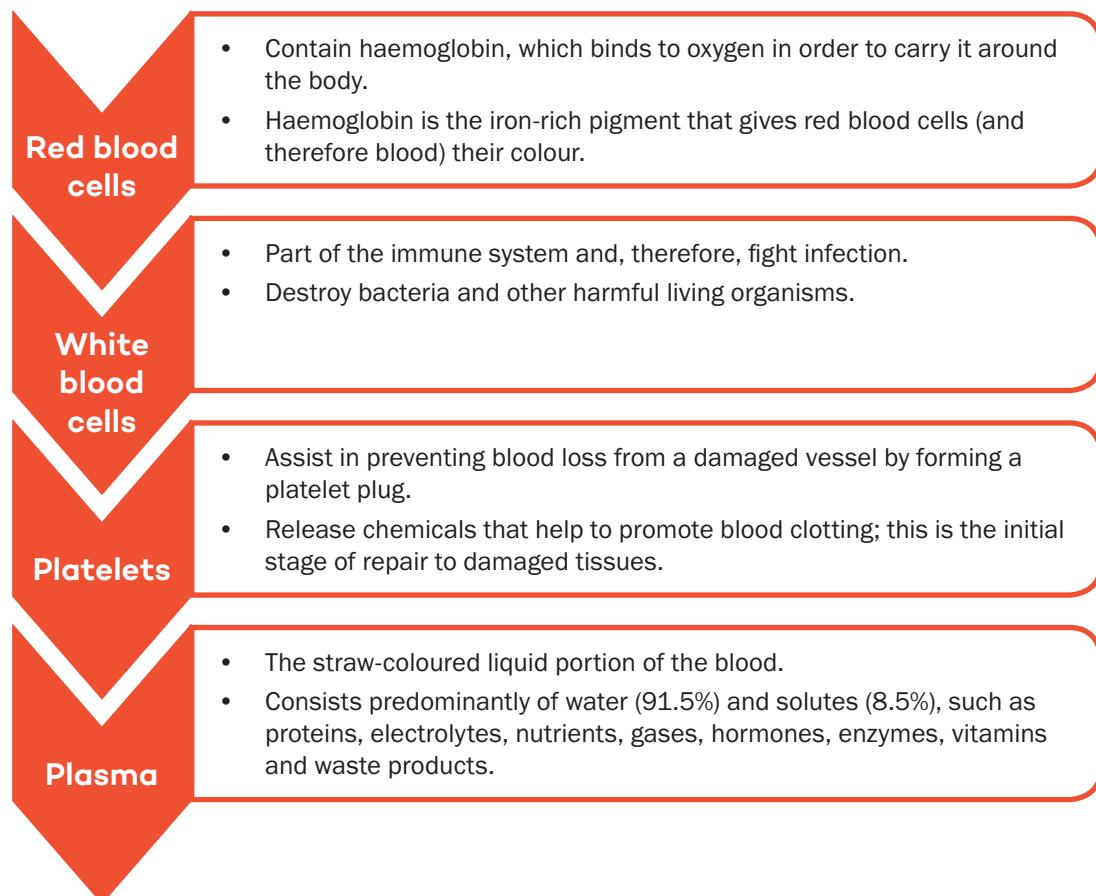
As the name suggests, blood vessels are responsible for carrying blood around the body. There are various types of blood vessels, which are differentiated by their shape, size and function.

| Blood vessel | Structure | Function |
|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Arteries. | <ul style="list-style-type: none"> Thick, muscular walls. Subdivide into smaller blood vessels called arterioles. The largest artery is the aorta, which leaves the left ventricle carrying blood under the highest pressure. | <ul style="list-style-type: none"> Carry blood under high pressure away from the heart. All carry oxygenated blood except the pulmonary artery. |
| Veins. | <ul style="list-style-type: none"> Thinner walls than arteries with little muscle. Subdivide into smaller blood vessels called venules. Contain one-way valves to prevent blood from flowing in the wrong direction. | <ul style="list-style-type: none"> Carry blood towards the heart under low-to-moderate pressure. All carry deoxygenated blood except the pulmonary vein. |
| Capillaries. | <ul style="list-style-type: none"> Extremely thin walls (approximately one cell thick). Link arteries to veins. Significantly higher in number than arteries and veins. | Allow for diffusion of gases and nutrients throughout the body, including muscle tissues. |



Components of blood and their function

Blood is the substance that carries nutrients and oxygen to all structures of the body and removes waste products and carbon dioxide. Blood is composed of a number of cells suspended in a liquid called plasma. Blood consists of the following four components:



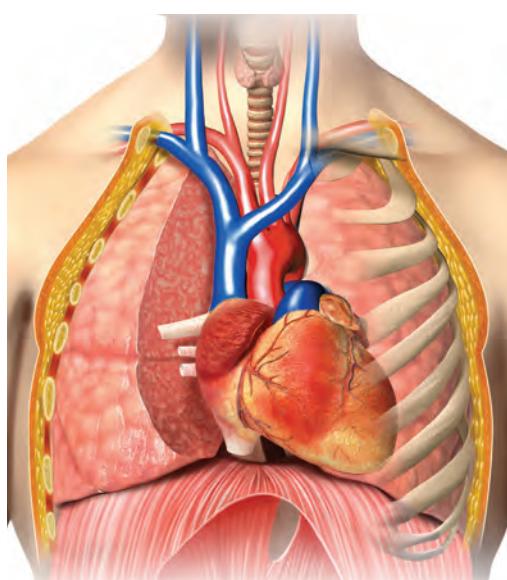
Something extra

The body contains approximately 240–270 million red blood cells in every drop of blood. Blood volume usually consists of about 40% red blood cells.

There are fewer white blood cells than red blood cells (approximately 700 times fewer).

The respiratory system

The respiratory system is responsible for the intake of oxygen from the air into the body and the removal of carbon dioxide from the body into the air. It consists of the lungs and respiratory muscles (the diaphragm and intercostal muscles).



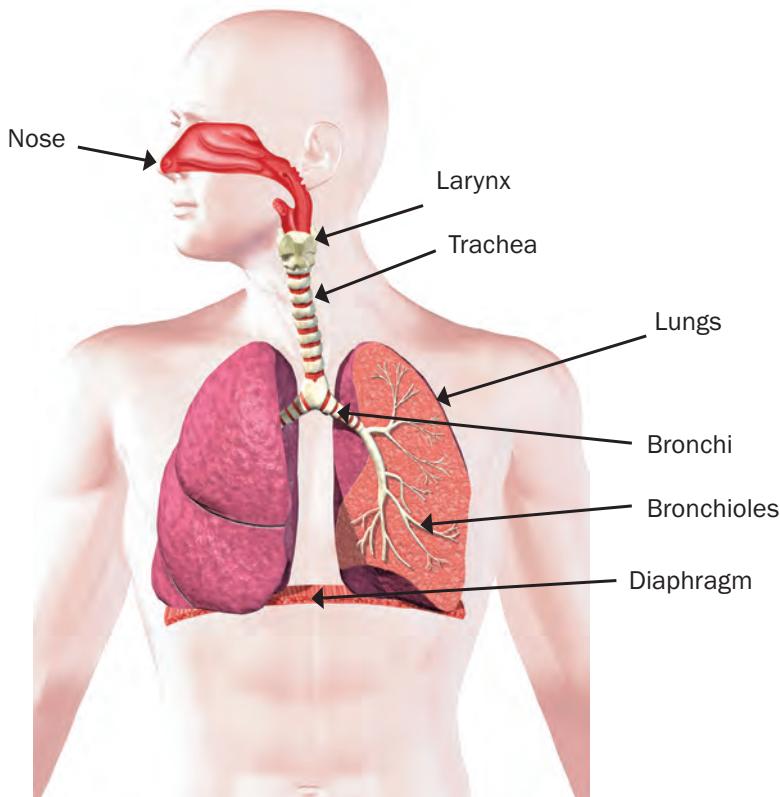
The respiratory system works interdependently with the circulatory system, ensuring the supply of oxygen keeps the body alive and performing its daily functions. It is essential for aerobic energy production and muscle work.

Structure and function of the lungs

The lungs are sponge-like structures that fill up most of the thoracic cavity (thorax) and are protected by the ribs on either side. A large sheet of muscle at the bottom of the ribcage (the diaphragm) separates the thorax from the abdomen.

The primary function of the lungs is gaseous exchange, i.e. receiving vital oxygen and passing it through to the circulatory system, while ensuring potentially harmful waste products, such as carbon dioxide go in the opposite direction and are expelled from the body.

Carbon dioxide and oxygen leave the body in the reverse direction during exhalation.



Nose and mouth

Pharynx (throat) and larynx (voice box)

Trachea

Bronchi / bronchus

Bronchioles

Alveoli

The mechanics of breathing

The two main mechanisms that trigger the human body to breathe are:

- Rising levels of carbon dioxide in the blood.
- Stretch receptors in the respiratory muscles (intercostal muscles) becoming stretched.

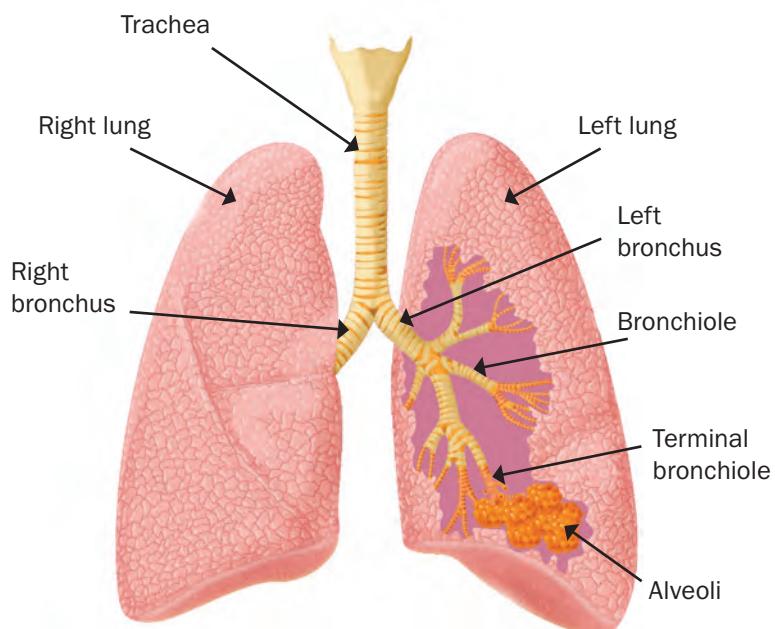
The main muscles involved in the action of breathing are the diaphragm and the internal and external intercostal muscles.

The main phases of the breathing cycle are:

- Inspiration/inhalation – drawing air into the lungs.
- Expiration/exhalation – expelling air from the lungs.

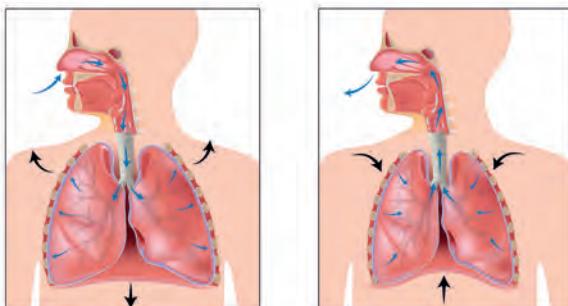
There is also a short pause before both inspiration and expiration.

During inspiration, the diaphragm muscle contracts, causing the normal 'dome shape' to flatten. The external intercostal muscles also contract, raising the ribcage. These actions increase the chest cavity volume. This increase in volume creates a negative pressure between the air in the lungs and air in the atmosphere. This is very much like a vacuum effect in which the negative pressure sucks air into the lungs until the two pressures are balanced.



During expiration, the diaphragm muscle relaxes and rises, returning upwards to its dome shape. The intercostal muscles also relax, decreasing the chest cavity volume. This creates a positive pressure, which 'pushes' some of the air out of the lungs.

During exercise, when breathing becomes more vigorous, the internal intercostal muscles become active. During expiration, they contract, forcing the ribs down and removing the air in the lungs.



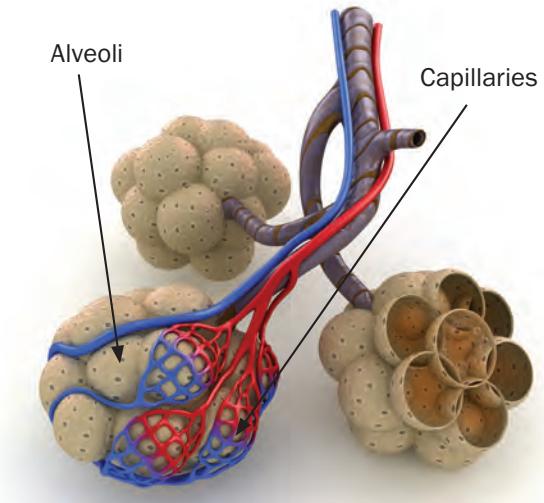
Inspiration

Expiration

Gaseous exchange

Gaseous exchange occurs in the lungs and the cells of the body. During gaseous exchange:

- Oxygen (O_2) in the alveoli (air sacs in the lungs) diffuses into the bloodstream (capillaries surrounding the alveoli) and travels to the heart where it is circulated around the body.
- Carbon dioxide (CO_2) is transported from the body via the blood. It diffuses into the alveoli where it is removed during expiration.
- Oxygen in the blood (travelling from the heart) diffuses into the cells (mitochondria) for aerobic energy production.
- Carbon dioxide from the cells diffuses into the blood where it is circulated back to the heart and then into the lungs for removal during expiration.



Diffusion

Gaseous exchange occurs through a process called diffusion, which is the movement of a gas from an area of high concentration to an area of low concentration. The concentration of oxygen decreases between the mouth and the lungs, therefore the gas flows in this direction. Carbon dioxide flows in the opposite direction.

Once the oxygen gets into the alveoli, it continues to follow this concentration gradient and diffuse into the bloodstream. The alveoli have minute capillaries running over and around them. The alveolar walls and the capillary walls are so thin that they allow gases to pass through them; oxygen passes into the blood and, at the same time, carbon dioxide passes back into the lungs to be exhaled.

The combined work of the cardiovascular and respiratory systems

Haemoglobin (Hb) is the protein in red blood cells that carries oxygen, carbon dioxide and carbon monoxide (CO) in the blood. The oxygen binds to the haemoglobin in the red blood cells and, at the same time, carbon dioxide dissociates from the haemoglobin and diffuses from the blood into the alveoli in the lungs to be removed from the body.

The red blood cells are transported via the circulatory system.

- Oxygen from the lungs is carried by the red blood cells to the heart where it is pumped from the heart to the body.
- Carbon dioxide from the cells is carried by the red blood cells back to the heart and into the lungs.

The lifecycle of the cardiovascular and respiratory systems

Early years

As with all of the body's systems, the cardiovascular and respiratory systems experience rapid growth in early years as we move away from the comfort of the womb and adapt to our new environment.

At birth, the mass (weight) of the right ventricle is equal to that of the left ventricle. However, with time and exposure to high volume and pressure of blood flow, the left ventricle grows in size at a significantly higher rate; by early childhood it is double the size of the right ventricle (Klabunde, 2005).

At birth, about 15% of a person's total quota of alveoli have formed (i.e. 45 million out of the 300 million that are acquired by adulthood). A child will develop a lot of air sacs very quickly within the first six months of their life (Strang, 1977).

A baby's breathing rate is higher (30–60 breaths per minute) than that of an adult (12–20 breaths per minute).

By the time a child reaches the age of three, their lungs and heart look like a mini version of that of an adult. From this stage onwards, the lungs get bigger as the person grows; when they stop growing, so does the size of their major cardiorespiratory organs.

Later life

Important changes occur in the cardiovascular and respiratory systems with advancing age, even in apparently healthy individuals. Some examples of the deterioration that occurs within these systems, in older age, are:

- Thickening and stiffening of the large arteries, which cause systolic blood pressure to rise with age, while diastolic pressure generally declines after the sixth decade.
- A decline in aerobic exercise capacity of approximately 10% per decade from the age of 40 onwards.
- Changes in the shape of the ribcage, as bones become thinner and reshape, meaning it cannot expand and contract as well during breathing.
- Weakening of the diaphragm, which can prevent a person from breathing enough air in or out.
- A loss of function in the part of the brain that controls breathing. When this happens, the lungs are not able to get enough oxygen or expel enough carbon dioxide from the lungs, making breathing more difficult.

Short-term effects and long-term benefits of exercise on the cardiovascular and respiratory systems

| Short-term, immediate effects | Long-term benefits |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Increased heart rate (bpm). • Increased breathing frequency. • Increase in systolic blood pressure. • Increased vasodilation (widening) of blood vessels towards the working muscles. • Increased volume of air in the lungs. • Increased stroke volume (amount of blood pumped from the heart per contraction). • Increase in cardiac output (volume of blood pumped from the heart in a minute). | <ul style="list-style-type: none"> • Decreased resting and working heart rate. • Increased aerobic capacity. • Normalised blood pressure. • Increased hypertrophy (muscle growth) of the left ventricle. • Increased size and elasticity of the arteries. • Increased capillary network, allowing more diffusion of gases. • Increased strength of the respiratory muscles (diaphragm and intercostals) • Increased stroke volume and cardiac output. • Reduced levels of bad cholesterol in the blood (low-density lipoproteins or LDLs). • Increased blood volume. • Increased size and number of mitochondria. |

Answer the following questions and make notes to revise this section.

- Where is the heart located?
- What is the name of the upper chambers of the heart?
- What is the name of the lower chambers of the heart?
- What is the role of heart valves?
- What blood pressure reading would be considered stage 1 hypertension?
- Describe systemic blood circulation.
- Describe pulmonary blood circulation.
- Identify the structural differences of arteries, veins and capillaries.
- Identify the functional differences of arteries, veins and capillaries.
- What are the four components of blood?
- Where are the lungs located?
- Describe the passage of air into the lungs.
- What are the two main respiratory muscles responsible for inhalation and exhalation?
- Describe gaseous exchange.
- What are the long-term benefits of exercise for the cardiovascular and respiratory systems?

Section 4: Energy systems

All functions of the body require energy, including muscle contraction to move the skeleton, digestion of food, respiration and repair and growth of tissues.

In order for these key functions to take place, important chemical reactions are continually occurring at cellular level throughout the body.

Adenosine triphosphate

All living organisms need the high-energy molecule, adenosine triphosphate (ATP) to function, much like a car needs petrol or diesel.

ATP is considered the energy currency of cellular life and the only fuel the human body recognises and uses. Its role is to capture chemical energy, obtained from the breakdown of food molecules, and release it to fuel other cellular processes.

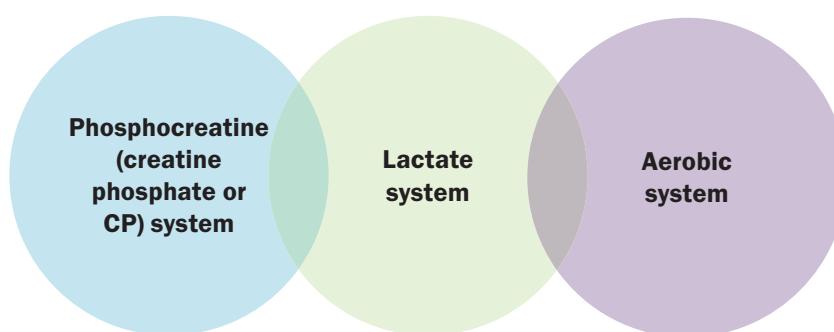
Structure of ATP

ATP is composed of one adenose molecule bonded with three phosphate molecules. ATP releases its energy when one of its high-energy phosphate bonds is broken and it is converted to adenosine diphosphate (ADP). When this high-energy bond is broken down, energy is released.

There is a very limited store of ATP within the muscles; it only lasts for approximately 1–2 seconds. Once the limited store of ATP has been used up, it has to be remade. Re-synthesis of ATP comes from the breakdown of either phosphocreatine (another chemical in the body) or certain nutrients in the diet, such as carbohydrate, fat and protein, which can be used to replenish stores.

The different energy systems

There are three energy systems, which all use different fuels to convert the ADP back into ATP for use by the cells. These energy systems are:



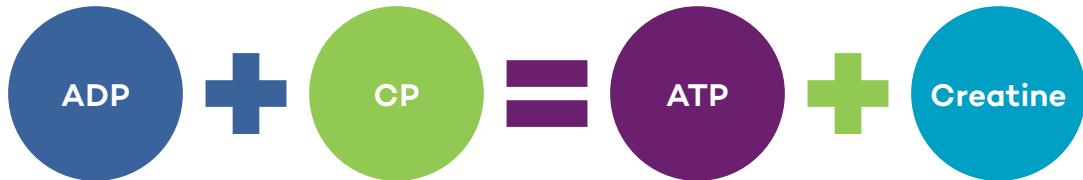
Something extra

ATP has an incredible ability to regenerate itself. In order to supply the body with its daily energy requirements, each ATP molecule is regenerated between 2000–3000 times per day.

Creatine phosphate (CP) or phosphocreatine system

The CP system provides ATP to primarily fuel high-intensity, explosive activity such as a shot put, 100m sprint or power lifting movement. It is also used to initiate most movement, regardless of intensity, as it is readily available in muscle tissue and doesn't have to wait for the heart to push oxygen to the specific areas.

CP benefits significantly from its chemical makeup, which allows it to regenerate ATP almost immediately by using its phosphate molecule:



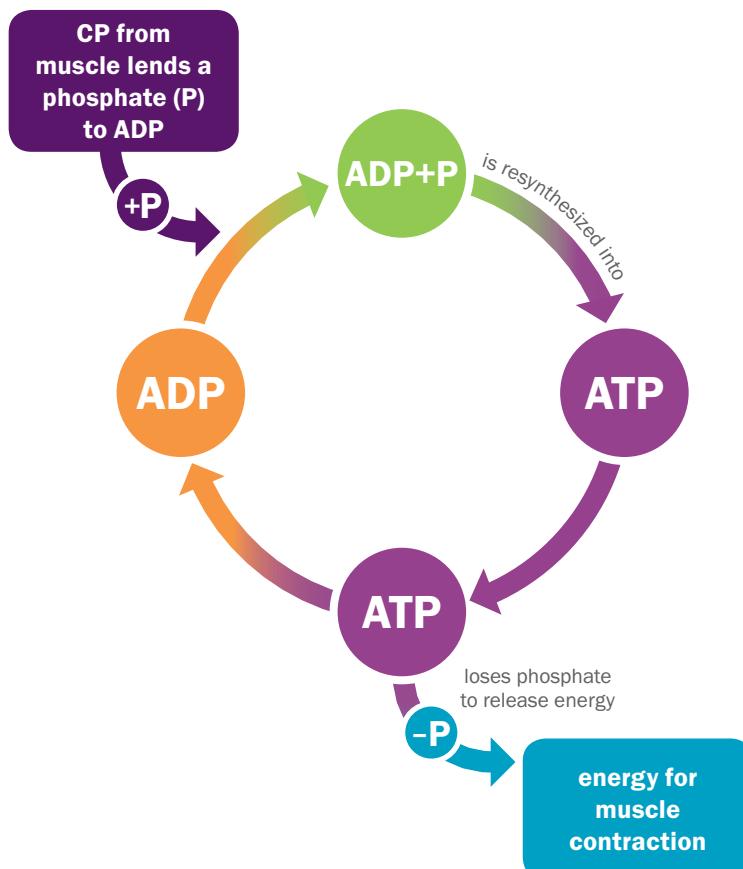
Creatine phosphate, like ATP, has a high-energy bond which, when broken down by the enzyme, creatine kinase, releases enough energy to yield an ATP molecule. This chemical reaction is very quick but only lasts for a very short period of time because of limited creatine phosphate stores. The CP system is exhausted after a maximum of ten seconds.

Lactate system

The lactate system is used to predominantly fuel high-intensity exercise that lasts longer than 10 seconds, e.g. a 400m race. It also becomes involved in low-moderate intensity exercise when the demand for oxygen and glycogen stored in the liver cannot be met.

The lactate system taps into stores of glycogen (stored form of carbohydrate) in the muscles to fuel ATP by breaking it down into glucose without the presence of oxygen. The conversion of glucose to lactic acid occurs

constantly within the body and only becomes a problem when lactic acid starts to accumulate. If the rates of lactic acid production and removal are equal then there is no problem, but if the production of lactic acid exceeds the muscles' and cardiovascular system's ability to disperse it, it will lead to a build-up, which will eventually cause the cessation of activity. This is known as the onset of blood lactate accumulation (OBLA), which is associated with certain sensations, such as laboured breathing (or breathlessness), 'heavy' limbs and pain ('the burn'), which usually bring about a need to slow down or stop.



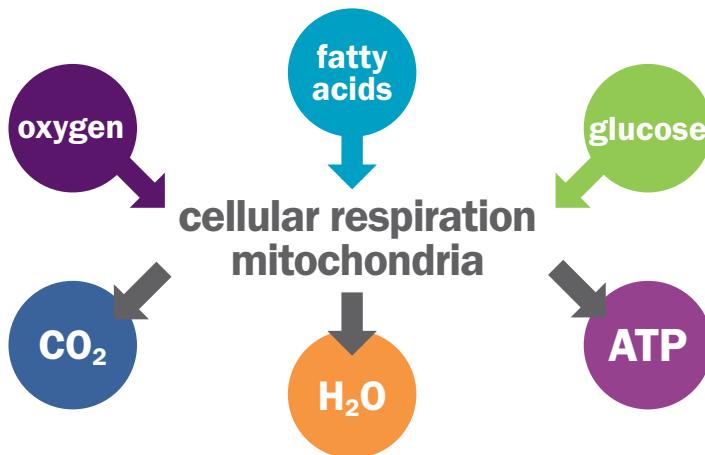
Exploring a common myth

It is often said that lactic acid build-up in muscles causes the burning sensation experienced during high-intensity, anaerobic exercise. While lactate levels are higher at this stage, the interference with muscle contraction is caused by hydrogen ions (H^+), which are produced as a result of anaerobic hydrolysis.

Targeted interval training improves the body's ability to withstand the build-up of lactic acid and/or the ability to remove it quickly, which delays or prevents accumulation.

Anaerobic training uses up the glycogen stored in the muscles quickly and requires short periods (1–3 minutes) of strenuous activity followed by periods of recovery. Ideally this recovery should be active (e.g. walking between running intervals) to aid the return of blood to the liver. Insufficient recovery, or static rest, might not allow the lactic acid to be dispersed before the commencement of the next interval.

Aerobic system



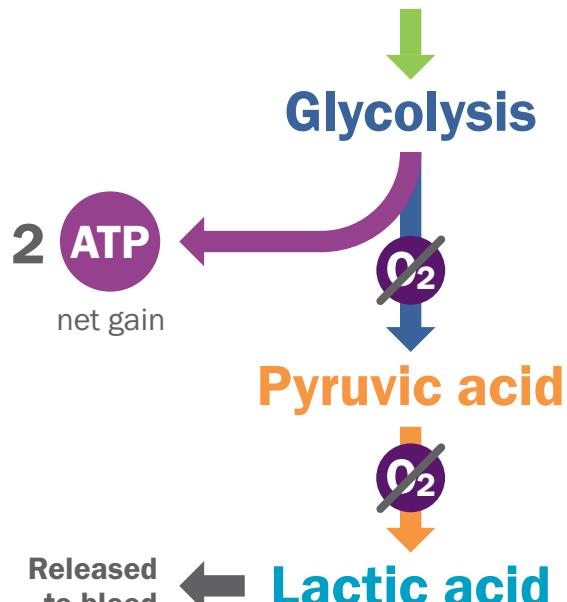
energy to cellular aerobic metabolism for the production of ATP. Whether the body is at rest or exercising aerobically, both carbohydrate and fat are required in varying proportions.

The aerobic system produces ATP, carbon dioxide, water (H_2O) and heat from the breakdown of fat and carbohydrate. These waste products are easily removed from the body. Carbon dioxide is transported to the lungs via the circulatory system and water is removed via sweat.

Something extra

The complete breakdown of a single glucose molecule regenerates approximately 36–38 molecules of ATP. A single molecule of a common type of dietary fat (16 carbon palmitic acid) yields 129 molecules of ATP, more than 3 times the ATP output of glucose. The body takes advantage of the economy of fat metabolism at low activity levels when adequate oxygen can easily be supplied. However, carbohydrate is the preferred energy source for higher activity levels because ATP is produced at a much faster rate from glucose than from fatty acids.

Glucose
(from glycogen breakdown or delivered from blood)



Using METs to measure cardiovascular and respiratory fitness

The use of oxygen by the cells of the body is known as oxygen uptake or consumption. When an average sized individual is at rest, the volume of oxygen uptake (VO_2) is approximately 3.5 millilitres of oxygen per kilogram of bodyweight per minute (ml/kg/min). This value of oxygen uptake is also known as one metabolic equivalent (or MET). Activities can therefore be categorised as light-, moderate- or strenuous-intensity, depending on the amount of oxygen uptake required, or the METs.

The maximal amount of oxygen a person can take in (respiratory), transport (cardiovascular) and utilise (muscular) provides an indication of their fitness.

The more oxygen taken in and used by the muscles, the higher the intensity the person could work at and the fitter they would be. This maximal oxygen uptake (or $\text{VO}_2 \text{ max}$) is generally accepted as the best way to measure someone's aerobic fitness levels and can be directly measured or estimated using various fitness tests.

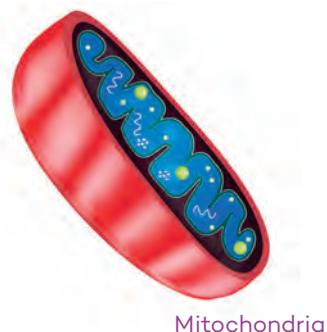
Location of ATP production

All three systems produce energy at cellular level, but in different places within the actual cell.

Aerobic energy production occurs in small subcellular structures called mitochondria, which is known as the 'powerhouse' of a cell.

The larger and/or more plentiful the mitochondria, the greater the potential for aerobic ATP production of that cell. This indicates that an athlete could run, swim or cycle at a higher intensity for a sustained period of time without fatigue.

Anaerobic energy production (CP and lactate systems) occurs within muscle cells, in the fluid matrix outside of the mitochondria.



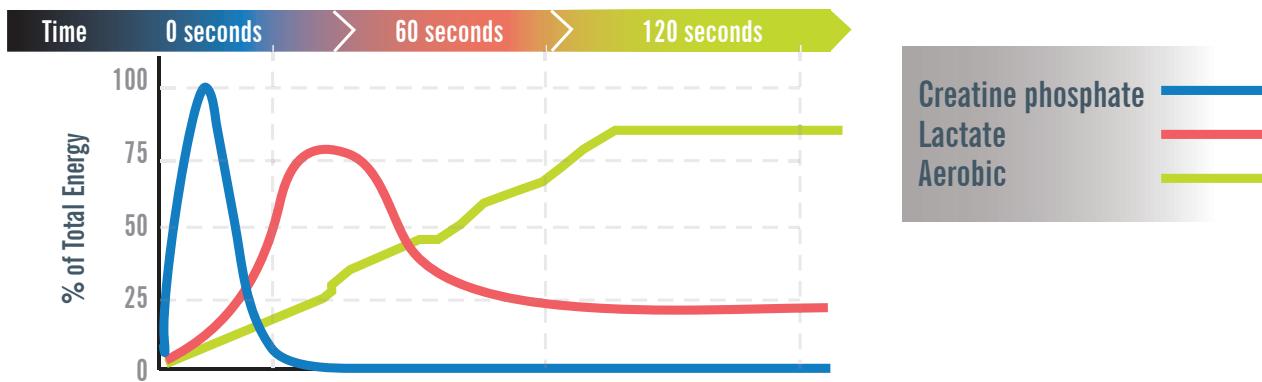
The interaction of energy systems during exercise

It is very important to realise that the energy systems do not work independently of each other; in fact, all three systems working in harmony to provide the body with energy. However, activities can be categorised by the dominant energy system, depending on their intensity and duration, for example:

- A golf swing or shot put would predominantly use the CP system.
- A 400m sprint or a squash or tennis rally would predominantly use the lactate system.
- A long-distance marathon run would predominantly use the aerobic system.

It is the intensity and duration of the activity or sport that determines which system predominates.

An individual's fitness level will also dictate the use of energy systems. For example, a trained middle distance runner would be able to utilise the aerobic energy system at a higher intensity for a longer duration than a sedentary individual, who would have to switch to the lactate system earlier, or reduce the intensity of the session.



Summary of energy systems

| Energy systems | | | |
|-----------------------------------------|-------------------------------------------|----------------------------------------------------------|--------------------------------------------------------------|
| | CP system | Lactate system | Aerobic system |
| Oxygen dependency | Anaerobic. | Anaerobic. | Aerobic. |
| Speed of energy production | Very rapid. | Rapid. | Slow. |
| Substrate needed (energy source) | Stored chemical energy (phosphocreatine). | Glycogen. | Glycogen and fat. |
| Amount of energy produced | Very limited ATP. | Limited ATP. | Unlimited ATP. |
| By-products of energy production | No fatiguing waste products. | Lactic acid. | No fatiguing waste products (only carbon dioxide and water). |
| Duration of energy production | Short duration (0–10 seconds). | 1–3 minutes of intense activity. | Long duration. |
| Intensity of activity | Very high intensity (95–100% max effort). | High intensity (60–95% max effort). | Low-to-moderate intensity (up to 60% max effort). |
| Recovery required | Quick recovery (30 seconds–5 minutes). | 20 minutes–2 hours (recovery from lactic acid exposure). | Time to eat and drink (to replenish fuel stores). |
| Predominant fibre types | Type IIb. | Type IIa. | Type I. |

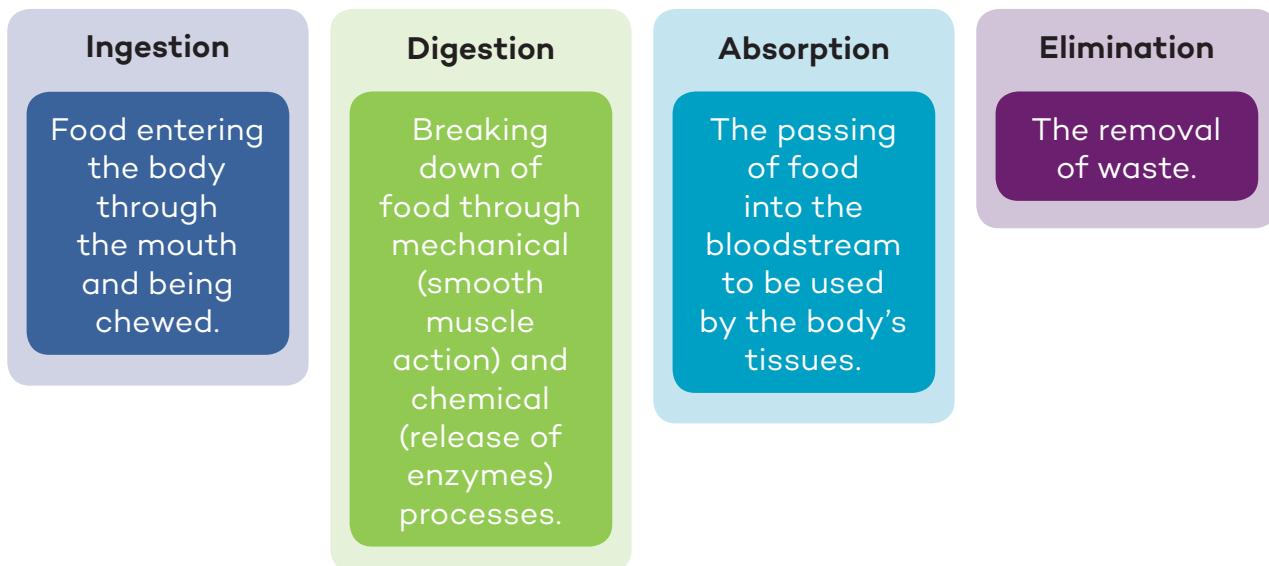
Answer the following questions and make notes to revise this section.

- What is the name of the high-energy molecule responsible for providing energy?
- What are the names of the three energy systems?
- What are the key differences between the three energy systems?
- When working aerobically, where does production of ATP take place?
- Which energy system would be working predominantly during a 100m sprint?
- Which energy system would be working predominantly during a marathon?

Section 5: The digestive system

The digestive system is responsible for the intake, breakdown, use and removal of food and drink. An efficient digestive system tells us when we are hungry, full and thirsty by sending messages to and from the brain via the nervous system. It extracts important nutrients for storage and immediate use and removes any waste.

The digestive system has four stages:



Journey through the alimentary canal (also known as the digestive tract/gastrointestinal tract/gut)

Food's journey through the alimentary canal can take up to 24 hours and covers a distance of around 9m (30 feet) from ingestion through the mouth to excretion through the anus.

Mouth

This is the entry point of food and where it begins to be broken down through the process of mastication (chewing) into a ball, or bolus.

Oesophagus (gullet)

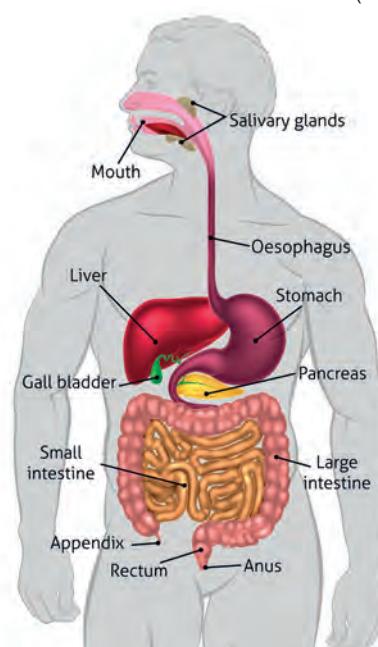
This is a thick-walled, muscular tube that carries broken down food from the mouth to the stomach.

Stomach

The stomach is a muscular bag located on the left side of the upper abdomen. It breaks down food further by releasing enzymes, and also kills bacteria.

Small intestine

The small intestine is a small, tightly folded tube that receives food from the stomach. It is the major site of digestion within the alimentary canal. Its role is to absorb important nutrients into the bloodstream to be passed to the body's tissues and used for energy. The small intestine is divided into three sections: the duodenum, jejunum and ileum.



The small intestine is about as large as an adult's middle finger but, when stretched out, it is about 22 feet (6.7m) long.

Large intestine

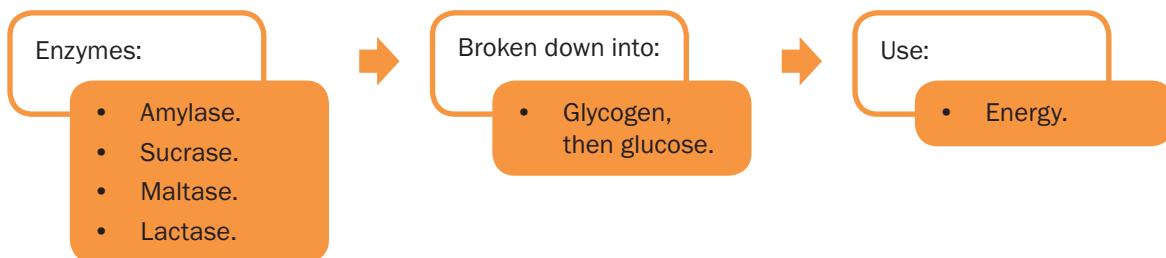
The large intestine absorbs water and vitamins from food residue, and forms and stores faeces ready for excretion. It is made up of the colon (large tube that surrounds the abdominal cavity) and the rectum (passageway for faeces), which leads to the anus (a valve-like exit from the end of the alimentary canal).

Breakdown and absorption of food

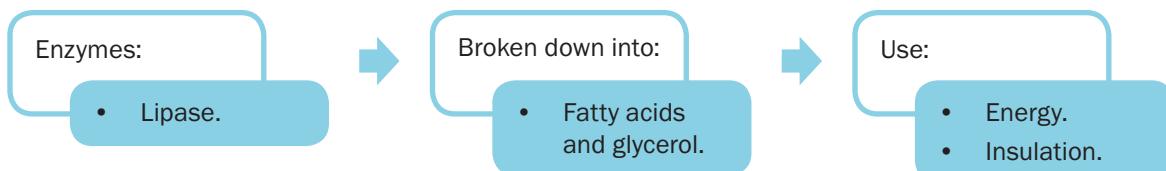
The major food groups (macronutrients) are broken down and used in different ways. Food is broken down at different points of the alimentary canal by digestive enzymes.

Enzymes are biological catalysts, which means they speed up chemical reactions in cells. In the case of digestive enzymes, the role is to speed up the process of nutrients being broken down in the digestive tract and absorbed into the bloodstream for use.

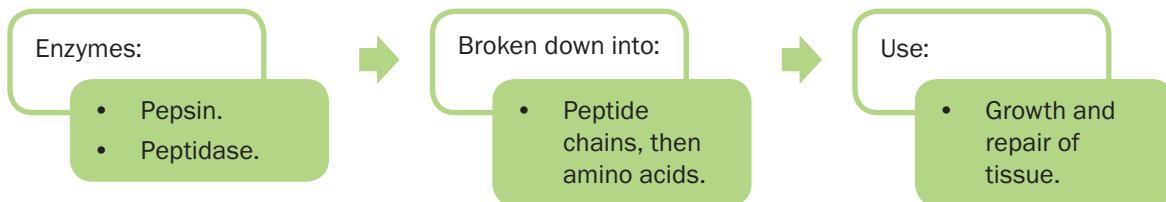
Carbohydrate



Fats



Protein



The role of dietary fibre in maintaining effective gut function

Dietary fibre is a type of complex carbohydrate that cannot be digested by the human body. It is found in foods such as fruits, vegetables, wholegrains and cereals and is vital for the efficient functioning of the digestive system. It is recommended that an average adult should eat at least 30g of fibre per day.

Fibre helps the gut by:

- Ensuring the smooth and speedy passing of waste.
- Helping to increase the amount of 'good bacteria' in the gut.
- Helping you feel fuller for longer and reducing the likelihood of snacking on foods high in sugar, thereby reducing the likelihood of obesity and associated conditions, e.g. type 2 diabetes.

For fibre to be effective in supporting gut function, it is also important to maintain adequate hydration levels by drinking lots of water throughout the day. Fluid supports the passing of food through the alimentary canal and helps to facilitate the passing of waste.

The role of the liver in assisting digestion

The liver is the body's largest internal organ and has many functions that relate specifically to digestion and absorption of food, including:

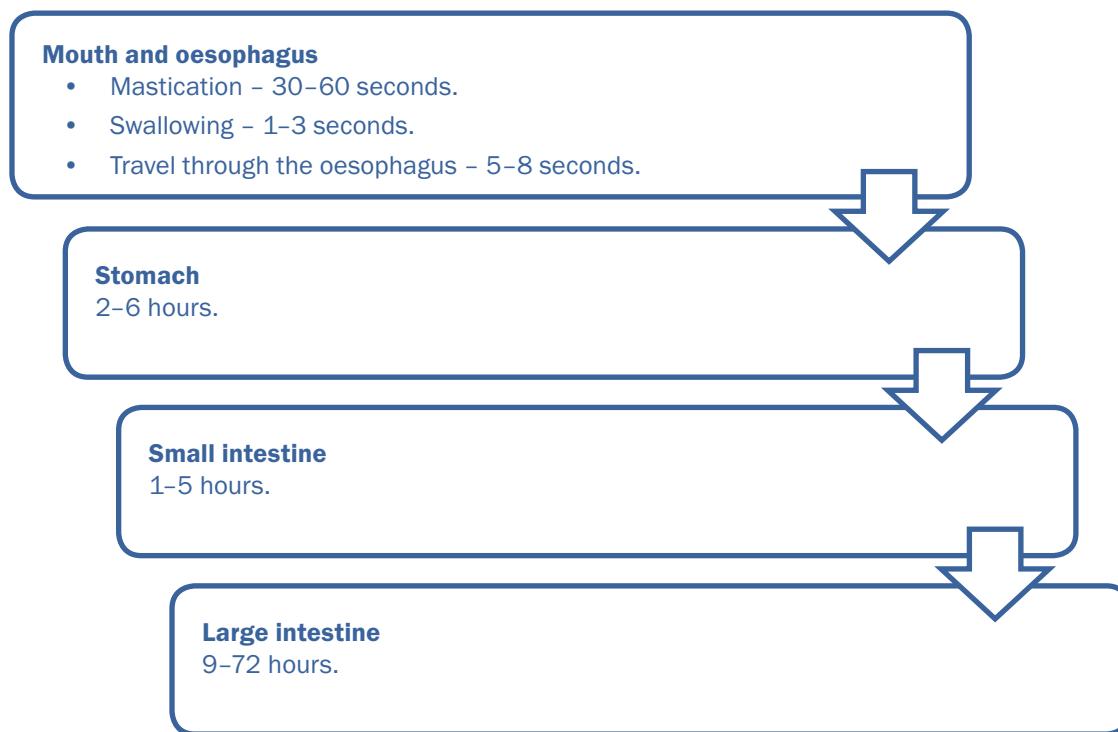
- Bile secretion, which is vital for the breakdown of fats in the small intestine.
- Removal of nutrients from the blood and conversion for storage. For example, it removes glucose (not needed for energy) to be converted back into glycogen.
- Detoxifying harmful substances in the blood, e.g. alcohol, by converting them into urea to be excreted as urine.
- Storage of vitamins and minerals that have a number of health benefits.
- Removal of bacteria from the bloodstream.

The role of the pancreas in assisting digestion

The pancreas is responsible for secreting digestive juices into the small intestine, which contain the aforementioned enzymes, in order to break down nutrients.

Timescales of digestion

The process of digestion, from start to finish, can take anywhere between 12 and 72 hours and is dependent on the individual's gut function and the type and amount of food ingested. The time frames are broken down as follows:



Revision activities

Answer the following questions and make notes to revise this section.

- What are the four stages of digestion?
- Describe the passage of food through the alimentary canal.
- Where is the main site for digestion of food?
- Where is the main site for absorption of food?
- Where is the main site for removal of waste?
- What is carbohydrate broken down into?
- What is protein broken down into?
- What is fat broken down into?
- How does dietary fibre help the gut to function effectively?
- What is the role of the liver in assisting digestion?
- What is the role of the pancreas in assisting digestion?
- How long does the digestion process take?

Section 6: Health and wellbeing

Becoming a fitness professional entails more than helping people to lift heavier weights, run faster or cycle longer distances. People are also looking to improve their overall health and wellbeing, which covers a range of areas.

In 1948 the World Health Organization (WHO) defined 'health' as:

'A state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity'.

This definition remains unchanged.

Total fitness

To be considered 'healthy', a person should embody the components of **total fitness**:

| | |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical fitness | The wellbeing of the body systems, including the heart, lungs, muscles, bones and joints. It covers health-related and skill-related components. |
| Mental and emotional fitness | The wellbeing of the mind; a positive mental state and harmony between the mind and emotions. It includes a person's ability to manage stress. |
| Medical fitness | Being free from injury, chronic disease and illness. |
| Nutritional fitness | Having access to healthy food; eating a healthy diet with a balanced nutritional intake for fuel, growth and repair. |
| Social fitness | Having healthy interactions and relationships with others. |

Factors that affect health and wellbeing

An individual's potential to lead a healthy lifestyle is very much influenced by a number of key factors, some of which can be controlled and some that cannot.

Non-controlled factors

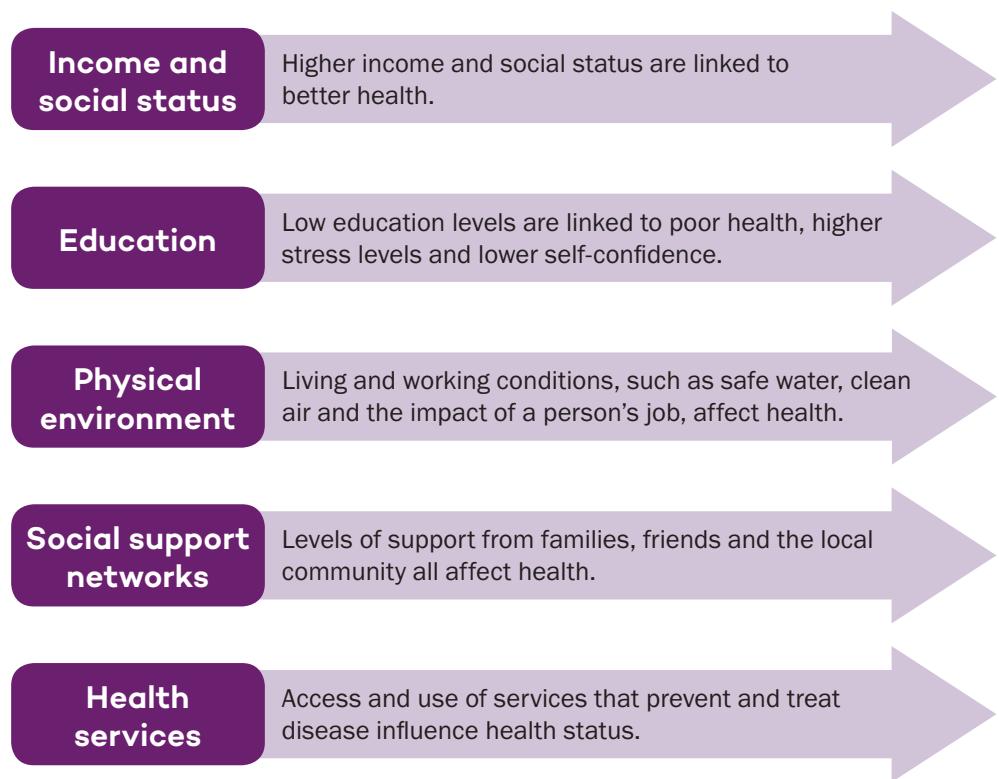
- Genetics – some individuals are more susceptible to illness and mental health issues than others.
- Age – at birth, our immune systems are weaker than that of a grown adult, however our ability to recover from illness and injury is quicker in our youth. As we move into old age, our body's systems deteriorate, increasing the risk of illness and injury.
- Gender – at different stages of life, men and women suffer from different illnesses.

Controlled factors (lifestyle behaviours)

- Activity levels – evidence has shown that a sedentary lifestyle can lead to a wide range of health conditions and diseases across all the body's systems, including mental health.
- Diet – it is important to eat a balanced diet that aligns with the government's healthy eating guidelines. A poor diet increases the risk of illness and disease.
- Smoking – cigarette smoke contains over 4,000 chemicals, including 43 that are carcinogenic (cancer-causing) and 400 other toxins (harmful substances).
- Alcohol and drugs – exceeding the government guidelines for alcohol intake increases the risk of certain diseases, such as fatty liver disease and hepatitis. It can also cause mental health problems and affect an individual's ability to function effectively. Taking illegal drugs carries a number of health risks, which vary according to the drug being taken.

Determinants of health

The WHO suggests that, although we may have control over our lifestyle behaviours, there are environmental factors that strongly influence the likelihood of an individual leading a healthy or unhealthy lifestyle. These are:



Adopting poor lifestyle behaviours, such as inactivity, eating a poor diet and excessive alcohol consumption, can increase the risk of illnesses and diseases, such as:



The role of physical activity in health and wellbeing

Physical activity is defined by the WHO as:

'Any bodily movement produced by skeletal muscles that requires energy expenditure'.

Physical activity doesn't have to be structured exercise or sport; alternatives include:

- Walking the dog (briskly).
- Dancing.
- Swimming.
- Washing the car.
- Mowing the lawn.
- Cycling.
- Cleaning the house.
- Rock climbing.
- Taking the stairs instead of a lift.

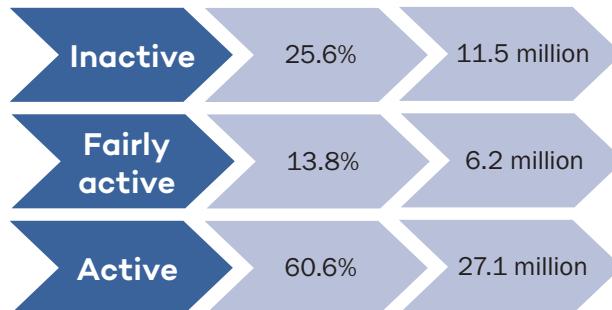
Physical inactivity has been identified as the fourth leading risk factor for global mortality, correlated with an estimated 3.2 million deaths per year (WHO, 2017).

The Chief Medical Officer (CMO) categorises physical activity levels in the following way:

- **Inactive:** less than 30 minutes per week.
- **Fairly active:** 30–149 minutes per week.
- **Active:** at least 150 minutes per week.
- Must be at least moderate-intensity.
- Vigorous-intensity counts as double.

In order to maintain a good level of health, it is recommended that adults should partake in 150 minutes of moderate physical activity, 75 minutes of vigorous physical activity or an equivalent combination of both each week.

Sport England's most recent 'Active Lives' survey found the English population to still be below par in their physical activity levels:



Health benefits of physical activity

Physical activity carries a wide range of health benefits, which include:

- Reducing the risk of premature death by 20–30%.
- Reducing the risk of developing CHD, stroke, diabetes and certain cancers by 50%.
- Improving functional capacity.
- Reducing the risk of back pain.
- Increasing independence in older people.
- Increasing bone density and reducing the risk of osteoporosis.
- Improving psychological wellbeing.
- Reducing the risk of stress, anxiety and clinical depression.
- Reducing the symptoms of depression and anxiety.
- Reducing the risk of falls in older adults.
- Improving weight loss and weight management, thereby reducing the risk of obesity.
- Improving quality of life and general wellbeing.

(Department of Health, 2011)

Revision activities

Answer the following questions and make notes to revise this section.

- How is health defined?
- What are the components of total fitness?
- Identify the factors that affect health and wellbeing.
- Which conditions can be caused by adopting poor lifestyle behaviours?
- How is physical activity defined?
- What are the health benefits of physical activity?

Section 7: Components of fitness and special populations

The previous section defines physical activity and looks at its impact on health and wellbeing. In this section, we will look closer at exercise and physical fitness

Exercise

Exercise differs from physical activity in that it is:

'Structured or planned activity that requires physical effort, with the aim of sustaining or improving physical fitness'.

(Ekkekakis and Lind, 2006)

Structured exercise includes a wide variety of gym, studio, pool and outdoor activities. The volume of exercise needed to achieve specific fitness goals and improve or maintain specific components of fitness (health- or skill-related) is described in terms of frequency, intensity, time and type (FITT).

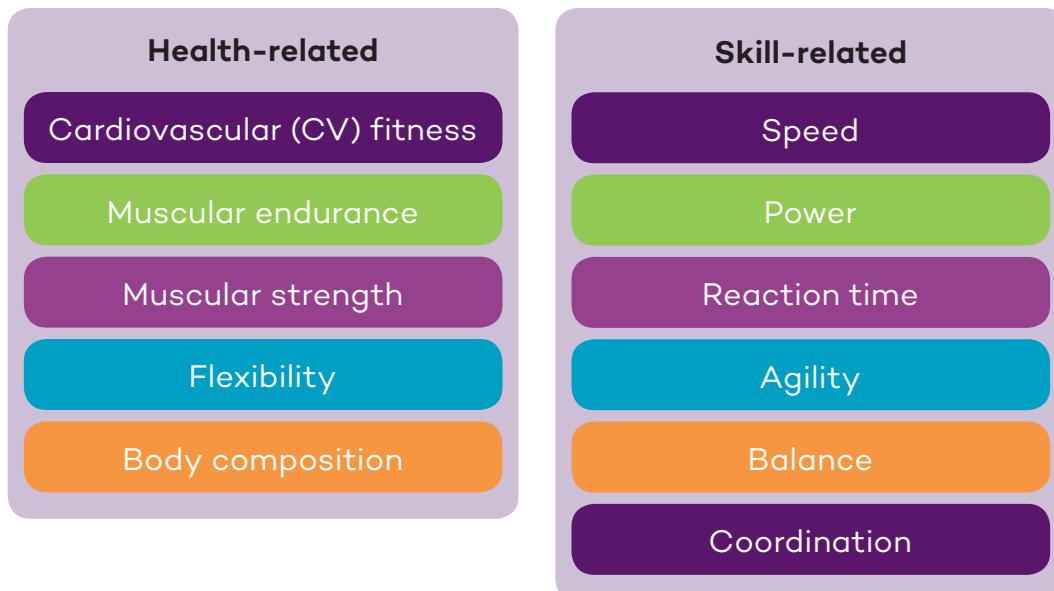
Physical fitness

Physical fitness can be defined as:

'A state of wellbeing that provides optimal performance'.

(Robergs and Roberts, 1997)

Physical fitness is a potential outcome from taking part in regular physical activity and exercise. Being physically fit defines an individual's ability to perform activities or exercises that train different components of fitness, which may be:



Health-related components of fitness

Cardiovascular (CV) fitness

The definition of CV fitness is: the ability of the heart, lungs and muscles to take in, transport and utilise oxygen during exercise. It is also referred to as cardiorespiratory fitness, stamina and aerobic fitness.

Cardiovascular activities increase heart rate and breathing rate, with the aim of speeding up blood flow and delivering more oxygen to the body to produce energy aerobically. When the pulse quickens and breathing gets deeper, the cardiovascular system is working.

Activities that will improve the efficiency of the heart, lungs and circulatory system, and increase cardiovascular fitness, are those which use the large muscles of the body in a continuous and rhythmic way, and which elevate the heart rate to an appropriate intensity. These include walking, swimming, running, cycling, rowing and dancing.

Muscular endurance (high reps, low resistance)

The definition of muscular endurance is: the ability of the muscles to work continuously under low-to-moderate resistance.

Daily activities that require muscular endurance include carrying shopping, climbing stairs, maintaining optimal posture, gardening and exercise sessions involving high-repetition resistance training.



Muscular endurance and muscular strength are sometimes combined and termed 'muscular fitness'.

Muscular strength (low reps, high resistance)

The definition of muscular strength is: the ability of the muscles to exert maximal force against a high resistance.

Strength-focussed activities require the lifting of heavier resistances or weights for a lower number of repetitions; usually fewer than ten. Examples of activities requiring maximal strength include heavy weight lifting and moving heavy objects.

Muscular strength is useful for two key reasons: enabling people to produce a greater maximal force when required, e.g. moving a piece of furniture, and minimising the amount of effort required to perform everyday sub-maximal tasks by enhancing an individual's level of strength.

Flexibility

The definition of flexibility is: the range of movement at a joint or series of joints.

Flexibility is determined by the shape of the bones and cartilage and by the length of the muscles and connective tissues (ligaments and tendons) that cross over the joint. The amount of muscle tension is also affected by the nervous system, which determines muscle tone (tension).

Flexibility can vary enormously from one person to another and is specific to the individual. It is important that individuals develop and maintain appropriate levels of flexibility to ensure an appropriate range of motion (ROM) and freedom of movement at all joints.

Immobility

A significant lack of flexibility can dramatically affect posture and force production at a joint, and can impair performance and daily functioning. Inactivity can lead to muscle shortening and a loss of flexibility (e.g. sedentary living or when a body part has been immobilised in a plaster cast). Certain sports may reduce flexibility, for example, jogging, football, boxing and hockey all involve movements where muscles are not worked through their full range. This can lead to muscle tightness and adaptive shortening. Imbalanced exercise programmes that overdevelop one muscle group (prime movers) while neglecting the opposing muscle group (antagonists) can also cause muscle imbalances that restrict flexibility.

Hypermobility

A high degree of flexibility or 'hypermobility' (sometimes erroneously referred to as being 'double-jointed') may lead to reduced joint stability and an increased incidence of injury.

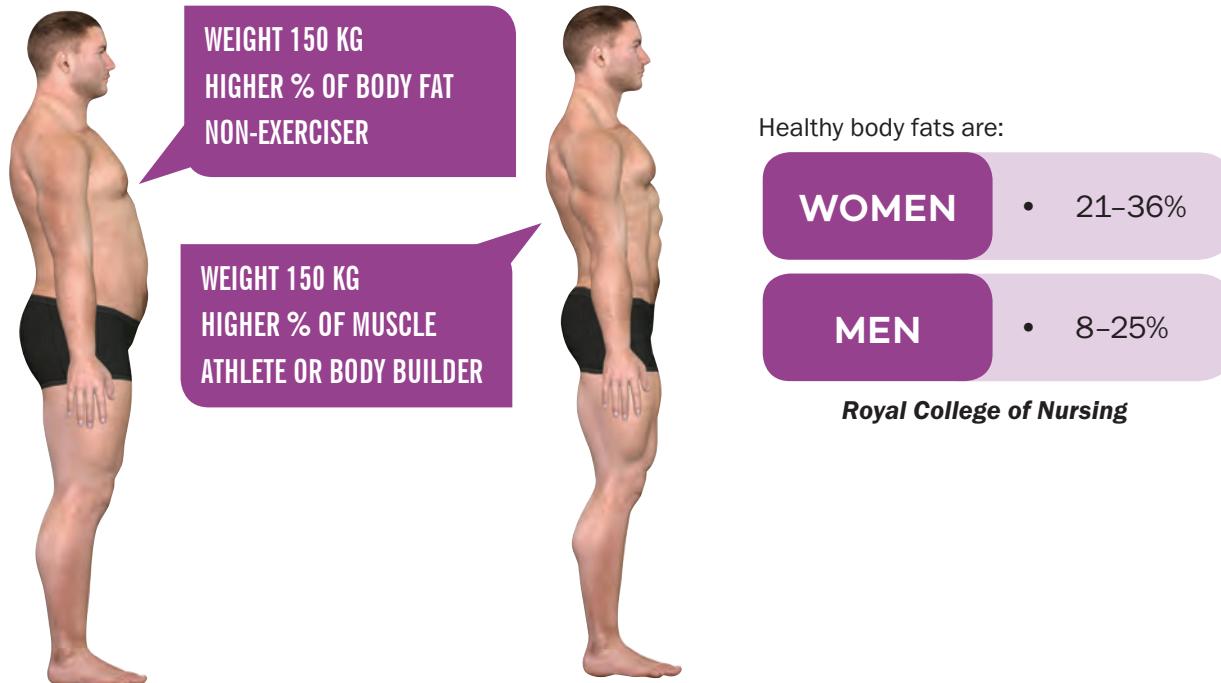
Examples of activities that require good flexibility include dance, yoga, gymnastics and martial arts; there are also certain daily activities that require the body to bend, twist and move through extended ranges of motion.

Body composition

The definition of body composition is: the proportion of fat and fat-free mass.

Body composition is normally measured as a percentage of body fat, which serves as an effective indicator of health.

Two individuals may be of equal weight and height, but their body composition and appearance may be totally different. Muscular tissue takes up less space in the body than fat tissue and this influences how lean people appear.



The point at which body fat becomes a risk for health varies between ethnic groups and age groups (NICE, 2013). Generally speaking, levels significantly above the percentages stated below may indicate excess body fat. Many athletes and sportspeople have a body fat percentage below the levels stated (depending on the sport). Performance in many sports will be enhanced when body fat percentages reach 7–19% for men and 10–25% for women.



Women naturally carry more body fat than men due to hormonal responses in puberty that prepare them for childbearing. Men have higher levels of testosterone, which increases lean muscle tissue, thereby affecting body composition and lowering body fat percentage.

Skill-related components of fitness (motor skills)

There are six skill-related components of fitness, which are also known as motor skills. These are:

| | |
|--------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Speed | 'Speed' defines how quickly a movement can be performed in a short space of time. Speed is required for many sporting events, including sprinting and throwing. |
| Power | Power is the ability to exert maximum muscular contraction instantly in an explosive burst of movement (within a short time frame). The two sub-components of power are strength-based and speed-based power. Sporting activities requiring power include jumping (high jump or long jump), throwing (shot put or javelin) and sprinting out of the starting blocks (a sprint start). |

| | |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reaction time | Reaction time is the ability to respond quickly to a stimulus. It is important in many sports and day-to-day activities. ‘Simple reaction time’ is the time taken between a stimulus and movement, e.g. a sprint start. |
| Agility | Agility is the ability to change the position of the body and move in different directions quickly, e.g. zigzag running and moving through and around a field of players in team sports. |
| Balance | Balance is the ability to control the body’s centre of gravity when stationary (e.g. a handstand or a yoga posture) or during movement (e.g. a spring board diver during take-off). |
| Coordination | Coordination is the ability to smoothly move two or more body parts under control, accurately and efficiently. It involves use of the senses (eyes and ears). Most activities require some form of coordination; these include performing choreographed dance or gymnastic routines, throwing, catching (eye-to-ball coordination), kicking and hitting (e.g. golf swings or kicking a football). |

Factors that affect health- and skill-related fitness

There are many factors that influence an individual’s health, fitness and training potential; some of these are specific to the individual (e.g. age and gender) while others are more generalised (e.g. the environment, weather and temperature).

Age

The body changes throughout a lifetime. During formative years, when the body is growing, consideration will need to be given to the effects of exercise on the developing bones, muscles and other body systems.

A person’s fitness is generally greatest during their 20s and declines with age. For older adults, the changes to the body systems – which progressively result in weaker muscles, lighter bones, stiffer joints, slower reflexes and an increase in body fat – will reduce training potential. Benefits can still be achieved, but the rate at which developments occur will be slightly slower. Age-related changes generally begin to occur at the age of 50 and make their mark at around 65. The onset of the ageing process and the rate of decline are influenced (and can be offset) by regular physical activity and exercise.

Flexibility: People are usually more flexible when they are younger. Babies and infants are very flexible and start to lose this natural flexibility as soon as they start to walk (when the joints become weight-bearing and need more stability). As people get older, muscle contractility remains, but elasticity is lost, resulting in tighter, stiffer muscles. This may also be influenced by activity levels, which tend to decrease as people get older.

Activity levels and age: Activity levels also reduce progressively with age in both men and women. An estimated 30% of people aged over 65 are classed as being inactive (less than 30 minutes of physical activity per week), compared to 15% of 6–24-year-olds. By the age of 75, it is estimated that only 36% meet the recommended activity guidelines (Sport England, 2016). Reduced activity levels can lead to a loss of mobility and independence, and to increased isolation.

Gender

There are a number of anatomical and physiological differences between men and women that influence their training potential. Throughout childhood and up to adolescence, males and females tend to have equal levels of general fitness. Specific gender-related changes occur at puberty.

Hormones: Increased levels of testosterone during puberty mean that active males grow stronger due to their greater muscle mass.

Cardiovascular potential: Men are generally larger than women. They have longer bones, larger muscles, larger hearts and larger lungs which give them greater potential for transporting oxygen and developing their cardiovascular fitness.

Body composition: Males generally have a lower percentage of body fat and higher levels of muscle mass than females. Females need higher levels of body fat to equip them for pregnancy and childbirth. Reducing body fat below recommended levels would diminish levels of the female hormone (oestrogen) and may cause the cessation of the menstrual cycle. This in turn would contribute to lower levels of calcium in the bones and may increase the risk of osteoporosis in later life.

Skeletal frame: The female pelvis is wider and deeper in order to support pregnancy and childbirth. The Q angle (quadriceps angle) of the female pelvis is also greater, which gives women a biomechanical disadvantage when running or squatting. It also leads to an inward rotation of the knees. These differences may also influence running speed; females have to move their legs through a wider angle, which potentially reduces speed.

Flexibility: Females of all ages tend to be more flexible than males. This may be due to specificity of training they take part in, but may also be attributed to structural and anatomical differences.

Hereditry

An individual's health, physical appearance and training potential are all influenced largely by genetic characteristics inherited from their parents.

Physically inherited characteristics may include eye colour, skin colour and hair texture. They may also include things like body type and muscle fibre type, which will have a greater influence on training potential. An individual who inherits an ectomorphic (tall and thin) body type and a larger percentage of slow twitch muscle fibres will be more suited to long-distance endurance activities than an individual who inherits a mesomorphic (lean, muscular) body type and a greater percentage of fast twitch muscle fibres. Training potential and goals need to be considerate of inherited characteristics.

Various health conditions are believed to have a genetic (family) risk component (e.g. CVD).

Flexibility: Some people are born with a naturally greater (sometimes excessive) ROM known as hypermobility. Hypermobility can increase the potential for injury (i.e. joint dislocation) and it may be necessary to concentrate on strengthening the muscles acting over the joint to increase stability.

Progression: Each individual has a genetic potential that defines how far their fitness could progress if training, nutrition and recovery were optimised.

The deconditioned novice has a large potential because they are starting from a point far below their genetic limits. As a result of this and their unfamiliarity with the exercise stimulus, almost any programme will work for an untrained individual (Fleck and Kraemer, 1997). This adaptation potential enables beginners to make rapid progress in the early stages of their training. Over time, and as they get closer to their genetic potential, the rate of progress will slow down.

Physique or body type

An individual's body type has a significant impact on their ability to perform various physical tasks successfully, e.g. a tall, thin person may be more suited to basketball than rugby.

A simple system for visually assessing body type is the system of somatotyping. The somatotyping system suggests that there are three distinct body types: ectomorph, endomorph and mesomorph.

Ectomorphs are naturally thin with little body fat or muscle mass. They find it difficult to gain weight (either muscle or fat). They have long levers and light body frames, which make them more suited to weight-bearing aerobic activities, such as long-distance running. Their light body frame means that their joints will bear comparatively less body weight.

Mesomorphs tend to be naturally lean and muscular with broad shoulders and a narrow waist and hips. Mesomorphs are naturally athletic and tend to be suited to a wide variety of sporting activities, especially those requiring a good power-to-weight ratio, e.g. sprinting, hurdling and jumping.

Endomorphs are naturally predisposed to fat storage. They tend to be apple- or pear-shaped and carry larger amounts of body fat. Endomorphs also tend to possess a reasonable degree of muscle mass, but this is often overlooked due to the predisposition for fat storage. Higher levels of body fat increase their potential to float in water, but also place additional stress on the weight-bearing joints during high-impact and weight-bearing activities. Endomorphs may be suited to activities such as the shot put or hammer throwing.



Awareness of body types may be useful when discussing client objectives. An endomorph with a goal of becoming a competitive marathon runner, for example, may need to re-evaluate this objective as they are not structurally suited to this type of activity. Similarly, ectomorphs are unlikely to succeed in competitive bodybuilding, as they have difficulty gaining muscular size. Any discussions about the suitability of certain activities should always be conducted with sensitivity.

Body type

Most individuals are not exclusively one body type but a combination, usually with a bias towards two types, e.g. ectomorph/mesomorph (taller, lean and muscular) or endomorph/mesomorph (shorter, rounder and muscular).

Activity level

Inactivity and sedentary living pose an increased risk of poor health. Regular non-structured physical activities, such as walking the dog, cycling and gardening can make significant improvements in maintaining health if performed on a daily basis. The key message from the Department of Health (2011) is to sit down less and move more often.

Active people and people who exercise regularly generally have greater mobility and flexibility than sedentary individuals. This may depend on the type of exercise and activity they perform, e.g. performing lots of resistance training exercises with a limited ROM and higher loads may actually decrease ROM.

Diet

The body needs specific nutrients for energy, growth and repair. These nutrients are provided by the food eaten in the diet. A healthy, balanced diet will help to ensure that the body is functioning optimally. An unhealthy or imbalanced diet may negatively affect health and increase the risk of cardiovascular disease, diabetes, obesity and other chronic health conditions.

Physical disabilities

People with disabilities are able to exercise and do not have to be inactive. A physical impairment may prevent a specific part of the body from functioning or moving in a certain way, but exercise can be adapted and modified to enable participation, promote inclusion and improve health and fitness. Many disabled people are first-class athletes.

Illness and fatigue

During temporary illness (colds or flu) the recommendation is to rest the body rather than exercise. Exercising with a fever (febrile illness) is contraindicated and places stress on the body systems. All clinical symptoms should have passed before returning to exercise and it may be necessary to start at a lower level before building up.

When the body is tired (through working too hard or insufficient rest between sessions) performance diminishes and this may hinder potential training gains. It may be necessary to review training plans and also eating behaviour to balance energy requirements.

Chronic health conditions also affect exercise potential and require exercises to be modified prior to participation. A client who is obese, for example, may need to perform low-impact or non-weight-bearing activities, e.g. swimming or cycling. A client with high blood pressure may need to exercise at a lower intensity.

N.B. Clients with chronic health conditions should be supervised by an appropriately qualified (Level 3 Exercise Referral) instructor.

Drugs

Prescribed and recreational drugs (alcohol, nicotine, caffeine and illegal substances) will affect exercise and fitness potential.

Prescribed medications used to treat chronic health conditions often have side effects that influence the exercise response. Clients using prescribed medication should be supervised by an appropriately qualified instructor.

Recreational drugs (alcohol, nicotine and caffeine) all have negative effects on health and may impact on exercise performance.

Cigarettes contain carbon monoxide, which reduces the potential to take in and use oxygen. Alcohol affects the nervous system, disrupting balance and coordination, which reduces the safety of exercise, especially if the person is using equipment. Caffeine is a stimulant and may offer a short-term boost to performance. However, in the long term, excess caffeine can contribute to health conditions including increased blood pressure, anxiety, depression and osteoporosis.

Stress

High levels of prolonged stress can lead to many other chronic health conditions including high blood pressure, coronary heart disease and depression. It will have a negative impact on the person's overall wellbeing and enjoyment of life.

Exercise and activity can assist with stress management. They provide an outlet for managing the physical tension caused by stress and a distraction for the mind, which can reduce mental strain. Exercise in the outdoors and in natural environments can have further positive effects on mood and wellbeing.

Environment and weather

Exercise safety can be affected by the environment. The quality of the air taken in will determine the amount of oxygen that can be utilised. Aerobic fitness can be significantly influenced by:

- Fumes from traffic and factories.
- Altitude, i.e. air is thinner at high altitudes and individuals need to breathe harder to get enough oxygen.
- Weather, i.e. temperature and humidity.

The weather and temperature may also affect exercise patterns. Some people may use poor weather conditions (e.g. snow, rain or heat) as a reason not to exercise. In most weather conditions and temperatures, exercise may need to be modified; in hot temperatures intensity may need to be reduced. In cold environments it may be necessary to lengthen the warm-up and wear additional clothing to prevent heat loss or wind chill.

Pregnancy

During both the pre and postnatal periods, there are significant changes to the female body that affect exercise potential.

During pregnancy, women produce excess amounts of a hormone called relaxin to assist the birth process. Relaxin affects a number of ligaments, including those in the pelvis, allowing greater flexibility than normal and potentially reducing joint stability. There are also changes to centre of gravity, blood volume and pressure and respiration, which can all affect health and skill related fitness.

Principles of training

There are a number of factors that need to be considered when planning and delivering physical activity and exercise. The key principles of training can be used to ensure individuals continue to progress towards their health and fitness goals in a safe and effective manner.

The key principles are:



Specificity

Any change or adaptation in the body's muscles, organs and systems will be very specific to the type of training (stress or stimulus) undertaken.

Exercises that develop and improve each component of fitness bring about specific adaptations, for example:

- Stretching exercises improve flexibility; they won't develop cardiovascular fitness.
- Aerobic endurance exercises improve cardiovascular fitness; they won't develop muscular strength.
- Strength training improves muscular strength, but it won't improve cardiovascular fitness or flexibility.

Different types of exercise that improve the same component of fitness also have specific effects, for example:

- Strength training for the legs makes them stronger, but won't make the upper body stronger.
- Stretching the hamstrings makes them more flexible, but won't improve the flexibility of other muscle groups.
- Swimming won't improve running ability or speed; there would be generalised improvements in the cardiorespiratory system but for specific and more effective results, the individual will need to practise the particular activity they want to develop.

Said principle

Specific
Adaptation to
Imposed
Demand

The training goals of an individual are essential when considering the appropriateness of specific types of exercise, e.g. are they aiming to improve general fitness or performance for a specific sport or athletic event? If fitness goals are specific, it will be important to consider:

- The predominant energy system and muscle fibre type used for the sport.
- The main prime movers recruited and joint actions required.
- The joint angle and range of movement used.
- The type of muscle contraction (concentric/eccentric) and speed of movement.

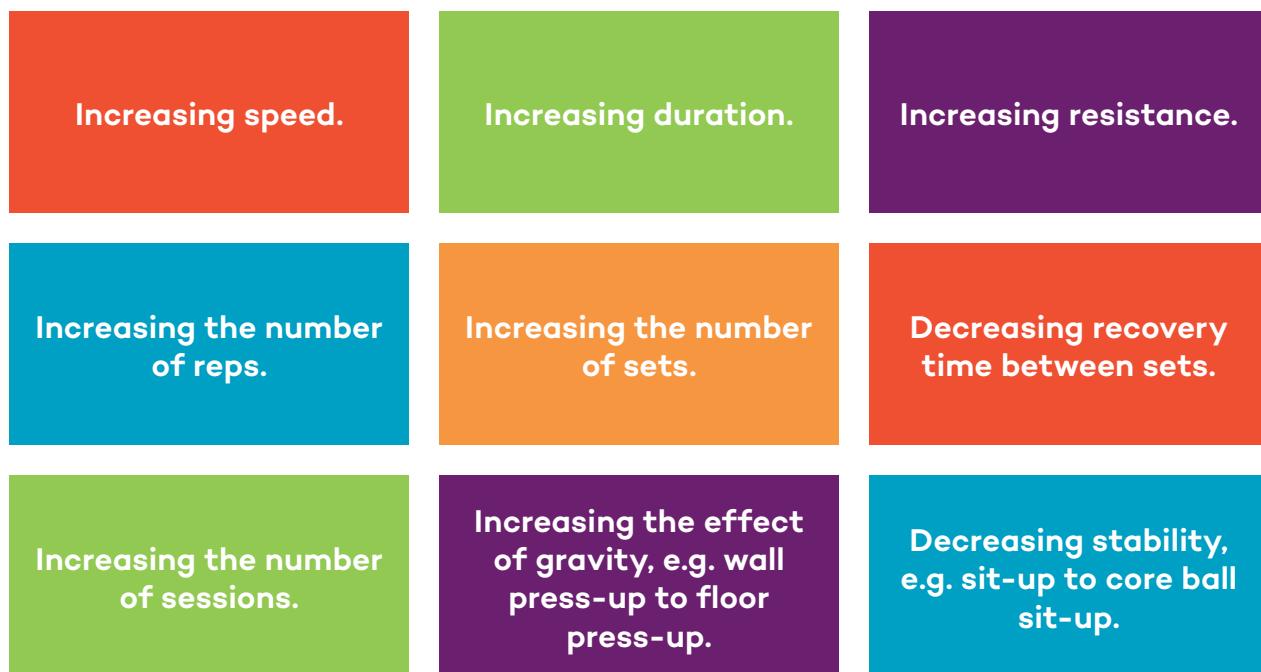
Progressive overload

To bring about any adaptation, the body will have to work a little bit harder than it is used to. One of the biggest reasons for non-adherence to an exercise programme is the lack of progress and challenge over a sustained period of time. The following scenario is very common:

1. A previously inactive client joins a gym and receives a new programme.
2. The client attends regularly for 4–6 weeks and makes good progress towards their goals.
3. The client continues with the **same** programme for another few weeks, making little, if any, progress (this is known as a plateau).
4. The client eventually attends less regularly until they stop exercising due to lack of motivation through seeing little change.

It is vital to continue to challenge the body's systems by gradually increasing the difficulty of exercise sessions.

Progressive overload can be achieved in a number of ways, such as:



The stimulus provided must be large enough to challenge and evoke the required adaptation. The level of overload applied will be determined by the current fitness of the individual and their goals. An untrained, sedentary person may need comparatively small changes to bring about a training effect, whereas a trained individual may need a greater challenge.

Reversibility – ‘use it or lose it’

Improvements in fitness can only be maintained through regular exercise and activity. If training (the exercise stimulus) stops, the benefits experienced will gradually decline.

The rate of decline is determined by the fitness of the individual, the level of stimulus reduction (e.g. total cessation or reduced volume) and the length of time for which the stimulus is reduced. Total inactivity or bed rest will bring about a greater decline than maintaining some activity. Athletes, for example, often plan timed rest periods as part of their training programme (post-season) to give the body time to rest and recover.

Total inactivity or lack of movement for extended time periods contributes to an increased risk of many chronic health conditions. To maintain optimal function, all body systems need to be trained regularly at an appropriate volume.

Adaptability

The body reacts and adapts in accordance with the type of challenge and overload to which it is subjected. For example:

- High-resistance and low-repetition exercise can lead to an increase in muscular strength.
- Intense exercise (lasting under ten seconds), e.g. sprints or maximal strength training, can cause adaptations in the ATP/CP systems, making them more efficient.
- Lower-intensity, longer-duration activities help to improve aerobic endurance by increasing the efficiency of the aerobic energy system (CV endurance).

Adaptability can only happen if progressive overload is factored into exercise sessions and effective recovery periods are factored in to allow growth and repair.

Recovery and rest

Physiological adaptations occur in the time following the activity rather than during the session. Scheduled rest periods are a vital part of any exercise programme; these include rest periods between exercises or sets within individual sessions, as well as recovery between training sessions.

Rest and recovery time are essential for preventing overtraining. Factors that influence the amount of required rest and recovery time include the volume of exercise and the fitness level of the individual. The quality of the recovery will largely be determined by the quality of sleep and dietary intake.

Overtraining

Every exercise programme requires a balance between overload and recovery. If the overload stimulus exceeds the body's ability to adapt, it may result in injury or overtraining.

If overtraining is suspected, the programme should be regressed (made easier) to enable the person to recover fully.

It is not necessary to regress every aspect of a training programme if overtraining is suspected. It may be sufficient to make one or two of the following changes:

- Increase the rest time between sets.
- Reduce frequency of training from four to three exercise sessions per week.
- Reduce the weight lifted on certain exercises (decrease resistance).
- Reduce the duration of the total session.
- Change high-impact activities to low-impact activities.
- Change exercise complexity by choosing simpler exercises (less complex equipment).

Signs and symptoms of overtraining

- Reduction in performance.
- Sudden loss of coordination.
- Lack of ability to concentrate.
- Irritability and oversensitivity to criticism.
- Reported disrupted sleep patterns.
- General lethargy.
- Susceptibility to colds and illness.

Individuality

There are many factors that will affect an individual's training potential; these include their age, body type, gender, heredity and other physiological differences, such as their ROM, current strength and cardiovascular fitness.

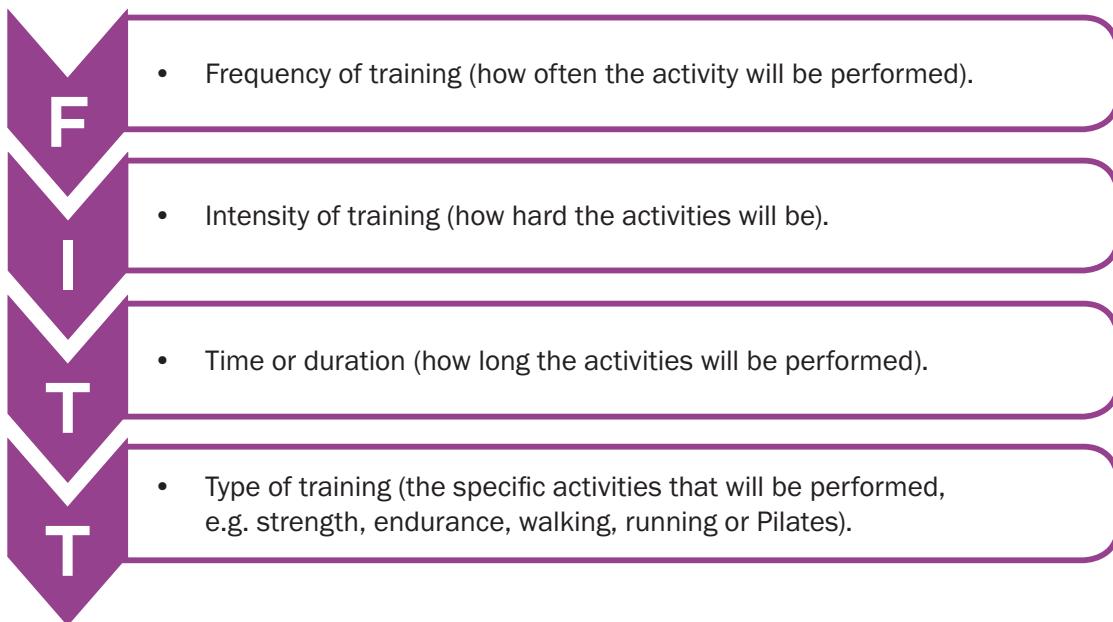
Clients may have similar general goals (e.g. to lose weight or get fitter), but individual differences will significantly influence the type of exercise that is recommended to ensure the programme is safe and effective. For example:

- If a client is overweight and deconditioned, low-impact, non-weight-bearing exercise may be a safer alternative to high-impact activities.
- If a client has restricted ROM at their hips, additional stretching exercises in this region may be appropriate.

A client's skill level and coordination may also influence exercise choice. A newcomer to gym training, for example, with low skill levels may find they are better able to maintain correct alignment using fixed resistance machines than free weights. A Pilates beginner will require modifications to many of the exercises to enable them to perform safely.

The FITT principles

When planning a programme of activity it is essential to consider the:



Frequency

Frequency refers to the number of training sessions carried out per week. The number of exercise sessions should reflect the individual's goals (e.g. increase physical activity or improve a specific component of fitness) and take into account their current fitness level and the time they have available, including commitments such as family and work and sufficient time to recover in between sessions.

An untrained, inactive individual can start by gradually increasing their daily activity levels, so that they are eventually active at a moderate intensity on five or more days of the week. Scheduled exercise sessions for a beginner may be planned on two to three non-consecutive days a week (with a rest in between each session).

Competitive athletes may train up to 12 times a week, with morning and evening sessions on many days; different muscles and fitness components will be the focus in different sessions.

Frequency of training also depends on the component of fitness being trained. It is safe to stretch every day if the muscles are warm, but for muscular strength and endurance training, 48 hours' rest is required prior to working the same muscle groups. Training for specific muscles should therefore be planned on non-consecutive days. If different muscle groups are worked on different days (e.g. a split routine), muscular training can be more frequent.

Another key factor that affects frequency is the intensity of the exercise. Moderate-intensity aerobic exercise can be performed more often (every day), with less risk of injury. Vigorous-intensity aerobic exercise carries a higher risk of injury and therefore may need to be performed less frequently (e.g. three days a week).

Intensity

The intensity of exercise will be determined by individual factors (existing fitness and skill level, etc.) and specific goals, e.g. the components of fitness trained (strength, flexibility or CV).

The intensity of CV exercise is traditionally monitored by measuring heart rate or rate of perceived exertion (RPE). The intensity of flexibility exercise is traditionally monitored by measuring the ROM. The intensity of muscle strength and endurance training is traditionally monitored by measuring the resistance lifted and the number of repetitions.

Time

The total time dedicated to a training session is largely dependent upon the type of exercise, component of fitness, fitness level of the individual and amount of time they have available or are willing to devote.

The minimum duration of training to improve CV fitness is 20 minutes, excluding the warm-up and cool-down.

For muscular fitness training, sufficient time must be allocated to train all major groups and perform the planned sets and repetitions for each specific exercise.

The time allocated for stretching should be sufficient to incorporate all major muscle groups for the appropriate number of seconds.

Group exercise sessions (exercise in water, outdoor boot camps, Pilates and yoga) tend to be planned for a set duration – usually a minimum of 45 minutes and a maximum of 90 minutes – which includes a warm-up and preparatory exercises and a cool-down and closing phase exercises.

Gym-based sessions are planned with similar time frames (between 45 and 120 minutes), including a warm-up and cool-down. The time allocated for the main workout will depend on the components of fitness trained (CV training only, muscular fitness training only or both) and the time required for each component. For example, a circuit weight training session integrating CV and muscular exercises may require less time than a strength-based resistance programme using more sets and longer rests between sets.

Type

There are many different types of exercise and activity, and specific activities will train particular components of fitness.

Gym-based exercise tends to involve:

- CV machines.
- Fixed resistance machines.
- Free weights.
- Portable equipment.
- Body weight.

Group exercise tends to involve:

- Body weight.
- Light free weights.
- Portable equipment.
- Mats.
- Specialised class equipment, e.g. an aqua exercise class might include floating aids.

The variables that will change the intensity for specific fitness components include:

- Resistance, including lever length, gravity and body weight.
- Repetitions.
- ROM.
- Rest.
- Sets.
- Rate or speed.

Special populations

Working with any special population group on a regular basis requires a full understanding of their specific needs. Further training and qualifications will ensure that any specific needs are fully understood and can be accommodated when developing exercise programmes.

However, if a comprehensive screening is conducted, which involves additional screening tools to the par-q, it may identify that a client is apparently healthy and has no contraindications for exercise. In these circumstances, the person may participate on a non-regular basis provided all the necessary adaptations are made.

Populations that are considered specialist include:

- Older adults.
- Pre and postnatal women.
- Young people (aged 14–16).
- Disabled people.

Older adults

The American College of Sports Medicine (ACSM) defines an older adult as an individual over the age of 65, or over the age of 55 with at least 1 clinically significant health condition or physical limitation.

The ageing process is characterised by progressive loss and decline in the functioning of the skeletal, cardiovascular, respiratory and neuromuscular systems. These changes affect fitness potential and safety during exercise. They require adaptation of exercise to be considered to meet specific needs.

Ageing is a natural and highly individual process. It often begins to take effect around the age of 50, with the signs becoming more noticeable and apparent around the age of 65. The progressive decline in functioning may lead to reduced mobility, loss of independence, increased frailty and heightened risk of falls and bone fractures for some older adults.

People of the same age may not have the same loss of functioning. Those who maintain an active and healthy lifestyle may delay some of the effects of ageing to a much later age. By contrast, those who are inactive and follow an unhealthy lifestyle may show more marked signs of ageing at a much younger age (40 or earlier).

Contraindications to exercise may include:

- Unstable or uncontrolled medical conditions (e.g. diabetes, asthma or angina).
- Resting blood pressure of more than 180/110mmHg.
- Resting heart rate over 100bpm (tachycardia).
- Joint condition made worse by exercise.
- Unexplained dizziness.

Ageing affects all body systems and once the process is underway there is a corresponding 1–2% decline in physical capacity each year. Functional declines (such as loss of flexibility, agility and mobility) make everyday activities harder to perform, e.g. getting up and down from the floor or chairs safely. These changes may partly contribute to the reduction of activity levels associated with ageing.

There will also be longevity of exposure to risk factors for some chronic health conditions: increased joint wear-and-tear (osteoarthritis); loss of bone mass (osteoporosis) and atherosclerosis (hypertension, coronary heart disease).

Pre-exercise screening

A comprehensive pre-screening process needs to be completed prior to participation to check for any medical issues that require signposting and clearance from a GP.

Any client responding 'yes' to the PAR-Q questions should be signposted to a GP prior to participation.

| Effects of ageing | Fitness potential considerations |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Fewer fast twitch muscle fibres. • Weaker and smaller muscle fibres. • Reduced motor neurons. • Reduced neuromuscular transmission (fewer nerves sending messages). • Reduced capillaries in the muscle. • Increased levels of connective tissue. • Sensory decline (loss of hearing and vision). • Cognitive decline. | <ul style="list-style-type: none"> • Reduced muscular strength. • Reduced muscle power. • Reduced coordination. • Reduced movement speed. • Reduced muscular endurance. • Reduced flexibility and ROM. • Reduced balance and coordination. • Reduced postural stability. • Reduced short-term memory. |
| <ul style="list-style-type: none"> • Loss of bone mass and reduced bone density. • Increased risk of osteoporosis. • Reduced availability of synovial fluid. • Calcification of the joints (calcium laid down in the cartilage). | <ul style="list-style-type: none"> • Bones become less resilient to stress and more susceptible to fracture. • Stiffer, less mobile joints. • Reduced shock absorption in the joints. |
| <ul style="list-style-type: none"> • Reduced stroke volume and cardiac output. • Less efficient heart and circulatory system. • Increased blood pressure. • Fewer capillaries. • Less elastic vessels. • Reduced intake, uptake and utilisation of oxygen. | <ul style="list-style-type: none"> • Lower maximal heart rate. • Lower training heart rate. • Slower recovery rate. • Decreased tolerance to fatigue. • Tendency to tire quicker. • Lower anaerobic threshold. • Lower tolerance of high-intensity exercise. |

(Lawrence, 2008)

Safety considerations and guidelines for older adults

Prior to participation all clients should be pre-screened. A healthy older adult between the ages of 50 and 65 can be reasonably accommodated in a regular exercise session, with appropriate adaptations to meet any specific age-related needs.

Older adults aged over 65 or between 50 and 64 with health conditions would need to be signposted to a GP for advice, as they may need to work with a specialist exercise referral instructor or a fitness professional with specific qualifications and experience in working with older adults.

The following general guidelines are recommended for all adults over 50 to minimise the risk of any adverse effects:

| Component | Adaptation |
|--------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Warm-up and preparation | <ul style="list-style-type: none"> • Use a longer, more gradual warm-up (around 15 minutes). • Use lots of mobility exercises. • Build ROM of mobility exercises gradually. Begin with moderate-range mobility exercise (e.g. small shoulder circles) before increasing the shoulder ROM and progressing to arm circles. • Use slower controlled movements. • Focus on posture, alignment and correct technique. |
| Cardiovascular training | <ul style="list-style-type: none"> • Build intensity more gradually. • Lower working intensity. • Use less impact. • Use less choreography (group exercise to music). • Use a longer, more gradual cool-down. • Emphasise correct technique. • Layer information (impart it in stages rather than all at once). |

| Component | Adaptation |
|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Muscular training | <ul style="list-style-type: none"> • Use less resistance and shorter leverage for some exercises. • Use fewer repetitions and sets, and more rest. • Use more stable and balanced positions. • Allow transition time to get down and up from the floor. • Use a slower pace. • Allow more time to change exercises or positions. • Emphasise correct technique. • Supine lying may be contraindicated (osteoporosis); extreme spinal flexion (i.e. full or half curl-ups from supine position) may also be contraindicated (consider alternatives). • Strengthen postural muscles, pelvic floor muscles and areas around potential fracture sites for osteoporosis (wrist, hip and spine). |
| Cool-down and closing | <ul style="list-style-type: none"> • Use a longer duration. • Consider using more stretches for specific muscles. • Use more stable positions. • Use a smaller ROM. |

Pre and postnatal women

Maintaining activity levels and exercise is generally recommended for healthy pregnant women. In most cases, activity and exercise at the appropriate intensity are safe for both mother and baby and not associated with any adverse effects.

Benefits of exercise during pregnancy:

- Prevention of excessive gestational weight gain.
- Prevention of gestational diabetes.
- Decreased risk of preeclampsia.
- Decreased incidence/symptoms of low back pain.
- Decreased risk of urinary incontinence.
- Prevention/improvement of depressive symptoms.
- Maintenance of fitness.
- Prevention of postpartum (postnatal) weight retention.

(ACSM, 2017)

The PARmedX for pregnancy screening tool should always be completed prior to participation to identify any contraindications and reasons for exclusion or referral to a specialist instructor.

N.B. The guidance offered in this section relates only to normal, healthy, adult women experiencing a normal, healthy, singleton pregnancy or women who have had a normal, healthy birth and who have had previous normal, healthy pregnancies and births.

The effects of pregnancy

The needs of pre and postnatal clients vary depending on the stage of pregnancy and the different physiological effects. Some general effects include:

- Increased heart rate.
- Increased stroke volume.
- Increased cardiac output.
- Increased oxygen uptake.
- Increased laxity of joints.

Relative contraindications to exercise (i.e. exercise is possible with precaution) include:

- Severe anaemia.
- Unevaluated cardiac dysrhythmia (irregular beating of the heart).
- Chronic bronchitis.
- Poorly controlled type 1 diabetes.
- Extreme morbid obesity.
- Extreme underweight.
- History of extremely sedentary lifestyle.
- Growth restriction in current pregnancy.
- Orthopaedic (skeletal) limitations.
- Poorly controlled seizure disorder.
- Poorly controlled hyperthyroidism.
- Heavy smoking.

Absolute contraindications to exercise (i.e. those requiring direct referral back to the GP) include:

- Heart disease.
- Lung disease.
- Incompetent cervix.
- Risk of premature labour.
- Persistent second or third trimester bleeding.
- Placenta previa (low lying placenta) after 26 weeks' gestation (into pregnancy).
- Premature labour during current pregnancy.
- Ruptured membranes.
- Preeclampsia (pregnancy-induced hypertension).

(ACSM, 2017)

Specific stage-related changes are identified in the table below:

| Trimester 1 (0–3 months) | Trimester 2 (3–6 months) | Trimester 3 (6–9 months) | Post birth |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Increase in weight by 1–3kg. • Breasts and uterus start to enlarge. • Hormonal changes commence, e.g. increased relaxin affects ligaments and joint stability. • Morning sickness. | <ul style="list-style-type: none"> • Increase in weight by 6–8kg. • Postural changes (shoulder girdle protraction, thoracic hyperkyphosis, long upper back extensors and short, tight pectoral muscles). • Possible low back pain and neck or shoulder pain. • Abdominal muscles start to lengthen and stretch as the baby grows. • Change in centre of gravity. | <ul style="list-style-type: none"> • Increase in weight by 3–4 kg. • Tendency to become tired more easily. • Venous return may be reduced. • Weight of the baby presses on the pelvic floor. • Pelvic girdle less stable (effects of relaxin). • Weight of the baby places stress on the lower spine (increased lordotic curve). • Centre of gravity changes, affecting balance. | <ul style="list-style-type: none"> • Avoid physical stress for two weeks. • Return to activity 6 weeks after normal birth or 12 weeks after caesarean birth. • Hormone levels are still high (up to one year). • Weaker pelvic floor. • Pelvic girdle less stable. • Check for diastasis recti (abdominal separation). • Rectus abdominis is mechanically weaker for at least 12 months. |

The physiological and postural changes of pregnancy persist for several months after birth, making women vulnerable to injury and long-term physical health problems, such as pelvic floor dysfunction. This has particular significance for exercise involving impact, twisting and rapid, ballistic or aggressive movements, which should be avoided for at least six months and introduced progressively.

Prenatal adaptations to session structure and content

Pregnant women should always exercise according to how they are feeling. Hormonal and postural changes make them more vulnerable to injury, joint misalignment, muscle imbalance and motor skills decline, especially if they are genetically hypermobile.

These changes may start from very early in pregnancy and gradually become more significant as pregnancy progresses. Pregnant women are vulnerable to nausea, dizziness and fainting.

Pregnant women should avoid:

- Exercising in the supine position after 16 weeks.
- Exercising to the point of exhaustion (the goal is to maintain activity, rather than improve fitness).
- Prone lying exercise.
- Prolonged motionless standing.
- Heavy, uncontrolled isometric or prolonged resistance work above the head.
- Leg adduction and abduction against a resistance.
- Isometric exercises.
- Loaded forward flexion.
- Rapid changes of direction or position.
- Uncontrolled twisting.
- Exercise with a risk of falling or abdominal trauma.
- Excessive and uncontrolled destabilisation (balance) techniques.
- Abdominal exercises (focus instead on posture, mobility and pelvic floor).

Warning signs to stop exercise during pregnancy

- Vaginal bleeding or amniotic fluid leakage.
- Shortness of breath prior to exertion.
- Dizziness, feeling faint or headache.
- Chest pain.
- Muscle weakness.
- Calf pain or swelling.
- Decreased foetal movement.
- Preterm (premature) labour.

(ACSM, 2017)

Postnatal adaptations to session structure and content

Women should not begin exercising post birth until they have received the permission of their healthcare professional, usually at the postpartum six-to-eight-week check.

After birth (prior to progressing to more vigorous exercise) the focus should be to re-educate posture and joint alignment, address muscle imbalances, improve stability and motor skills and encourage transversus abdominis (TA) recruitment and pelvic floor function.

A woman should be referred to a health professional if she is experiencing any of the following symptoms post birth:

- Stress incontinence or pelvic floor muscle weakness.
- ‘Dragging’ pain or a feeling of heaviness in the lower abdominal or pelvic floor area.
- Groin pain, low back pain or difficulty walking, even if it is mild and intermittent.
- Abdominal muscle weakness, excessive abdominal doming, abdominal muscle separation, softness or sinking at the umbilical midline or umbilical hernia.

| Component | Adaptations |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Warm-up and preparation | <ul style="list-style-type: none"> Emphasise correct posture at the start and throughout the session. Make movements slower and more controlled. Increase the number of mobility exercises. Use full ROM mobility exercises to warm the muscles. Build up intensity of movements much more gradually to avoid sudden increases in blood pressure. Support stretch positions and take care not to exceed a comfortable ROM. |
| Cardiovascular training | <ul style="list-style-type: none"> Use low-to-moderate intensity. Use low impact. Use a more gradual build-up and lowering of intensity. Use less choreography (group exercise to music). Use a slower tempo. Women who are unused to exercise should start with shorter durations (begin with 15 minutes and increase gradually to 30 minutes). Maintain adequate hydration. Avoid exercising in very hot or humid conditions. Avoid heart rate monitoring – use verbal and visual methods of monitoring intensity. |
| Muscular fitness | <ul style="list-style-type: none"> Include exercises for the pelvic floor muscles. Avoid supine and prone lying (prenatal). Select comfortable starting positions. Avoid exercises which may place too much pressure on the pelvic girdle. Use movements related to everyday life. Perform fewer repetitions. Use lower-intensity exercises. Do not use heavy abdominal exercises; sit-up, crunch or oblique cross-over type exercises are not an appropriate choice for abdominal muscle re-education post birth. |
| Cool-down and closing | <ul style="list-style-type: none"> Include specific relaxation work. Avoid positions which may over-stretch the ligaments. Select balanced and comfortable positions for passive stretching. Use shorter-hold stretches to maintain rather than develop flexibility. |

Disabled people

People often automatically think of disabled people as wheelchair users; in fact, they make up only 6% of the disabled population. The majority of registered disabled people (around 8–10 million in the UK) have other health and physical conditions, which include:

- Blindness or partial sightedness.
- Deafness or partial hearing.
- Down's syndrome.
- Stroke.
- Obesity.
- Arthritic conditions.
- Mental health conditions (e.g. severe depression).
- Cancer.
- HIV.
- Limb amputation.
- Fibromyalgia.
- Cerebral palsy.

Disability

'An umbrella term covering impairments, activity limitations and participation restrictions.'

(World Health Organization)

Impairment: A problem in body function or structure.

Activity limitation: A difficulty encountered by an individual in executing a task or action.

Participation restriction: A problem experienced by an individual in involvement in life situations.

Benefits and barriers to activity

Regular physical activity in a safe and supportive environment offers many health benefits for disabled people. It will reduce the risk of developing chronic health conditions and can help to maintain and improve independence.

Disabled people are one of the populations identified as not meeting the recommended levels of physical activity. Many disabled people find they experience various access-related barriers to physical exercise. Promoting physical activity and enabling participation are therefore priorities.

Legislation

Service providers must anticipate the needs of disabled clients and make reasonable changes to accommodate these.

Equality Act (2010)

The Inclusive Fitness Initiative (IFI)

The IFI provides guidance and support to operators interested in welcoming disabled people into their facilities, and to disabled people who wish to become active. This guidance is provided in line with their policies.

Contraindications and safety considerations

Prior to participation, it is essential to pre-screen (PAR-Q) and check for any contraindications (e.g. stage 3 hypertension or heart conditions), and to seek clearance and guidance from a GP or health professional. Certain medical conditions will require activity interventions led by a specialist instructor.

To enable participation, the following must be considered for adaptation in relation to the needs of the individual:

EXERCISE SELECTION:

This will be determined by specific needs and may include:

Simplifying some exercises.

Reducing intensity (fewer repetitions, lower resistance, appropriate range of motion, controlled rate).

Modifying exercise positions and modalities, e.g. using wheelchair-based activities for wheelchair users or chair-based activities for individuals with physical or functional limitations or issues with balance.

TEACHING STYLE:

Teaching style and methods will need to accommodate specific needs and may include:

Clarity of verbal instructions for the blind or visually impaired.

Clarity of demonstrations; facing the person and speaking clearly when instructing the deaf or those with partial hearing (e.g. to enable lip reading).

Finding appropriate ways to engage and encourage people with learning disabilities, e.g. Down's syndrome.

HEALTH AND SAFETY:

This will include consideration of entry and access to all facilities; safe evacuation procedures in emergencies and respect to other legislation e.g. safeguarding vulnerable adults.

| | |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Progressive disorders | These conditions worsen over time, e.g. multiple sclerosis. Careful monitoring is required to ensure that the exercise programme does not cause the condition to worsen (exacerbation). |
| Asymmetrical weaknesses | These conditions result in a difference in strength between the left and right sides of the body, e.g. stroke and cerebral palsy. The aim should be to improve the affected side as much as possible without neglecting the unaffected side. If the nerves controlling the affected side have been partially or completely damaged, the opportunity for improvement in the local muscles is greatly reduced. |
| Spasticity | Many physical disabilities present with spastic muscles that are very tight or rigid. Flexibility training is important. However, before they incorporate any flexibility into a programme, the instructor must seek advice from a suitably trained medical authority on how to stretch a spastic muscle without causing injury. |
| Neuromuscular disorders | These affect the central nervous system (CNS), e.g. muscular dystrophy. Muscles can become progressively weaker as a result of the decline in CNS functioning; this can be offset in the programme by working on general fitness levels. Any rapid decline in function would necessitate immediate referral to the GP for guidance. |
| Sensory nerve damage | Damage to sensory nerves occurs with many types of physical disability. An inability to detect pressure against the skin can result in a pressure sore. Using a wheelchair increases the risk of developing pressure sores and clients will usually be aware of the importance of frequent checks. The use of gym equipment may bring similar risks, so additional checks should be advised. |
| Depression | This is a disabling condition in its own right. It can sometimes be a secondary condition resulting from the physical and psychological challenges of living with a disability. Depression reduces motivation and energy levels, and can contribute to drop-out from the programme. Medications used to treat depression have many negative side effects, including weight gain and suicide risk. |

Young people (aged 14–16)

Most healthy 14–16-year-olds can be accommodated within a regular exercise session with basic modifications. However, it is advisable to seek further training on working with adolescents to gain understanding of the physiological and psychological changes that affect this age group. As with all populations, a comprehensive pre-screening process is essential and all medical conditions would necessitate signposting to a GP prior to participation.

Growth plate fractures

The growth plate is the weakest area of the growing skeleton. Growth plate fractures account for up to 15% of all childhood fractures, with the highest level of incidence among 14–16-year-old boys and 11–13-year-old girls. A serious injury to a joint is more likely to damage the growth plate than the ligaments around it.

Preventative measures to avoid growth-related injuries include:

- Avoiding excessive training; this includes playing too much of one sport, playing the wrong sport for the young person's body type or using a resistance that is too heavy.
- Considering gender differences and the differing stages of development.
- Avoiding inappropriate size-matching in pair activities.
- Avoiding too much static, high-impact activity, e.g. jogging on the spot.
- Warming up and cooling down thoroughly.
- Using appropriate equipment for the activity, e.g. correct size and weight.

Flexibility

During the growth spurt, there is an increased injury risk because the soft tissue around the joints is already stretched, as muscle growth does not keep up with bone growth.

Caution should be taken when teaching any stretch exercise. The aim should be to stretch only to the point of mild tension and to avoid overstretching.

Limb length

During the growth spurt, young people have disproportionately long legs, meaning that they are biomechanically out of balance and are potentially less coordinated.

Technique

Young adults have not generally developed their 'body awareness' and coordination. They require closer supervision to ensure correct alignment. To reduce the risk of injury, begin with non-complex, low-resistance exercises and, where possible, use movement patterns that replicate everyday activities. Progression should only be applied when technique is correct.

Gymnasium equipment

The resistance machines in most gyms are designed for adult users and the weight increments are generally too great for young people. Free weights can be a better choice because they allow smaller weight increases and their safe and effective use is not dependent on the size of the exerciser. Care should be taken to ensure correct technique.

Cardiovascular and cardiorespiratory considerations

Young adults have smaller heart chambers and lower heart volumes. This results in a lower stroke volume at rest and during exercise. Chamber size and blood volume gradually increase with body growth. The lower stroke volume is counterbalanced by higher maximal heart rates. However, higher heart rates cannot fully compensate for the lower stroke volume and so cardiac output (volume of blood pumped from the left ventricle in one minute) is lower.

Young adults generally have lower blood pressure than adults, mainly because they have not been exposed to the risk factors affecting blood pressure for so long (longevity effects).

Lung volume and peak flow rates steadily increase until full growth. For example, maximum ventilation increases from 40L/min at 5 years of age to more than 110L/min as an adult. This means that children and young people have higher respiratory rates than adults – 60 breaths per minute compared to 40 breaths per minute for the equivalent level of exercise.

The measure of the amount of ventilation (passage of air in and out of the lungs) required for each litre of oxygen consumed (VE/VO_2) is also higher in young people, which means that children have inferior pulmonary functions.

Children and young people's arterial/venous oxygen difference is greater and this suggests that a higher percentage of the cardiac output goes to the working muscles than for an adult; this is another way in which children and young adults compensate for their lower stroke volume.

Aerobic capacity in young people is higher in absolute terms; VO_2 max (measured in L/min) increases from the ages of 6–18 for boys and 6–14 for girls. However, little change is observed with age when VO_2 max is normalised by body weight. There is a slight decline after puberty in girls because of the increase in body fat rather than muscle mass. By contrast, VO_2 max slightly increases for boys, during puberty, as a result of the growth in muscle mass. Any absolute difference in VO_2 max does not limit endurance performance. Young people more often lack technique and coordination and end up with poor economy of movement in activities such as running.

Anaerobic exercise

The anaerobic capacity for both boys and girls increases with age, but is not fully developed until around the age of 20. Young people have less glycogen stored per gram of muscle and have fewer stores of creatine phosphate. They have a lower anaerobic work level and should work at a low-to-moderate intensity rather than higher intensities. Activities to avoid until they reach physical and skeletal maturity include power lifting, bodybuilding and maximal resistance lifts.

Body temperature and dehydration

Young people have an inferior cooling mechanism due to low blood volume and high skin temperature. They are sensitive to heat stress because they expend more energy per kilogram of bodyweight than an adult during exercise.

Adolescents are at risk of dehydration when exercising, due to overheating. In the cold, they lose heat more quickly due to their relatively large surface area compared to their mass.

Summary of the key safety considerations

- **Growth-related issues and injuries:** Lower impact and intensity (fewer repetitions, less resistance) and avoid overtraining.
- **Flexibility:** Modify stretch positions, stretch to the point of mild tension (without overstretching), modify ROM and focus on correct technique. Avoid ballistic stretching.
- **Temperature:** Maintain hydration, lower intensity and avoid exercise in humid conditions.
- **Self-esteem and confidence:** Be mindful of any lack of confidence and low self-esteem, and how this may affect behaviour and motivation. Body image issues may be apparent (eating disorders would constitute a contraindication for exercise).
- **Medical conditions:** The presence of any medical conditions would necessitate signposting to a GP prior to participation.
- **Obesity:** This may present with other CVD risk factors (inactivity, hypertension, high cholesterol or diabetes) that negatively affect health. Sufferers need to be signposted to a GP prior to participation.
- **Immaturity:** This may affect behaviour and regard for safety.
- **Reduced coordination and motor skills:** Simpler and non-complex activities with less technical demand would be recommended. Focus on exercise technique and adapt your teaching style to meet the client's needs.

| | |
|------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency | Aerobic: every day. Strength: three days a week. Bone strengthening: three days a week. |
| Intensity | Moderate-to-vigorous-intensity aerobic exercise. |
| Time | 60 minutes. |
| Type | CV: swimming, dancing, cycling, running or walking. Strength: climbing trees, games (e.g. tug of war) and resistance exercises. Bone strengthening: jumping, running, skipping, hop scotch and games (basketball, tennis, etc.). |

Table 7.1 Recommended guidelines for children and adolescents

Answer the following questions and make notes to revise this section.

- How is exercise defined?
- How is physical fitness defined?
- What are the components of health-related fitness?
- What are the components of skill-related fitness?
- Define overload.
- Define reversibility.
- Define specificity.
- Define adaptability.
- What does 'FITT' stand for?
- What are the contraindications to exercise for an older adult?
- Identify the physiological effects of ageing.
- What are the benefits of exercising during pregnancy?
- What are the contraindications of exercise for pre and postnatal clients?
- How is disability defined?
- What are the potential benefits of exercise for a disabled client?
- What are the risks of exercise associated with young people (14–16 years old)?

Nervous system anatomy

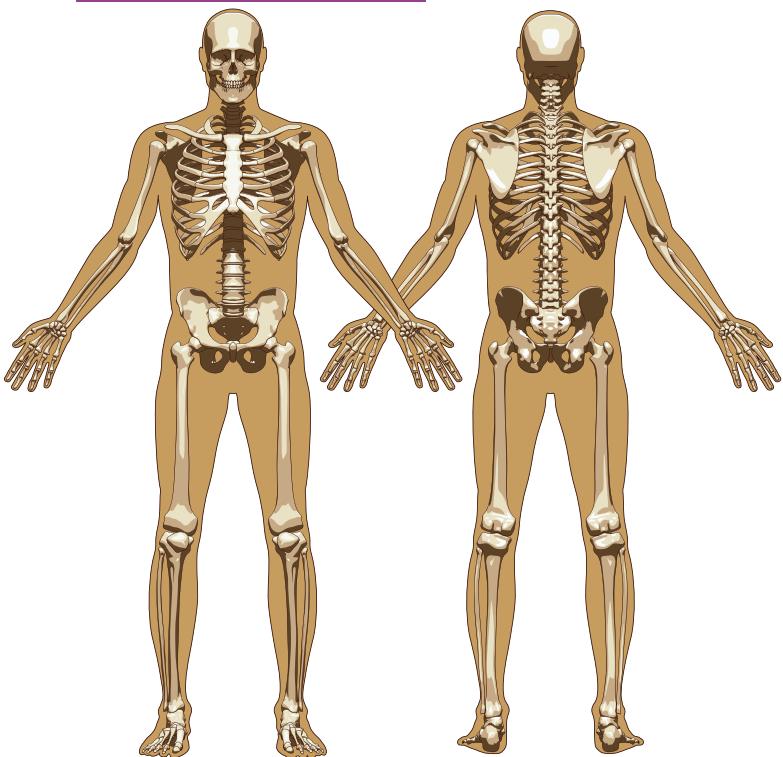


The body is a living structure comprised of many finely integrated and interconnected systems. Each system can be described independently and separately, but it is important to remember that they are actually interdependent.

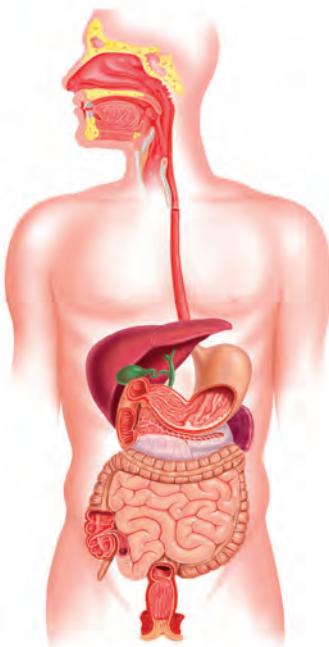
Every system depends on other systems for optimal functioning.

To give a very basic example of the interconnection: the skeletal system of bones and joints provides the framework; the muscles generate movement of the skeletal framework; the heart and circulatory system pump oxygen and nutrients to fuel the muscles; the respiratory system takes in oxygen and removes waste products; the nervous system is the control centre responsible for overseeing and responding to all demands and actions; and the digestive system breaks down and stores the nutrients required for energy production.

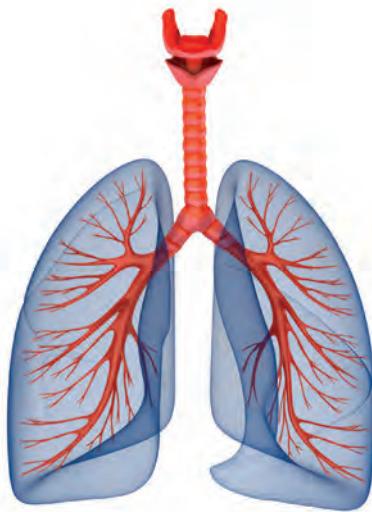
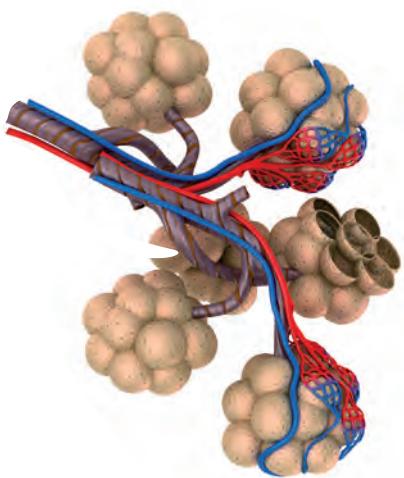
Skeletal anatomy



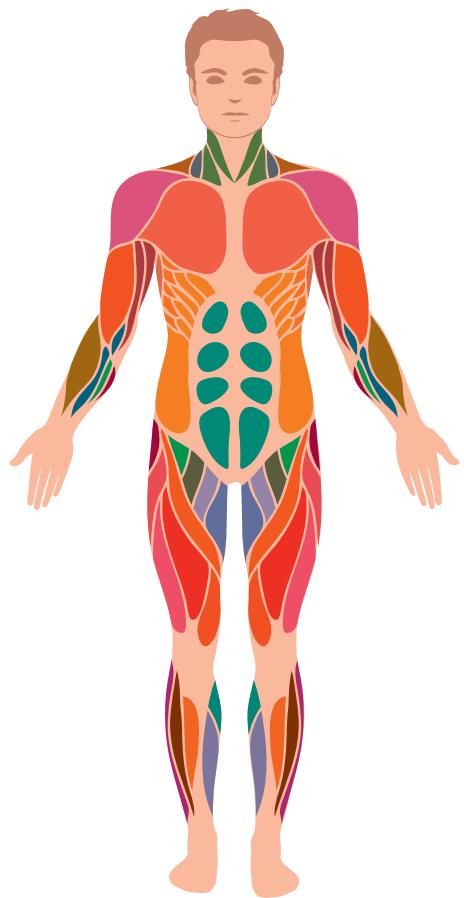
Digestive anatomy



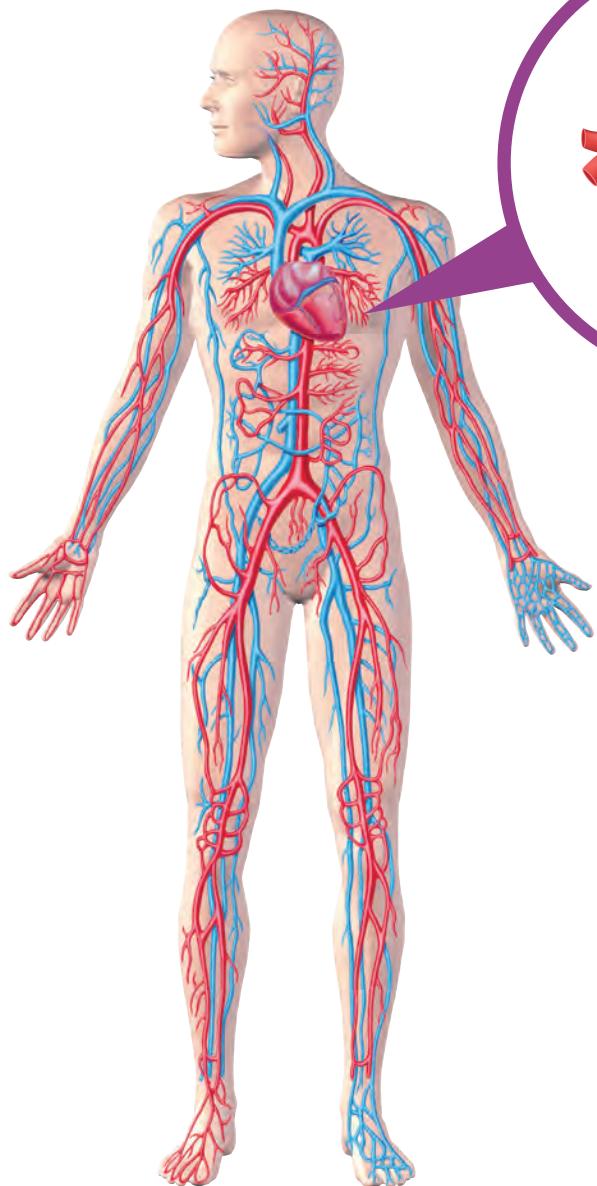
Lung anatomy



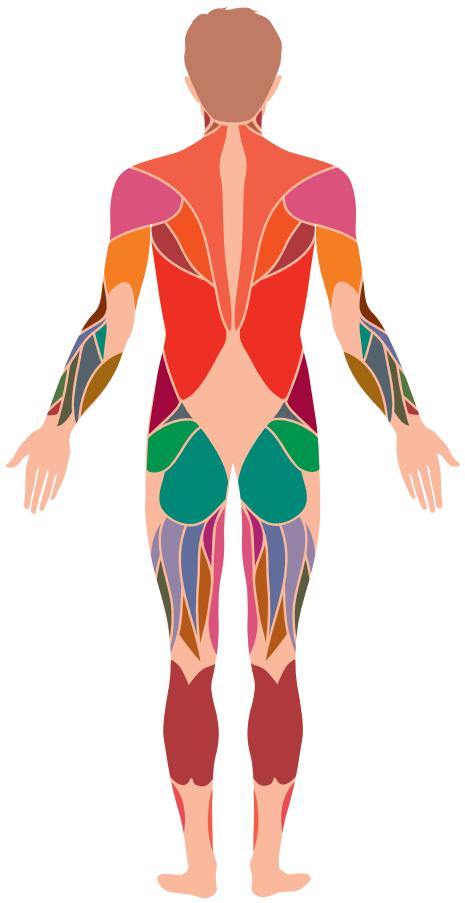
Muscle anatomy



Heart anatomy



Circulatory anatomy



Notes

Professionalism and customer care for fitness instructors

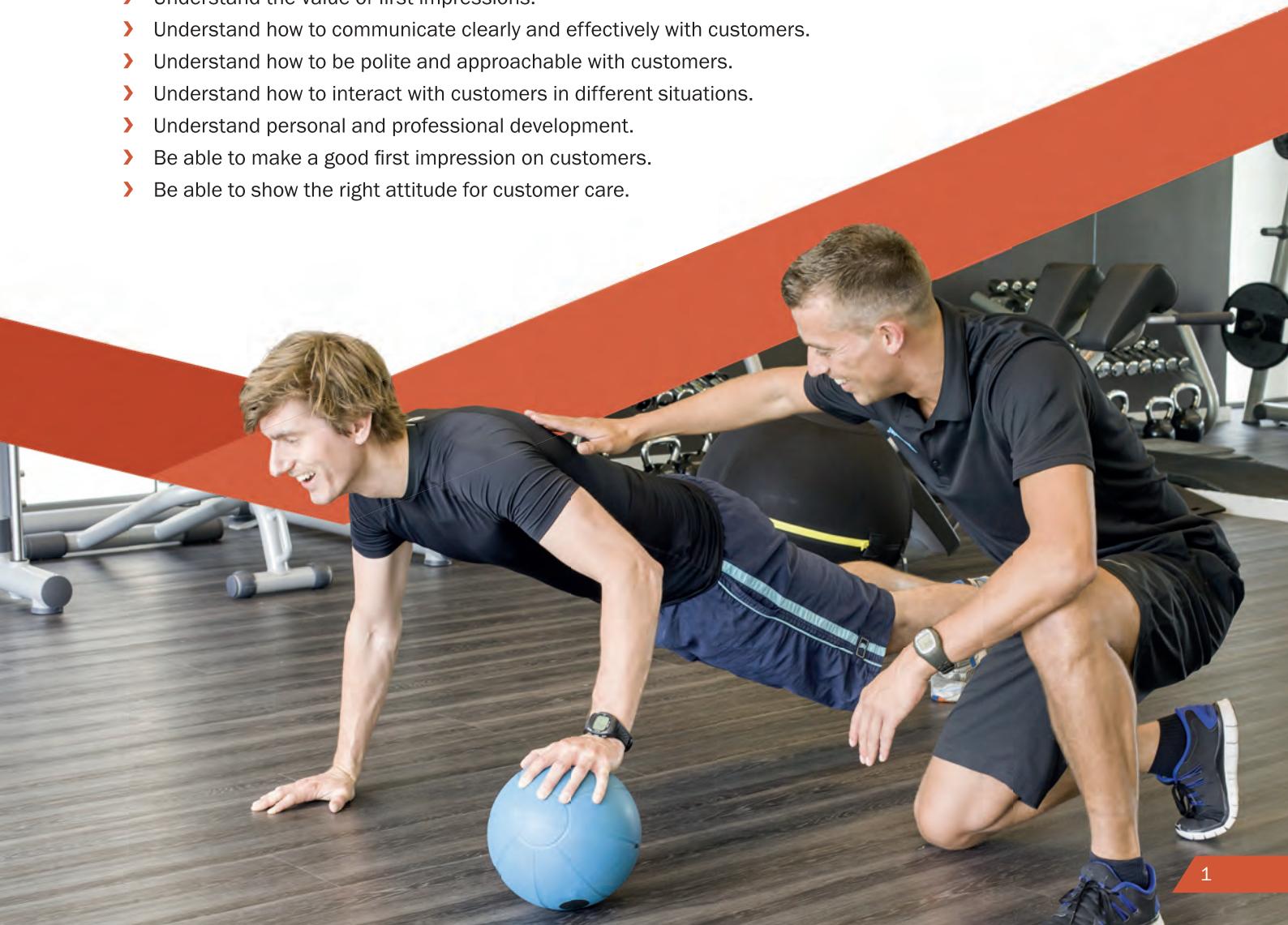
Aim

As the health and fitness industry continues to grow, it is vital that operators such as gyms, health clubs and boutique clubs fully understand the needs of their customers and are able to rely on a professional workforce to best support them in achieving their goals.

Learning outcomes

At the end of this unit you will:

- Understand the legal and professional requirements for fitness instructing.
- Understand how an instructor can help all types of customer to have a positive exercise experience.
- Understand the products and services offered by fitness instructors and facilities.
- Understand the skills and behaviours needed to deliver effective customer care.
- Understand the value of first impressions.
- Understand how to communicate clearly and effectively with customers.
- Understand how to be polite and approachable with customers.
- Understand how to interact with customers in different situations.
- Understand personal and professional development.
- Be able to make a good first impression on customers.
- Be able to show the right attitude for customer care.



Unit Contents

Professionalism and customer care for fitness instructors

| | |
|------------------------------------------------------------------------------|----|
| Section 1: The role and responsibilities of the fitness instructor | 3 |
| Section 2: Exploring the needs of fitness facility customers..... | 9 |
| Section 3: Providing excellent customer care..... | 15 |
| Section 4: Continuing professional development and reflective practice | 31 |
| Please see end of manual for Glossary and References | |

Section 1: The role and responsibilities of the fitness instructor

The role of the fitness instructor is to engage, facilitate, educate and support clients in the gym environment. This involves:

- Playing a key role in customer experience and member retention.
- Motivating clients to adhere to exercise to support long-term health-related behaviour change.
- Conducting pre-exercise screening, fitness assessments, consultations and inductions.
- Providing sound demonstrations of gym-based exercise and equipment.
- Referring clients to other exercise or health professionals, when appropriate.
- Planning safe and effective gym-based exercise programmes.
- Providing ongoing supervision, monitoring and programme review to ensure programmes remain engaging, varied and progress in line with clients' needs and goals.
- Providing a positive customer experience by routinely 'walking the gym floor' to engage and build rapport with clients and to support safe and effective exercise technique.
- Taking responsibility for health and safety, as well as cleaning, relevant to their role within the gym environment.

The gym instructor works independently and as part of a team. As a first point of contact, the gym instructor will provide high levels of customer care and service, and will help with any customer feedback, taking responsibility for the customer experience.

The gym instructor will typically work five days across a 7 day week that may include weekends, early mornings, evenings and public holidays, and will typically report to the fitness/leisure manager.

Equality, diversity and difference

It is important to value equality and diversity and to give people the respect and care that they deserve and have a right to expect. This requires you to ensure all work is conducted in accordance with legal, professional and ethical codes of practice.

There are various characteristics that people share and have in common (similarities) and some that make them different to others (differences). Some characteristics are protected by legislation to ensure that people do not experience prejudice, discrimination, harassment or bullying on account of them when using services.

There are currently nine protected characteristics:

- Age.
- Disability.
- Gender reassignment.
- Marriage and civil partnership.
- Pregnancy and maternity.
- Race.
- Religion or belief.
- Sex.
- Sexual orientation.

Equality

Enjoying equal rights and being of the same importance.

Diversity

Valuing the individual difference of a person.

(Gravells and Simpson, 2009)



There are many other diverse characteristics that make one individual different to another; examples of these include:

| | | | |
|----------------------------------------------|---------------------------------------------|---------------------------------|---------------------------------------|
| Occupation/ employment status | Taste in music/TV programmes | Political persuasion | Accent |
| Favourite sports/sports teams | Skin/hair colour | Family | Mental/ physical ability |
| Sexual orientation | Appearance | Socioeconomic status | Schooling (public/private) |
| Geographic location | Hobbies/ talents | Height and weight | Ability and confidence |

People have the right to be valued and treated with equal respect and importance regardless of differences.

Current equality legislation includes The Equality Act, 2010, which incorporates the Sex Discrimination Act, 1975; the Race Relations Act, 1976, as amended by the Race Relations Amendment Act, 2000; the Disability Discrimination Act, 1995; the Sexual Orientation Regulations, 2003 and the Religion or Belief Regulations, 2003.

All professionals (including exercise professionals and fitness instructors) and organisations are required to operate within the legal framework of equality when providing services, to ensure that all clients and prospective customers are treated equally, fairly and with the highest standards of customer care, irrespective of differences.

ACTIVITY

Think of your closest friend or family member. Consider each of the diverse characteristics identified above and highlight those you have in common with them and those you do not.



Professional codes of conduct

Most occupations have codes of conduct and ethical practice to which professionals have to adhere. For fitness instructors, this is no different as there is a clear set of values to follow to ensure levels of professionalism and ethical practice are upheld. These values are translated into standards of conduct and are applicable to roles across the industry.

Codes of conduct and ethical practice are different to law. Ethical codes guide professionals in their work and help them to make ethical decisions. These codes regulate the behaviour of professionals and breaking them can carry punitive measures. A professional can be charged with breaking the code of conduct without breaking the law.

Ethical practice

The responsibility for ethical behaviour and practice lies entirely with the exercise professional. The client could be vulnerable and susceptible to the influence of those who offer help. All actions and behaviours should aim to empower clients.

Koocher and Keith-Spiegel (1998) use the following principles to guide ethics in psychology; these apply equally to other professions:

1. Professional action must bring no harm to clients.
2. Clients have the right to choose their own direction.
3. Be faithful to clients, the profession, the employing organisations and ultimately yourself.
4. Be just and fair to all clients, thereby ensuring non-discriminatory professional actions.
5. Be of benefit to clients by promoting their welfare.
6. Treat all clients with dignity and respect.
7. Be fully accountable to clients.
8. Maintain clear and unwavering professional boundaries.

Ethical responsibility

(To) do nothing that will harm society.

(Ivey, Ivey and Simek-Morgan, 1997)

Examples of how fitness instructors can comply with legislation and industry codes of conduct include:

- Respecting individual difference and diversity.
- Challenging discrimination and unfairness.
- Dealing with client information confidentially.
- Promoting inclusion, rather than exclusion (unless exclusion is required on medical grounds, e.g. exercise contraindications).
- Adapting communication to accommodate clients' specific needs.
- Tailoring programmes to accommodate different clients' needs and abilities (e.g. alternative exercises).

Scope of practice

Scope of practice describes the procedures, actions and processes that a professional is permitted to undertake in keeping with the terms of their qualifications and experience. It is important that fitness instructors understand the limitations of their role and only provide support, advice and guidance to customers within their scope of practice.

Examples of support, advice and guidance that fall outside the scope of practice of a fitness instructor include:

- Complex dietary advice.
- Exercise advice for severe back pain.
- Exercise advice for a client suffering from a mental health condition.
- Exercise programming advice for an intermediate/advanced athlete preparing for a marathon.

| | | | |
|------------------------------------------------------------------------|------------------------------|-----------------------------|---------------------------|
| B 4 Is the applicant suffering from, or has ever suffered from: | | | |
| Tuberculosis: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Leprosy: |
| Venereal Disease: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Hepatitis (sp |
| Syphoid, dysentery or other infectious or communicable disease: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | AIDS / AIDS Conditions, i |
| Genetic & Familial Disorders (eg Huntington's Chorea): | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Deficiency Sy |
| Nervous or Mental Illness: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Gastro-Intesti |
| Diabetes: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Disorders: |
| High Blood Pressure: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Epilepsy, othe |
| Arthritis: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | blackouts or di |
| Deafness or Chronic Ear Disease: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Heart Disease: |
| Skin Diseases: | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Rheumatic Fiev |
| | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Asthma or Chron |
| | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Lung Disease: |
| | <input type="checkbox"/> Yes | <input type="checkbox"/> No | Blindness: |

When customers seek support, advice or guidance that falls outside of a fitness instructor's scope of practice, it is important to refer them to other health and fitness professionals, as appropriate, for example:

- GP.
- Physiotherapist.
- Dietitian.
- Psychologist.
- Strength and conditioning coach.
- Exercise referral specialist.
- Low back pain specialist.
- Obesity and diabetes specialist.

Insurance requirements

The risks of injury and illness are higher for health and fitness customers than they are in most industries; insurance claims can therefore be quite common and typical grounds for these include:

- Injury due to negligence or poor advice.
- Psychological damage due to poor advice.
- Lack of progress towards goals in relation to promises made.

Other claims against fitness professionals include:

- Harassment
- Sexual harassment

Any fitness instructor who is employed by a health and fitness facility will be covered by the organisation's **public liability insurance**; this covers employers and its staff against claims of negligence resulting in injury, illness or property damage. It is important to fully understand what you are covered for if a claim is made against you, and how your employer will support you.

If you are self-employed, insurance cover may be different, so it is important to check with the centres you work for, as you may need to acquire your own insurance, which could include:

- Personal liability insurance, which covers claims made against the individual for injury or damage by a third party.
- Professional indemnity insurance, which covers claims made against the individual for giving poor advice or insufficient service by a third party.
- Business equipment insurance, which covers claims made against you for damage to a third party's equipment.

To protect themselves against insurance claims, fitness instructors should consider the following key points:

1. Document everything

Prior to every session, ensure that consent has been given and the appropriate forms signed by the customer, that the risks have been explained and understood and that appropriate health screening has taken place and been documented. Fitness professionals should always make sure that they give instruction on the proper use of equipment that they recommend for a client to use on their own. Always ask if the client has questions. Document in the training record that the instruction was given on the date in question and that the client acknowledged receiving the instruction. In the event of a claim, documentation of the actual date on which the instruction was given, along with a statement from the client that they understood and had no additional questions, can help to defend against allegations of failure to instruct.

Fitness professionals should review all of their clients' fitness plans regularly and ask the clients if they have any questions about any aspect of their plan. You should then document their responses on the training log and address concerns right away. Thorough documentation can require as little as one or two sentences for each training session and go a long way in defending a claim against the instructor.

2. Build Relationships

Listening to their clients can also help the fitness professional to reduce their risk of claims. It is a fact that the more questions people ask and the better they listen, the better they will be at building relationships. Examples of questions you should ask include:

- ‘How does that exercise feel?’
- ‘What exercises and activities do you like?’
- ‘Why do you not like that particular exercise?’

Maybe a client doesn’t like an activity because it hurts in a way that it shouldn’t or makes them afraid of losing their balance. By listening, a fitness professional can determine whether a client needs more instruction on an activity or a different activity altogether. By responding to their clients’ needs, fitness professionals can retain their custom for longer and even gain extra business through referral. In summary, by becoming a good listener, fitness professionals can become more successful!

3. Be Organised

As a fitness professional, it is critical that you ensure all documentation is stored confidentially and in an organised fashion so records of all sessions can easily be found and presented, in the event of a claim being made.

Revision activities

Answer the questions and make notes to revise this section.

- List five roles of a fitness instructor.
- What is the definition of ‘equality’?
- What are the nine protected characteristics?
- List eight examples of diverse characteristics.
- What does ‘ethical practice’ mean?
- What does ‘scope of practice’ mean?
- What types of insurance claims can be made against fitness instructors?

Section 2: Exploring the needs of fitness facility customers

The differing needs of fitness facility customers

The fitness facility market continues to diversify in order to meet the growing and wide-ranging needs of its customers. These customers include, but are not limited to:

| | | | |
|----------------------------------------------------------------|----------------------------|--------------------------------------------------------------------|---------------------------|
| Gym only (CV and resistance) | Gym and swim | Gym, sauna and steam | Classes only |
| Gym and classes | Gym, swim and classes | Family options, e.g. children's activities/facilities, e.g. creche | Gym with racquet sports |
| Social needs, e.g. special events, bar and restaurant included | 24-hour access | Simply weights | Simply CV equipment |
| Portable gym equipment | Personal training services | Bootcamps | Olympic lifting equipment |

It is important that all fitness facilities and their employees understand the needs of their customers to ensure that, as a minimum, they are met and, ideally, that expectations are exceeded.

It is possible for some fitness facilities to suit the needs of more than one of the customers identified above, for example, an upmarket health, fitness and racquets club would be able to provide gym facilities, swimming facilities, classes, racquets, personal training, social and family options, CV equipment and weights for training. By contrast, others are more niche in their offering and focus on one specific customer market; as an example, some boutique studios would only be able to provide portable equipment and run certain classes.

Products and services in a fitness facility

Fitness instructors normally offer the following services:

- Standard health screening.
- Tailored programme design.
- Induction to the facility and exercise equipment that includes important health and safety information.
- Exercise demonstrations and support with customers' own technique.
- Fitness testing.
- Basic healthy eating advice for healthy adults in line with the Eatwell Guide and national guidelines.
- Technical guidance for customers wanting an in-depth understanding of the exercises they are being prescribed and their specific benefits.
- Motivation and encouragement.
- Support with setting realistic exercise-based goals and overcoming perceived barriers.

Fitness facilities normally offer the following products and services:

- Access to a range of CV, resistance and functional exercise equipment.
- Access to a range of fitness classes (this is normally included in the membership, however some facilities may charge extra for some or all of their classes).
- Changing facilities, including showers.

Some fitness facilities may also offer ancillary and specialist products and services, such as:

- Personal training.
- Exercise on referral schemes
- Physiotherapy/sports rehabilitation.
- Beauty products and services.
- Nutrition/lifestyle seminars/packages.
- Jacuzzis, steam rooms and saunas.
- Running clubs.
- Restaurant facilities.
- Sports facilities such as tennis and squash courts.
- Massage and aromatherapy services.
- Children's facilities and services, such as a crèche and children's entertainment.



Membership options and contracts

Fitness facilities normally offer a range of membership options and contracts to best suit all customers. These include, but are not limited to:

| Membership/contract | Description | Who might it benefit? |
|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Annual membership | Minimum 12-month membership to access all facilities and services offered as standard. This can be offered either through monthly payments, which may include a 'sign-up fee', or payment in full, which is normally at a lower price than the total yearly cost of the pay monthly option. | Customers who plan to attend regularly normally consider this the best value for money. |
| 'Pay as you go' | This gives the customer the option of only paying for access to fitness facilities as and when they use them. | Customers who, for various reasons, cannot commit to regular attendance may find this a cheaper option. It is also useful for customers who may not be staying at the same location for a full year and only wish to commit to a few months of gym membership. |
| Off-peak membership | Customers can only use the fitness facility during quieter periods – normally between 10am and 3.30pm and on weekends at some facilities. This is normally a cheaper option than peak membership. | Customers who are retired, work unsociable or part-time hours or are not in work may benefit from this cheaper option. |
| Family membership | Fitness facilities offer family memberships that provide additional services such as a 'kids' clubs' and sports coaching lessons. | Families who wish to be active together without having to attend different activities/events at various locations. |
| Corporate membership | Some fitness facilities offer local employers the option of a discounted membership if their employees join. | Local employees would benefit from a cheaper contract. Employers benefit from a healthier workforce, increased productivity and reduced sick leave. |
| No contract membership | Fixed monthly payments with no minimum duration, meaning the customer can cancel at any time. | Customers not willing to commit to a 12-month contract normally find this option cheaper than 'pay as you go'. |
| Membership offering additional services e.g. 'Platinum membership' | The basic offering with additions such as access to unlimited sports facilities, e.g. squash or tennis courts. | Customers who want to make full use of everything the fitness facility has on offer. |

ACTIVITY

Research fitness facilities in your local area and make a note of:

- Services on offer.
- Additional facilities.
- Membership options and prices.

Compare the different options and decide what type of customer would be best-suited to each facility.

The customer journey

The customer journey describes the process customers go through from initially registering their interest to becoming a long-term member. This will vary from one fitness facility to another, however the most common customer journey is as follows:

Enquiry: The prospective customer contacts the centre either through an online enquiry form, phone call or walk-in.

Programme and induction:

The fitness instructor designs a tailored programme and shows the customer how to perform each exercise prescribed.

Upsell: There may be an opportunity to sell additional products and services, such as personal training, specialist classes or towel service.

Show round: The prospective customer is given a tour of the facilities and information about the products and services on offer.

Consultation: The fitness instructor discusses the customer's goals and current fitness levels.

Follow-up consultation/re-programme: 4–6 weeks later, the customer reviews their progress with the fitness instructor and may have a new programme designed.

Sign-up: The customer selects the membership package that best suits their circumstances and completes the sign-up paperwork.

Screening: An appointment is made with a fitness instructor to screen the client to ensure they are fit and healthy enough to exercise.

Repeat last stage: Continue to review customer progress to ensure adherence and member retention.

At any point during this process, the customer may decide that they do not wish to sign up, continue to attend or renew their membership. It is up to the fitness facility and its employees to provide excellent customer service and keep in regular contact to ensure customers continue to attend and pay their membership.

Client retention is vital for every organisation and service in the health and fitness industry; the industry would not survive without customers.

Upholding standards of customer care is essential. It is important for the client, as it allows for an enjoyable experience in the health and fitness environment and encourages long-term involvement in physical activity. It also benefits the organisation by helping to secure repeat business and recommendations.



Research suggests it costs 6–7 times more for a fitness facility to acquire a new member than it does to keep an existing one; with some finding the difference is higher still.

Revision activities

Answer the following questions and make notes to revise this section.

- What are the different needs of customers when using fitness facilities?
- What are the usual membership options for customers using fitness facilities?
- Describe a regular ‘customer journey’ of a fitness facility.
- Why is member retention important?

Notes

Section 3: Providing excellent customer care

Customers have a wide variety of needs; they might ask questions, need guidance or want information. They expect competent staff and instructors; safe, up-to-date equipment and fast, efficient service.

Meeting clients' needs is a minimum requirement; it provides a satisfactory experience. Providing an exceptional service requires you to exceed clients' expectations.

Meeting client needs

Doing what the client wants or giving them what they expect.

Exceeding client needs

Giving clients more than they want, doing more than they expect and 'going the extra mile'.

The benefits of exceeding client needs and providing excellent customer care

- Customer loyalty, which means repeat business and an increase in referrals.
- Increased sales and profit.
- More frequent sales as customers attend more and spend more money on additional products and services whilst at the fitness facility.
- Less money spent on attracting new customers.
- Fewer complaints and more issues resolved to the customers' satisfaction.
- Positive company reputation.
- Improved employee morale and productivity as customers respond positively to them.
- Reduced staff grievances and absenteeism.
- Reduced staff turnover.
- Improved employee relationships.

Helping customers to have a positive exercise experience

The key to ensuring customers have a positive exercise experience is forging positive relationships and developing a customer-friendly attitude.

Positive relationships lead to positive experiences and happy customers. Happy customers are more likely to return and spread the word than unhappy ones! Rapport and strong working relationships can be established through the use of effective communication skills.

Making a positive first impression

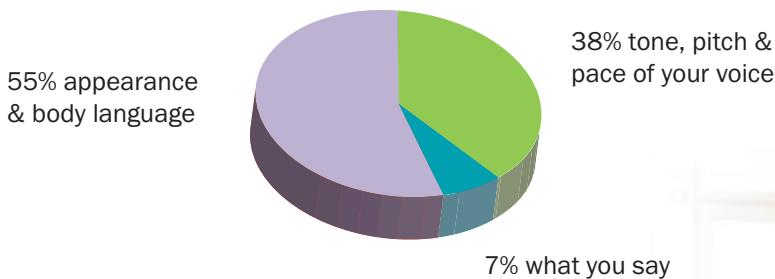
'You never get a second chance to make a good first impression'

First impressions count; simply smiling and addressing someone by name instantly forms a positive connection with lasting impact. By contrast, a negative first impression can be hard to change and take a very long time to forget. Another key consideration is positive body language, e.g. eye contact, relaxed and open posture and polite tone of voice.



It takes 5–7 seconds to create a first impression.

First Impressions: The 93% Rule



Meet and greet

The most traditional and professional method of meeting and greeting a customer is a handshake. When initiating this greeting, it is important to follow these steps:

1. Offer your hand to the customer first (introduce yourself by name if it is the first time you have met, e.g. 'Hi, I'm Melissa') with your little finger towards the floor and your thumb towards the sky.
2. Ensure you are standing and that you look the customer in the eye and smile before shaking hands.
3. Offer a greeting during the handshake, e.g. 'it is nice to meet you', or 'how have you been?'
4. Ensure your handshake is firm, but not crushing.
5. Ensure your handshake lasts 2–5 seconds before releasing.



It is important, when greeting someone, to do so in a positive manner, i.e. smile, ensure there is eye contact and adopt an open posture.

Presenting a professional image

The way someone thinks and feels about themselves, others and their work (their attitude and beliefs) is often reflected in their appearance, actions, behaviours and communication.

A positive attitude and demeanour (e.g. smiling and being polite) is attractive; a negative attitude (e.g. grumbling and being miserable) can be off-putting.

Nobody is happy, positive and upbeat all the time. Personal circumstances can affect thoughts and feelings on a daily basis. Events in the workplace can also trigger feelings of discontent (e.g. work rotas and shifts). It is poor professional practice to bring any personal or work-related issues to the workplace. It is important to put aside any issues and show a professional approach. Personal problems should be managed in your spare time and any work-related issues should be handled assertively by following organisational procedures.

It would be unprofessional, for example, to speak negatively about an organisation (e.g. complaining to customers or being rude to them); this is passive-aggressive behaviour and often leads to further discontent and conflict. Assertive actions are constructive and enable resolution of problems.

Professional appearance

Clothing and personal grooming should be consistent with the 'image' of the organisation and meet the expectations of the clientele. Examples of these include:



Using social media profiles

Most people have at least one social media account, especially on some of the most popular sites, such as Facebook, Twitter, Instagram and LinkedIn.

People use different social media platforms for different reasons, for example:

- Keeping in touch with friends and family.
- Promoting their business or their employer's business.
- Keeping up to date with the latest news.
- Finding a new job.
- Entertainment.



Social media platforms provide individuals with an opportunity to share information, opinions and queries with others. Some of the more popular platforms tend to be used in the following ways:

- | | |
|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facebook | <ul style="list-style-type: none"> • Share photos, videos and updates on their personal or professional life. • Share information about their business or the organisation that employs them. |
| Twitter | <ul style="list-style-type: none"> • Share opinion and thoughts on topical subjects. • Share information about their personal or professional life. |
| Instagram | <ul style="list-style-type: none"> • Share photos and videos of their personal or professional life. |
| LinkedIn | <ul style="list-style-type: none"> • Share information about their professional life. • Share information about their business or the organisation that employs them. |

It is important for fitness professionals to understand the benefits and risks associated with social media. All profiles can be made private regardless of the platform, but this does not guarantee total secrecy of every view you post. Be mindful that some of the views and comments you share may still be seen by your clients and customers of the fitness facility you work for, even if they are not a ‘friend’ or do not ‘follow’ your personal page or account.

| Benefits of social media | Risks of social media |
|-------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Excellent way of keeping up to date with industry changes. | Information provided through social media may not be reputable, or could be sales-focussed and therefore biased. |
| Free opportunity to promote yourself or the business that employs you. | Personal opinions or images shared may not represent the views of all customers and could upset certain individuals. They may also not represent the views of the employer and result in disciplinary action if serious offence has been taken. |
| Certain platforms provide an opportunity to seek employment (LinkedIn). | Excessive use in the workplace could reduce productivity and result in disciplinary action by the employer. |

It is vital for any public-facing employee to strongly consider the content they share on social media profiles before posting. Be mindful of different views and the likelihood of the content causing offence to others.

Punctuality and reliability

Punctuality and reliability are essential professional ethics. Lack of punctuality suggests a lack of care and effort; it infers poor organisation and time management skills.

It is important to arrive early for client appointments and training sessions, to prepare the necessary resources, to be available to meet and greet your client or clients and to be able to answer (or ask) any questions (e.g. pre-exercise screening checks).

Being late for client appointments or training sessions is unacceptable and reflects badly on both the instructor and the organisation. Repeated lateness will alienate clients (which could cause them to go elsewhere) and may lead to disciplinary action from your employer.

Professionalism and integrity

Professionalism and integrity are essential. It is important to be honest and to live and work to a high moral code; this means setting the highest possible standards of conduct and includes keeping promises, carrying out all duties and doing what is required to fulfil all working contracts with clients and the organisation. It also means ‘walking the talk’ and practising what is being preached; for a fitness professional or exercise instructor, this would include maintaining your own training and activity levels.

Integrity is also important for dealing with personal client information. Personal information is confidential and should never be discussed with a third party without the client’s consent.

Personal qualities

Some personal qualities improve the client experience as a whole and reflect positively on the instructor and the organisation:

- **Be patient, compassionate and sensitive;** these qualities reflect empathy and help you gain an understanding of the client's needs, wants and expectations. For example, if a client is new to exercise, they might need extra time to learn concepts (e.g. how to operate equipment or perform an exercise). Patience and compassion can go a long way towards helping the client develop their skills and knowledge; these qualities could also inspire an instructor to evaluate their approach and search for creative ways of enhancing the client's learning experience.
- **Be enthusiastic and maintain a sense of humour;** enthusiasm reflects passion and is 'contagious'. It is pleasant to be in the company of enthusiastic people and their energy can lift spirits in the workplace, as well as the training session.
- **Be approachable;** clients need to feel comfortable if they ask for help.
- **Be confident;** self-confidence grows from experience and is a quality that attracts people. It should not be confused with overconfidence, which is often a 'turn-off' and can push people away rather than attract them.
- **Be motivational;** providing positive encouragement and constructive, helpful feedback is essential for supporting clients.
- **Be organised** – keep a day-to-day diary to plan appointments and sessions.
- **Be a role model** – practise what you preach. Clients are often drawn to instructors because they are inspired by a quality or attribute the instructor possesses. Aim to demonstrate positive attitudes, behaviours and actions.
- **Be adaptable;** sometimes even the best-laid plans can go wrong, so you need to be flexible and have back-up strategies in place, for example, having alternative activities available to meet certain clients' needs or being ready to use a different piece of equipment if the one you intended to work with is in use or being maintained. Develop an action plan and prepare for the unexpected.
- **Be empowering;** educate clients and give them the chance to make informed decisions for themselves. Use effective communication skills to listen to clients and draw the solutions to overcome the barriers that face them – facilitate rather than dictate.

Communicating clearly and effectively with customers

Effective communication skills are essential in all professional working roles. As an exercise professional and fitness instructor, communication skills are needed to:

- Build rapport and motivate clients to engage with exercise and activity – to become more active.
- Support clients and encourage them to maintain their long-term commitment to being active.

Communication skills are needed for conducting consultations with clients and for delivering sessions.

| Active listening skills | Non-verbal communication skills | Verbal communication skills |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Nodding as the client speaks. • Leaning forward. • Positive facial expressions. • Eye contact. • Paraphrasing. • Reflecting and summarising. | <ul style="list-style-type: none"> • Being aware of personal space. • Using hand gestures. • Smiling. • Maintaining eye contact. • Awareness of body language and posture, e.g. avoiding crossing arms when interacting as it can appear hostile. • Avoiding aggressive acts, e.g. pointing or standing over the client. | <ul style="list-style-type: none"> • Appropriate tone, rhythm and pitch of voice. • Appropriate richness, warmth and volume of voice. • Matching the customer's words. • Appropriate language. |

Listening

One of the most important skills to develop when working with clients is active listening. When one person listens fully to what another person is saying, it encourages and motivates the person to carry on speaking and sharing information. Active listening is essential for gathering information from clients. Fitness instructors and exercise professionals need to understand their clients to be able to support and motivate them fully. This entails knowing:

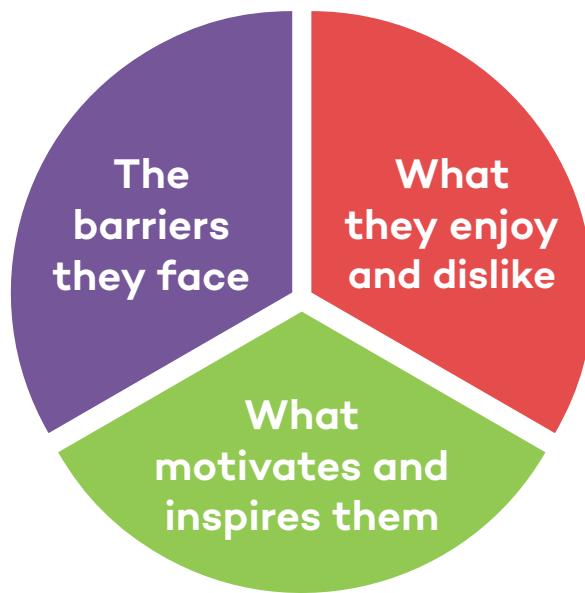
Active listening means more than just listening to the spoken word; it means looking for the meaning behind the words in order to fully understand the person and their wants and needs. Active listening should be supported by effective observation skills, as non-verbal communication (the client's facial expression, tone of voice, body posture, eye contact and gestures) brings extra meaning to what is being said. Valuable information can be gathered about a client's emotions, beliefs and motivation by observing these non-verbal cues.

To listen effectively, you should:

- **Show attention and interest;** both verbal and non-verbal communication can be used to convey these.
 - **Verbal statements** include acknowledging statements, e.g. 'okay', 'yes' and '*I hear what you say*', and specific skills, e.g. using reflective statements or paraphrasing your client to show attention.
 - **Non-verbal gestures** include maintaining regular eye contact, using nods of the head, gestures (e.g. a smile) and body movements (e.g. leaning forwards) that show attention and interest.
- **Show empathy and non-judgement.** Empathy is the ability to see from another person's perspective. It doesn't mean agreeing or disagreeing; it means appreciating and accepting the validity of the other person's view as their own perspective.
Showing empathy entails suspending any need to pass judgement (to agree or disagree) with something the other person says or does (actions, behaviour and words). Empathy is about understanding the other person and getting to know why they behave as they do, rather than judging them for their actions.

Empathy can be developed by reflecting the client's words back to them, e.g. if the client says they feel tired, a simple reflective statement would be: '*you are feeling tired today*' or '*you don't feel you have the energy for exercise today*'.

Empathy builds rapport and supports the development of a working relationship. Lack of empathy would stop the client from feeling understood or heard and compromise the quality of the relationship. Any non-empathetic, flippant, dismissive, judgemental or patronising responses to are likely to discourage clients from sharing information and might trigger defensiveness. As an example, if the client says they feel tired, responding ineffectively with statements such as '*don't we all*', '*never mind, you'll feel better after this*' or '*how can you feel tired, you haven't done anything yet?*' would be non-empathetic.



Try **paraphrasing and summarising**: these are both effective methods of showing attention and interest. The instructor can use their own words to restate or summarise their understanding of the conversation. Paraphrasing and summarising allow the client to expand (say more), disagree (e.g. ‘no, that wasn’t what I meant, I meant....’) or confirm that the understanding is accurate, for example:

Client: ‘I would really like to exercise regularly, but I just don’t have the time.’

Instructor: ‘You want to exercise more, but can’t find the time.’

- Use **clarifying statements or questions** to check your understanding with a client. They can also help the client to elaborate and give more information, for example:

Client: ‘I need to take it easy at the moment.’

Instructor: ‘Take it easy?’ (a reflective statement asked with a questioning tone) or ‘Please can you expand on what you mean by ‘take it easy at the moment’?’ (an open question).

N.B. Care should be taken when asking questions; the aim should be to enquire and gather information, not to confront or challenge.

- **Make use of silence.** During a consultation, periods of silence can be used to give clients time to think, reflect and find the right words to express their objectives and barriers.

Managing silence requires you to refrain from jumping in and filling the gap with another question or piece of advice, both of which can hamper the client’s thinking and reflective process.

| Communication | Motivating uses | Demotivating uses |
|-------------------------------------|------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Use of terminology. | Using simple, accessible language. | Overly technical or medical jargon can confuse and frighten clients. |
| Feedback. | Using constructive, descriptive and positive feedback, e.g. ‘great alignment and control!’ | Critical or negative comments are not helpful; they can trigger feelings of shame and humiliation that demotivate clients. |
| Listening and giving advice. | Listening and using active listening skills before offering advice. | Jumping in with ‘expert opinions’ or advice before you have seen the bigger picture shows a lack of interest and respect. |
| Body language. | Keeping an open posture, smiling, maintaining eye contact and being friendly and approachable. | Closed posture, avoiding eye contact, scowling and raising eyebrows are all likely to put clients off. |
| Words and language. | Using positive, inspiring words, e.g. ‘well done!’, ‘good to see you’, ‘great work!’ and ‘fabulous!’ | Negative language and an aggressive tone of voice, e.g. ‘not like that’, ‘just don’t’ and ‘that’s bad’. |
| Interest and attention. | Paying attention to people and showing a genuine interest in them. | Being dismissive and disinterested doesn’t motivate clients. Feigning interest is also usually recognised at some level of consciousness. |
| Perception. | Aiming to understand clients. | Passing judgement – this is a way of telling people that they are ‘not okay’. |

Table 3.1 Motivation and communication

Going the extra mile

Every employee within a fitness facility has a duty to ensure that standards of customer service are upheld at all times. Frontline staff, e.g. receptionists and fitness professionals, are at the heart of this and must always have a positive attitude when dealing with customer queries and complaints.

Very simple acts can go a long way in the service industry, for example, acknowledging a customer, when busy with another one, simply by smiling and mouthing ‘hello’ or waving, makes them feel valued and welcome, especially if they are addressed by name.

Always deal with customer requests in a positive manner, even if they appear unreasonable. It is part of your role to ensure all customers are given the best possible exercise experience during their time at the fitness facility to encourage adherence and member retention.

Customers do not care how knowledgeable the instructor is unless they show them how much they CARE. The acronym, CARE (consideration, active listening, responsiveness and empathy) captures the essence of a customer-friendly attitude.

- **Consideration:** Always offer to help, don’t make promises unless they can be kept, always be honest about the service provided and consider the customer’s circumstances and feelings.
- **Active listening:** Listen to the customer and demonstrate an understanding by responding appropriately.
- **Responsiveness:** Deal with customer queries and complaints promptly. The speed of response is critical in ensuring the customer remains satisfied with the service provided. If a customer asks a question, don’t pass them onto someone else – make the effort to respond in person and introduce compensatory measures for complaints, e.g. a free fitness session or discount.
- **Empathy:** Be non-judgemental and understanding of customers’ needs; view the situation from their perspective.

As we have seen, an exercise professional that goes the extra mile can make all the difference to the customer experience and help the organisation with member retention. Examples of going the extra mile and building rapport with customers include:

- Contacting them to check on progress with their exercise regime.
- Asking them how they feel the day after a session.
- Asking them about their programme and whether they would like anything reviewed.
- Asking them about their goals and whether they would like some help.
- Finding out information on their behalf (where relevant).
- Letting them know about new services or products and offering free trial sessions.
- Getting to know them and meeting additional needs, e.g. gathering information on stress management, relaxation techniques or mindfulness for a client with stress issues.
- Remembering their birthdays and wishing them happy birthday if they attend on or near the day (some clubs register birthdays for this purpose).

ACTIVITY

Think about the following scenarios and write down how you would respond to the customer:

1. A customer asks you to turn the music down in the main gym, even though four other members have commented to suggest it isn’t loud enough.
2. A customer asks you to wipe down a machine that has a previous customers’ sweat all over it, which they left without cleaning.
3. While you are delivering a group induction, a customer approaches you to ask if you can ‘spot’ her for a set, as there are no other available instructors.
4. A customer asks when the broken treadmills will be fixed, as there are none available and they have been broken for over two weeks.

Asking them for feedback after a period of membership or use of a service to see how their experience can be improved; this could be done in conversation or via a survey.

Forming working relationships with clients

Working relationships exist in all professions and are developed for a variety of purposes. They include relationships among:

- Customers.
- Work colleagues and team members.
- Managers.
- Other professionals, e.g. GPs and physiotherapists.

Effective working relationships are important for ensuring the efficient and professional delivery of all services and for enhancing the reputation of the industry.

It is important to develop and maintain strong working relationships with clients for many reasons:

- To make them feel supported and welcome.
- To engage them in active, healthy living.
- To offer relevant advice, information and support, e.g. correct exercise technique.
- To help and support them in any changes they wish to make to their activity levels and lifestyle.
- To promote exercise adherence and generate repeat business, so that they continue to use the service.
- To provide the best possible customer experience – to meet their needs and expectations.
- To gain their trust and make them feel valued.
- To establish and maintain appropriate, professional working boundaries.
- To clarify roles, responsibilities and expectations.
- To uphold the reputation of the organisation as an excellent service provider.

All professional working relationships depend on certain qualities:

- Mutual respect.
- Trust.
- Effective communication.
- Rapport.
- Empathy and positive regard.
- Feelings of safety and security.
- Professional and ethical standards of practice and conduct, with respect to diversity and equality.
- Respect for boundaries.

Establishing and respecting boundaries

All relationships need boundaries in order to function effectively; they are the foundations for the development of trust and mutual respect. Boundaries are especially important in working relationships for ensuring that both parties are clear on their specific roles and responsibilities, and on the expectations of the other person.

Clear boundaries and agreements for working can minimise the potential for conflict, which might arise if boundaries are ambiguous or expectations are not met. It is helpful to clarify all roles and boundaries once you start working with a client, rather than operate on assumptions. In some professions (e.g. counselling), written contracts are discussed, signed and agreed before any work can commence.



Examples of areas in which working relationships might need boundaries

- Punctuality and time-keeping.
- Payment for services, e.g. method and time of payment.
- Appointment cancellation and any sundry charges.
- Information sharing and confidentiality.
- Appropriate areas for imparting information, e.g. fitness instructors should not give advice on diets or attempt to diagnose medical conditions.
- Equality, diversity and treating people fairly.
- Advertising professional services honestly; this entails delivering sessions for which qualifications are held.
- Personal relationships with clients.
- Accepting gifts.
- Attending social events with clients.

Providing advice, guidance and support

One of the most important parts of a fitness instructor's role is to be constantly providing advice, guidance and support to customers. Fitness instructors are the first point of contact for customers, who rely on their technical knowledge and support to help them achieve their exercise goals.

Examples of advice, guidance and support include:

- Correct exercise technique.
- Advice on progression and regression of exercises
- Advice and demonstrations of exercises that target specific muscle groups.
- Nutritional advice (ensuring the advice is based on national healthy eating guidelines and within scope of practice).
- Information on classes offered.
- Advice on how to improve a particular aspect of fitness or prepare effectively for an event, e.g. a 10km race.
- Support through 'spotting'.

It is vital that any advice, guidance and support provided is within the fitness instructor's scope of practice and, where appropriate, the customer is referred to other professionals.

Approaching customers

There are certain times when it is appropriate to approach customers to offer support and guidance. Here are a few examples:

| Scenario | How to handle it |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A customer is walking around the gym floor looking lost. | Approach the customer, smile and ask them if there is anything you can help them with. Ensure positive body language throughout. |
| A customer is performing an exercise with unsafe technique. | When it is safe to do so, approach the customer and say: ' <i>Excuse me, would it be okay for me to show you a different way of performing this exercise that will work the muscles you are targeting more effectively?</i> ' Once you are given the opportunity to show the correct technique, explain how this approach also reduces the risk of injury. Check that the customer can perform the exercise correctly following the demonstration and give positive reinforcement when they do. Ask the customer if there are any other exercises they would like help with; if not, leave them with words of encouragement. |
| A customer is reading a notice board. | Approach the customer to the side and ask them if there is anything in particular they are interested in or would like more information on. Offer words of advice, in line with your scope of practice as a fitness instructor, and seek advice from others who are qualified to provide it, where appropriate. |

Walking the gym floor

As a fitness instructor, excellent customer care can be demonstrated through routine tasks to show consideration to customers. The best way of carrying out these tasks is to 'walk the gym floor' providing support, advice and guidance, for example:

- Asking a customer if they would like their water bottle filling up while they are on a cardiovascular machine.
- Being available prior to an exercise class to provide information to potential class members who would like to know more about what it entails.
- Offering to 'spot' a customer who is using free weights.
- Providing a customer with some tissue or a hand towel during a CV workout.
- Offering a customer alternative exercises if they need a new challenge or are struggling with one that has been prescribed.
- Offering words of encouragement to customers while they are exercising.
- Simply smiling and saying hello as you pass customers.
- Simply asking customers how their day was, or how their workout was as they are leaving.
- Correcting technique if you see a customer performing an exercise unsafely.

Sources of relevant and appropriate information for meeting clients' needs

Meeting customers' needs requires you to access certain information. Different clients have different needs and most fitness establishments have documents that answer frequently asked questions and outline the procedures for dealing with complaints.

Resources that detail the procedures, standards and customer service levels expected of an organisation include:

- Normal operating procedures (NOPs).
- Membership types and packages.
- Health club or gym rules and regulations.
- Health club or gym customer service standards.
- Health and safety regulations.
- Professional code of conduct.
- Studio timetables and class descriptions.
- Booking information, e.g. for swimming lessons, tennis courts, facilities and activities.
- Hair and beauty services, e.g. massages.
- Exercise referral operating standards and procedures.

Other team members can also be relied upon to provide information. Studio instructors, personal trainers, yoga and Pilates teachers and sports massage therapists can all share information about the services they deliver.

Clients who require information outside employees' areas of expertise should be signposted to relevant information sources, as detailed below:

| Information requested | Source of information |
|----------------------------------------------------------------------------|-------------------------------------|
| Medical information | GP |
| Diet and weight loss | Dietitian |
| Mental health concerns, e.g. stress, depression or eating disorders | Counsellor or mental health charity |
| Pregnancy | GP or clinic |
| Alcohol or drugs | Alcohol charity, e.g. Drinkaware |
| Giving up smoking | Smoking cessation service |

The key to excellent customer service is to ‘under-promise and over-deliver’, however there may be times, due to unforeseen circumstances, that promises cannot be kept and you have to explain the situation to customers.

First of all, it is important to apologise and accept responsibility on behalf of the organisation. Always have an alternative; it may not be exactly what the customer wants but it shows that their needs have been fully considered and the best attempts have been made to create a possible solution.

Example

The studio instructor had to cancel their class at the last minute due to illness and there is nobody else in the centre qualified or experienced enough to cover it.

1. Approach the customers to apologise and explain what has happened.
2. Explain that you/the facility have tried to contact other instructors who are able to deliver the same class, however none are available at such short notice.
3. Accept full responsibility.
4. Offer alternatives that you can deliver to those still looking for a group exercise class, e.g. a circuit-based session.

Obtaining feedback from customers to support continued exercise adherence

There are numerous ways in which fitness instructors can gain feedback from clients, which include:

- **Verbal feedback;** this could be as simple as asking them how their session was as they are leaving the gym, or what they think of the new equipment that has been installed. This is a quick and easy method of gaining feedback that serves a dual purpose:
 - It makes the customer feel that their opinion is valued and that you care about what they have to say.
 - It provides true, qualitative feedback that could help improve the service provided.
- **Written feedback;** this could come in the form of a survey, questionnaire, written letter/e-mail or comment card. Surveys and questionnaires allow the fitness operator to develop quantitative feedback that can be used to monitor public opinion about the centre. Comment cards and customer letters/e-mails are similar to verbal feedback in that they offer specific opinions from individual customers; these may be a complaint, a specific thank you in relation to a member of staff or general comments about the customer experience as a whole. It is important to collect customer feedback using the range of methods identified above as these will allow you to support them in achieving their exercise goals.



Dealing with customer complaints

When dealing with customer complaints, you must not take them personally or become defensive. Instead, look at a complaint as valuable customer feedback.

How the problem is dealt with can strongly influence how the instructor is perceived and leave a lasting impression on the customer. The client might not just be displeased; they may be upset, confused, disillusioned or angry.

When dealing with a complaint, you should:

- Listen without interrupting.
- Thank the client for their feedback and for bringing the issue to your attention.
- Take ownership of the complaint.
- Be polite.
- Remain calm and never enter into an argument.
- Follow organisational procedures – record the complaint (fill in a complaint form), acknowledge receipt of it and reassure the customer that it will be resolved in a timely fashion.
- Offer a point of contact – advise the client of possible solutions or alternatives, allow them to decide on an appropriate solution and ensure that they are appeased before they leave.
- Inform relevant staff of the problem.
- Communicate with the client and update them on progress.

Gestures of goodwill help to maintain positive relationships when dealing with complaints. All customer needs and complaints should be dealt with immediately, or as soon as possible. Keeping clients waiting or delaying responses looks lazy and unprofessional. It is essential to keep the customer up to date on progress when dealing with their needs or complaints. Maintaining communication links is important as customers tend to become frustrated if they don't know what is happening. Keeping them informed shows that the instructor and organisation are dealing with their requirements and not ignoring them.

Dealing with angry customers

Dealing with an angry customer requires practice. The key is to listen; sometimes being heard is all that is needed. Most people can only rant for a short period of time. Active listening allows them to hear themselves and tends to have a calming effect. When listening to angry clients, try to imagine yourself in their position and see things from their perspective (empathy). Always avoid being confrontational, dismissive or aggressive, although it is important to be assertive. Be mindful of your tone of voice, words and body language.

Compare these examples of aggressive and assertive communication:

| Aggressive language | Assertive language |
|----------------------------------------------------------|---------------------------------------------------------------------------------|
| 'Don't you dare speak to me like that!' | 'I'd prefer it if you didn't speak to me in that way.' |
| 'With that attitude, how do you expect to resolve this?' | 'I can understand your frustration; let's see what we can do about this.' |
| 'Shut up or I won't continue this conversation!' | 'I won't be able to continue this conversation if you keep using bad language.' |
| Aggressive body language | Assertive body language |
| Scowling | Open facial expression |
| Closed posture with the arms folded | Open posture |
| Invading personal space | Standing at a respectful distance |

Following organisational procedures when dealing with customer complaints

All organisations have procedures for dealing with complaints. These need to be followed in order to ensure all complaints are dealt with fairly, consistently and effectively. They must also be dealt with positively or it could reflect badly on the organisation. Remember that every complaint is an opportunity for services to be improved.

It might be that the customer is not satisfied with the outcome of the complaint and wishes to speak to someone more senior. Wherever possible, there should be an attempt to get the manager on duty to greet and speak with the customer at that point. If this isn't possible, ensure you obtain the customer's details and explain that you will pass these onto the manager who will contact you as soon as possible (ideally give a time frame – this may be specified in the organisation's complaints procedure document).

Teamwork

Teamwork is vital for delivering excellent customer service as it demonstrates care for the customer from across the company, not just one employee. As an example, if a customer wanted to know the best supplements to take for muscle gain, a Level 2 fitness instructor would not be in a position to advise them, but may have a colleague who is sufficiently qualified to deal with this request.

Teamwork also promotes positive staff morale and a true sense of belonging, which is mirrored by customers as they experience the ‘feel-good factor’ around the facility.

Another example of effective teamwork that works in the opposite way would be if a personal trainer was overrunning on time due to their previous client turning up late; as a fitness instructor, you could compensate for the lag in time by taking their next client through their warm-up so they are ready for the main workout with their personal trainer on time. Working collaboratively to deal with this situation could also prevent a customer complaint.

Social inclusion in a fitness environment

Fitness instructors can support customers in achieving their exercise goals by encouraging social inclusion. Family, friends or training buddies can help to boost motivation and offer reassurance. A common reason for giving up on exercise programmes is a feeling that no one will notice or care, and so the aim of a social support network is to give the client the necessary motivation to make a long-term commitment. A broad support network is vital for people who are not receiving positive encouragement at home.

Group training (small personal training groups or larger group exercise sessions) is a very effective method for encouraging commitment. The social aspect of training promotes enjoyment and increases the level of commitment among clients who do not want to let down their peers.

Another example of group training is a gym floor class (also known as a ‘fast class’) where a fitness instructor encourages customers to take part in a pre-planned or sometimes ‘ad-libbed’ exercise class on the gym floor. These can be CV-focussed, resistance-focussed or a combination of both, depending on the needs of the group.

Answer the following questions and make notes to revise this section.

- How long does it take to create a first impression?
- Describe how you should greet a customer.
- List the personal qualities required to create a positive working relationship with customers.
- What is **active listening**?
- Give three examples of how a fitness instructor could go the extra mile.
- Give five examples of how you can communicate and build rapport with customers when walking the gym floor.
- What kinds of feedback can fitness instructors obtain from customers?
- How can social inclusion in a fitness environment support customers in achieving their exercise goals?
- Why is it important to deal quickly and positively with customer complaints?
- How would you approach a customer who is performing an exercise unsafely?

Notes

Section 4: Continuing professional development and reflective practice

Continuing professional development (CPD) is defined by the Chartered Institute of Management for Sport and Physical Activity (CIMSPA) as:

'The practice of undertaking additional learning through courses, workshops or conferences or taking part in other activities which confirm that knowledge, understanding and skills are suitable for the specific job role.'

'Education is the kindling of a flame, not the filling of a vessel.'

Socrates

CPD is important in any industry, but within the health and fitness industry it is absolutely vital that knowledge and skills are kept up to date on a regular basis. The health and fitness industry continues to grow and change very quickly so it is important not to get left behind.

Examples of constant changes within health and fitness include:

- **New exercise guidelines;** these can be as simple as the type of stretching you should be performing in a warm-up, or the intensity you should prescribe for a client of a certain age or one with a specific medical condition.
- **New equipment;** the layout of a gym continues to change as 'functional equipment' replaces more traditional resistance equipment.
- **New research;** research is continually being released suggesting 'x' is the best way to gain muscle or 'y' is the best way of improving CV fitness. It is important to keep up to date but also to consider whether the source of research is reputable, unbiased and relevant to the type of customer you are working with.
- **New healthy eating guidelines;** as a Level 2 fitness instructor, part of your role will be to recommend healthy eating based on national guidelines. It is important that you are up to date with the latest guidelines so you are in a position to best advise your customers.

Benefits of CPD to the individual, their employer and the customer

CPD is not only for keeping up to date with industry changes so you can do your job well; it enables you to progress within the industry by looking at areas in which to specialise and grow your knowledge and skills. This could create a greater earning potential and lead you into a more specialised field that you have a particular passion for.

The more you know, understand and can do in your job role, the more job satisfaction you will enjoy, the higher the quality of service you will be able to provide and the more the organisation will benefit from having you as an employee.

CPD carries a number of benefits:

- It ensures your capabilities keep pace with the current standards of others in the field.
- It ensures that you maintain and enhance the knowledge and skills you need to deliver a professional service to your customers.
- It ensures that you and your knowledge stay relevant and up to date, and that you are more aware of the changing trends and directions in health and fitness. The pace of change is probably faster than it's ever been – and this is a feature of the new normal that we live and work in.
- It helps you continue to make a meaningful contribution to your team. Becoming more competent in the workplace helps you to advance in your career and eventually move into new positions where you can lead, manage, influence, coach and mentor others.
- It helps you to stay interested and interesting. Experience is a great teacher, but it does mean that we tend to do what we have done before; by contrast, focussed CPD opens you up to new possibilities, knowledge and skill areas.

- It can deliver a deepened understanding of what it means to be a professional, along with an improved appreciation of the implications and impacts of your work.
- It can lead to increased customer confidence in your ability and knowledge, which benefits the organisation by ensuring repeat business.

A common ‘joke’ within corporate circles highlights the importance of developing existing employees’ knowledge and skills:

*Two managers are talking about training their employees.
The first asks, ‘Yeah, but what if we train them, and they just leave?’
The second responds, ‘What if we don’t train them, and they stay?’*

Planning and reviewing cycle

A planning and reviewing cycle is a continuing process of self-reflection, review and action. It is important to follow a ‘plan and review’ cycle for CPD to ensure that the appropriate training and development needs are identified and actioned, and that their effectiveness is evaluated.

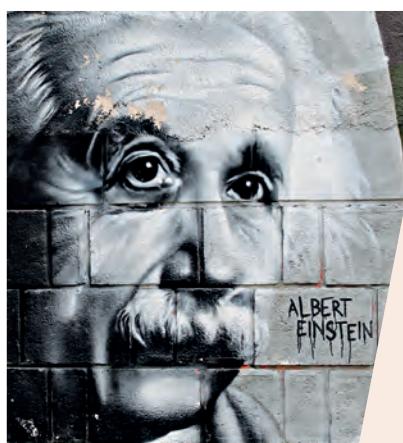


Personal development plan (PDP)

A PDP is the result of effective reflection of personal goals and aspirations. It is a written action plan detailing personal, academic and career based goals and how they can be achieved.

A PDP should include:

- Short-, medium- and long-term SMART (specific, measurable, achievable, realistic/relevant and time-bound) goals.
- Dates for reviews of goals.
- How the goals can be achieved and who can help achieve them.
- Reviews of previous SMART goals.



“Once you stop learning, you start dying.”

It is important to review goals and targets at regular intervals to ensure there is a clear focus on what needs to be achieved and how effective the training and development has been. Once they have been achieved and proven effective, the process starts again.

A PDP should be flexible and change as personal requirements and aspirations change.

SWOT analysis

One effective method of reflecting on your own work and highlighting ways to improve skills, knowledge and practice is to complete a SWOT analysis:



Example of a SWOT analysis for a qualified fitness instructor

| | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Strengths | Weaknesses |
| <ul style="list-style-type: none"> Knowledge of resistance exercises and free weights. Knowledge of how to build muscle. Approachable and friendly character. | <ul style="list-style-type: none"> Knowledge of CV fitness-based goals, e.g. distance running. Ability to teach group exercise classes. Knowledge of nutrition. |
| Opportunities | Threats |
| <ul style="list-style-type: none"> New classes added to the timetable. Free training available with local provider. Access to online CPD portal through work. Increase in membership sales, therefore more clients available for personal training, once qualified. | <ul style="list-style-type: none"> Qualified instructors who have a broader range of skills, e.g. can teach classes. High staff turnover. |

Self-reflection

Self-reflection can occur at different stages to help identify areas for CPD, for example:

- Written evaluation after each induction, consultation, exercise class, etc. identifying what went well, what could have gone better and what you will change next time.
- Monthly reflection on performance, progress and current knowledge and skills.
- Biannual and annual reflection on success of CPD.

ACTIVITY

Complete a SWOT analysis of your current position and identify what further training you might take to complete this qualification.

Supporting you with CPD

Other people can support you in the CPD process, including:

- **Customers;** receiving feedback from customers, whether it is good or bad, can help identify strengths and areas for development.
- **Managers;** during the appraisal process, which normally occurs biannually or annually depending on where you work, there is usually an opportunity to discuss CPD with your employer. Your manager may be able to identify a particular skillset that you haven't noticed yourself and possibly recommend opportunities to develop it, alongside other skills, through further training. Any CPD that is identified and documented will be reviewed during the next appraisal to evaluate its effectiveness.
- **Colleagues;** area specialists can support you in improving your knowledge and skills in their specific discipline. As an example, if you wanted to add some fresh ideas to your circuit class, you can speak to an experienced class instructor to show you some new content to incorporate.

Sources of information for CPD

There are many places to access information to fulfil your CPD needs, including:

- **Training providers;** approved training providers offer both nationally accredited qualifications and non-accredited 'endorsed' CPD courses. Before enrolling, always make sure you do your research to check that the qualifications are approved by an Ofqual-regulated awarding organisation, such as Active IQ.
- **Journals;** these can be accessed online and provide expert insight into specific areas of study. Always make sure the source is reputable – some examples include:
 - British Medical Journal (BMJ).
 - American College of Sports Medicine (ACSM).
 - The Nutrition Society.
- **Reputable websites;** you can access excellent information to improve your knowledge online, but be very wary of the source and always make sure it is credible. Examples of reputable websites include:
 - PTontheNet.
 - National Academy of Sports Medicine (NASM).
 - National Institute of Health and Care Excellence (NICE).
 - NHS website.
 - Google Scholar.

ACTIVITY

Carry out some research on CPD courses and note down what progression options are available on completion of a Level 2 fitness instructing course.

Revision activities

Answer the following questions and make notes to revise this section.

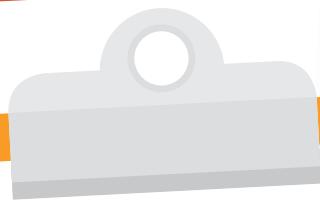
- How does CIMSPA define continuing professional development (CPD)?
- Why is CPD important in the fitness industry?
- What does ‘SWOT’ stand for when referring to a SWOT analysis?
- What sources can be used to ensure CPD?
- Who can support you with CPD?

10 COMMANDMENTS OF A GYM INSTRUCTOR

- 1** Thou must play a key role in customer experience and member retention.
- 2** Thou must motivate clients to adhere to exercise to support long-term health-related behaviour change.
- 3** Thou must conduct pre-exercise screening, fitness assessments, consultations and inductions.
- 4** Thou must provide sound demonstrations of gym-based exercise and equipment.
- 5** Thou must refer clients to other exercise or health professionals, when appropriate.
- 6** Thou must plan safe and effective gym-based exercise programmes.
- 7** Thou must provide ongoing supervision, monitoring and programme review to ensure programmes remain engaging, varied and progress in line with clients' needs and goals.
- 8** Thou must provide a positive customer experience by routinely 'walking the gym floor' to engage and build rapport with clients and support safe and effective exercise technique.
- 9** Thou must take responsibility for health and safety, as well as cleaning, relevant to role within the gym environment.
- 10** Thou must work independently and as part of a team.



PROVIDING EXCELLENT CUSTOMER CARE:



- Presentation**
- Positive first impression**
- Professional**
- Communication skills**

- Going the extra mile**
- Supporting clients**
- Teamwork**

Equality
Enjoying equal rights and being of the same importance.





CONTINUING PROFESSIONAL DEVELOPMENT



WHY?

- Provides new career opportunities
- Keep up-to-date with current best practice guidelines and trends
- Maintains professionalism
- Continue to make a positive contribution to the team

WHAT?

- Qualifications/ courses
- Workshops
- Seminars/ webinars
- Research
- Work experience

HOW?

- Plan and review cycle
- SWOT analysis
- Feedback from customers, peers, managers and mentors
- Training from reputable companies
- Access to reputable journals and books



Diversity
Valuing the individual difference of a person.



Notes

Health and safety in the fitness environment

Aim

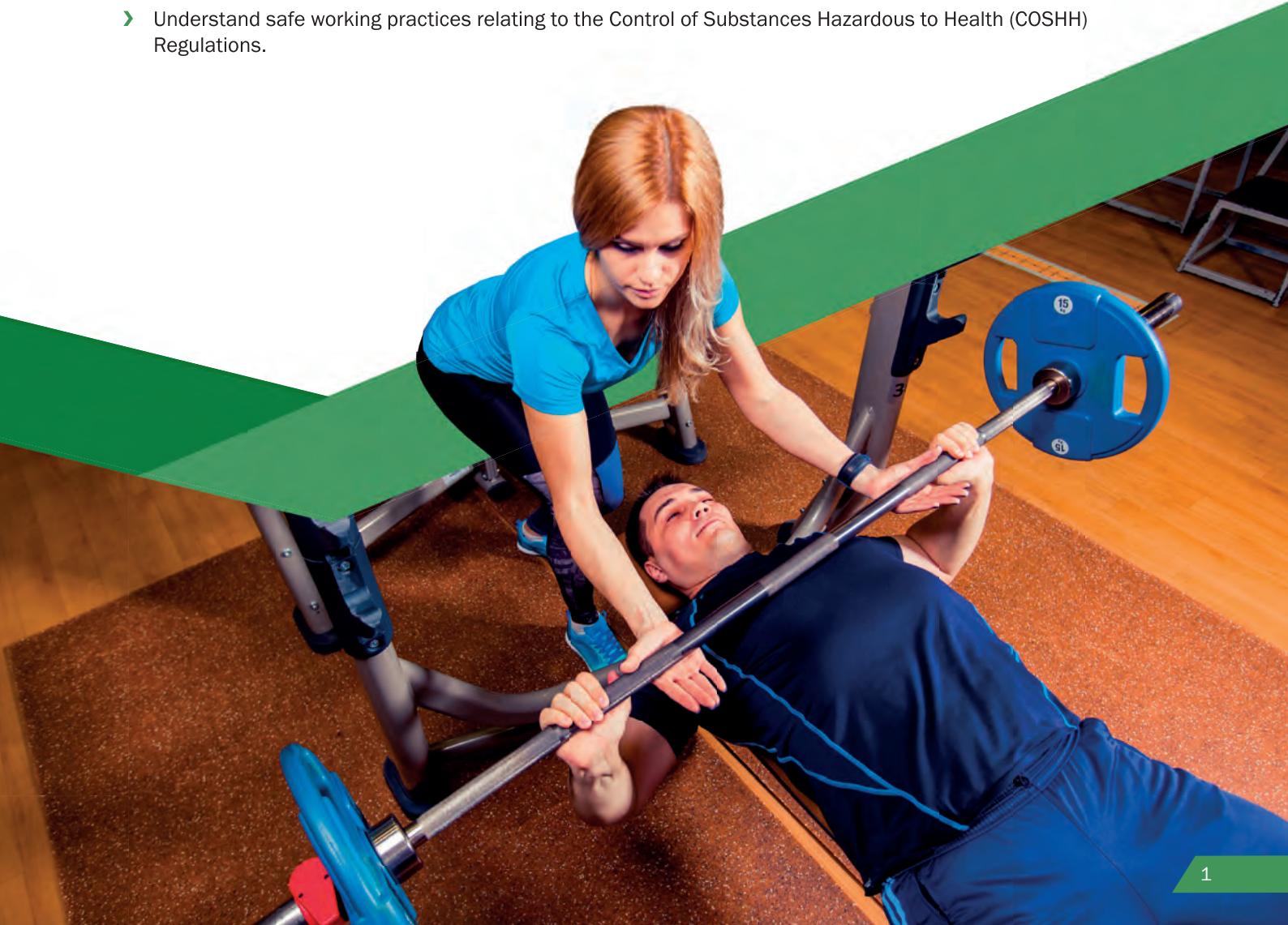
Health and safety is of prime importance in every industry. In a fitness environment, all staff need to know the organisation's health and safety policies, risk management strategies and emergency procedures. They should also understand their responsibilities and limitations with regard to duty of care and the welfare interests of themselves, their colleagues and clients, which can include children and vulnerable adults.



Learning outcomes

At the end of this unit you will:

- Understand health and safety in the workplace.
- Understand hazards and risks in a fitness environment.
- Understand normal and emergency operating procedures in the workplace.
- Understand how to maintain a safe and effective fitness environment.
- Understand the cleaning requirements in fitness environments.
- Understand safe working practices relating to the Control of Substances Hazardous to Health (COSHH) Regulations.



Unit Contents

Health and safety in the fitness environment

| | |
|-------------------------------------------------------------------------------------|----|
| Section 1: The importance of health and safety in the workplace | 3 |
| Section 2: Controlling hazards and risks..... | 9 |
| Section 3: How to maintain a safe and effective gym-based exercise environment..... | 17 |
| Section 4: Cleanliness in a fitness environment | 23 |
| Please see end of manual for Glossary and References | |

Section 1: The importance of health and safety in the workplace

The purpose of health and safety in the workplace is to ensure the welfare of all people, as far as is reasonably practicable. This includes the welfare of employees, customers and any person using services or visiting the facility.

Legal and regulatory requirements

The main piece of health and safety legislation for any workplace in the UK (including a fitness environment) is the Health and Safety at Work Act, 1974. The Act comprises a variety of health and safety laws and regulations that stipulate the duties of employers and employees. The Health and Safety Executive (HSE), along with local authorities and other enforcing authorities, are responsible for implementing the Act alongside a number of other Acts and statutory instruments relevant to the working environment. As of 5th April 2014, a health and safety law poster must be clearly displayed in the workplace or an equivalent pocket card/leaflet given to all employees.

| Legislation | Requirements |
|---------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013 (RIDDOR) | Employers must report occupational injuries, diseases and dangerous events that happen in the workplace. |
| Manual Handling Operations Regulations, 1992 | Employers must have procedures in place for the lifting or moving of objects by hand or bodily force. Hazardous lifting should be eliminated where possible; if it is unavoidable, mechanical aids must be provided. |
| Management of Health and Safety at Work Regulations, 1999 | Employers must carry out risk assessments and implement appropriate measures to manage risks, e.g. appointing and training staff to deal with safety issues. |
| Employers' Liability (Compulsory Insurance) Act, 1969 | Employers must have insurance for covering accidents and ill health. |
| Health and Safety (First Aid) Regulations, 1981 | Employers must have at least one qualified first aider or appointed person (depending on risk assessment). First aid kits and facilities must be available. |
| Personal Protective Equipment at Work Regulations, 1992 | Employers must provide adequate, suitable protective clothing and equipment for their employees (as appropriate). Equipment must fit properly, carry the CE Kitemark and be kept clean and stored correctly. |
| Control of Substances Hazardous to Health Regulations, 2002 (COSHH) | Employers must assess and take precautions against the risks of hazardous substances (e.g. chemicals, dust, gases and fumes) and train their staff to use them safely. |
| Health and Safety Information for Employees Regulations, 1989 | Employers must display a poster that provides employees with information on health and safety. |
| Provision and Use of Work Equipment Regulations, 1998 | Employers must ensure that all equipment and machinery is safe to use and adequately checked and maintained. |
| Noise at Work Regulations, 2005 | Employers must take action to ensure employees are protected from hearing damage in the workplace, e.g. caused by drilling or music. |
| Workplace (Health, Safety and Welfare) Regulations, 1992 | Outlines numerous welfare issues for employers to consider, including workstations, seating, heating, lighting and ventilation. |

Table 1.1 Health and safety legislation and regulations (HSE, 2014)

Employer responsibilities for health and safety

Employers must:

- Carry out relevant risk assessments.
- Implement safety measures in response to issues identified by risk assessments.
- Appoint competent people to manage the welfare of others and implement safety measures.
- Devise emergency procedures.
- Provide clear guidance and training for employees, which must be documented.
- Consult with employees on all health and safety issues.
- Report injuries in the workplace.
- Provide insurance for injuries.
- Provide facilities and equipment for dealing with health and safety issues.
- Work with other employers (where relevant) who share the workplace.
- Display a health and safety policy statement if they employ five or more people.

Other necessary arrangements can include:

- Providing and maintaining appropriate equipment for work.
- Providing toilets and washing areas.
- Providing drinking water.
- Appointing and training staff to manage potential areas of risk (e.g. first aid and chemical spillage procedures).

Employee responsibilities for health and safety

Employees must:

- Follow procedures and training programmes correctly.
- Take care of their health and safety at work, and that of others around them.
- Cooperate with their employer and report any concerns immediately.

Employees have the right to:

- An explanation of how risks will be controlled and who is responsible for managing risk, by their employer, in a way that they understand.
- Consultation with their health and safety representatives, in protecting everyone from harm in the workplace.
- Provision of necessary health and safety training, free of charge.
- Provision and adequate maintenance of any necessary equipment and protective clothing, free of charge.
- Access to toilets, washing facilities and drinking water.
- Access to adequate first aid facilities.
- Insurance that covers them in the event of any illness or injury sustained through work.

Duty of care and professional role boundaries

Everyone in the workplace has a duty of care to protect themselves and others as far as is reasonably practicable. Personal responsibilities are specified in each employee's job description. The aspects of health and safety that fall within the role of a fitness instructor are personal safety, client safety and environment safety:

| Role aspect | Responsibilities |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Personal safety | <ul style="list-style-type: none"> • Holding appropriate qualifications for any session delivered. • Only working with people or groups for which they are qualified. • Holding public liability insurance and employer liability insurance. • Maintaining continuing professional development (CPD). • Being a member of an appropriate regulatory body (e.g. CIMSPA). • Adhering to industry codes of conduct. • Following organisational procedures. • Holding a first aid or cardiopulmonary resuscitation (CPR) qualification if working with certain groups (e.g. exercise referral). • Awareness of health and safety policy and responsible behaviour, e.g. reporting hazards. • Knowing the on-duty first aider, location of the nearest contact phone and first aid kit and procedure for reporting accidents. |
| Client safety | <ul style="list-style-type: none"> • Screening clients before exercise using appropriate methods, e.g. PAR-Q and verbal screening checks. • Referring clients to their GP when necessary (e.g. medical conditions). • Ensuring clients dress appropriately (e.g. acceptable footwear and no jewellery). • Ensuring that clients are not chewing gum. • Ensuring that clients' technique and use of equipment is safe by observing and correcting them wherever necessary. |
| Environment safety | <ul style="list-style-type: none"> • Ensuring there is enough space for participants (no overcrowding or risk of collision). • Ensuring there are no trailing wires (risk of slips and trips). • Ensuring floors are dry or signs are positioned to identify wet floors. • Ensuring the environment is prepared for exercise (e.g. checking that equipment is set up properly and nothing is causing an obstruction). • Ensuring the environment is left clear and tidy after exercise, with everything put away in the correct place. • Keeping floors clean and swept. |
| Equipment safety | <ul style="list-style-type: none"> • Ensuring equipment is stored appropriately, e.g. steps stacked at an appropriate height, weights stored on racks and pool equipment in baskets. • Ensuring equipment is clean, e.g. wiping down CV equipment or mats. • Placing 'Out of order' signs on any broken equipment. • Reporting broken equipment to maintenance personnel. |

Table 1.2 Health and safety responsibilities for fitness instructors

Consequences of not following legal health and safety requirements

Failure to comply with these requirements can have serious consequences for both organisations and individuals. Sanctions include fines, imprisonment and disqualification from professional membership or Companies House as a registered director.

Case Study

A sports centre was fined £15,000 by the Health and Safety Executive after a man broke his neck when the handlebars of the exercise bike he was using collapsed.

At the time of reporting, the man was still receiving treatment after suffering injuries 14 months after the incident.

He was taking part in a spinning class when the handlebars of his bike became detached from the frame and he fell forwards, hitting his head on the bike in front.

In a statement, he said he had been in a rigid neck collar for ten months and received physiotherapy weekly. He also had to drink through a straw for nine months, as he was unable to tilt his head, and faces the possibility of surgery to fuse bones in his neck together.

Environmental health officers found that the bike's handlebars had been extended beyond the marked safe maximum height.

'Members of the public could adjust the handlebars and there was no physical way of stopping them adjusting the bars beyond the safe limit', an environmental health manager at the council said, *'that was compounded by the fact that there was no methodical system for checking whether the bikes had been adjusted beyond their safe limit'*.

On behalf of the organisation that owns the sports centre, the spokesperson told the court that equipment checks were carried out on a daily and weekly basis, although a service contract for the bikes had been stopped.

He said the manufacturer of the bikes had provided instructions for their use but the gym did not have instructions on adjusting the handlebars.

They admitted to breaching Section 3(1) of the Health and Safety at Work Act by failing to ensure the safety of non-employees, and were fined £15,000 with costs of £2,562.

Imposing the penalty, they said the decision not to have the bikes serviced had been motivated by profit.

Since the accident, the bikes have been modified so the handlebars can only be adjusted by a member of staff using a key.

Roles of staff members responsible for health and safety in a fitness organisation

The management team and organisation's directors assume overall responsibility for health and safety in the workplace. However, they often appoint and train people for specific duties.

Health and safety officer

There is usually a designated advocate for health and safety in a fitness workplace; it is often the duty manager because of their multifaceted role and responsibilities.

Department health and safety lead

Each department typically has a designated health and safety lead, which is usually the manager or head of department; they are responsible for ensuring the welfare of others and making sure that any incidents are reported and acted upon appropriately.

First aiders

A number of employees in a fitness environment are delegated and trained to provide first aid.

Fitness instructors

Fitness instructors will be required to conduct a number of health and safety checks during their hours of work. All checks should follow the employer's health and safety policies and procedures. All associated documentation must be filled in correctly to demonstrate evidence of health and safety compliance.



Answer the following questions and make notes to revise this section.

- Why is health and safety important in the workplace?
- Describe three pieces of legislation that relate to health and safety in the UK.
- What responsibilities does an employee have in relation to health and safety?
- What are the potential consequences of employers or employees not following legal health and safety requirements?
- How can you ensure you adhere to your duty of care in relation to environmental safety?
- What is the role of a health and safety officer?

Any person who fails to follow current health and safety legislation may become liable for incidents or accidents that occur. If their duty of care/service is questioned, this may be taken to a court of law and challenged as negligence. Any relevant documentation would be used as evidence. A court will consider the current standard working practices within the industry and the chain of responsibility to highlight areas of failure (negligence).

Section 2: Controlling hazards and risks

Prevention is the priority for managing emergencies in a fitness environment. Organisations and staff need to be aware of all potential hazards, evaluate the level of risk or harm and aim to eliminate or control them.

There are many potential hazards in a fitness environment. If they are not identified and managed, they will increase the risk of accidents and emergencies.

- A hazard is anything that can cause harm, e.g. heavy weights, hot temperatures, chemicals, trailing wires and even electricity.
- A risk is the likelihood of somebody being harmed by the hazard and the severity of the harm it could cause, e.g. sprains, strains, fainting, burns, falls and electrocution.

Risk assessment and management procedures ensure that all hazards in the workplace are identified and steps are taken to prevent them from causing harm.

Possible hazards in a fitness environment

There are many potential hazards in a fitness environment, which may relate to the facilities, the equipment, working practices, manual handling and lifting, security, client behaviour and hygiene.

| Area for consideration | Possible hazards | |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Facilities | Loose or trailing electrical wires. Power cut. Flooring or carpet damage. Damaged or loose ceiling tiles. Lack of ventilation. High pool chlorine levels. | Heating failure. Gas leak. Broken window. Damaged fixtures. Temperature too hot or cold. Fire exits blocked. |
| Equipment | Faulty wiring. Fraying cables on weight machines. The belt slipping on a treadmill. | Foot straps broken on a spinning bike. Loose dumbbell weights. A damaged seat on a rower. Poor positioning of equipment. Barbell use without clips/collars |
| Working practices | Insufficient maintenance checks. A cleaning rota that is poorly adhered to. An insufficiently monitored gym floor. Poor manual handling and lifting practices. | Poor performance on evacuation drills. Pool plant room chemicals in close proximity. Poorly filed PAR-Q and member medical records. |
| Clients | Medical conditions. Older adults. Disability. Pre or postnatal. Inactive. | Cardiovascular disease risk factors. Injuries. Deconditioned body shape Low skill and fitness levels. Incorrect clothing or footwear. |

| Area for consideration | Possible hazards |
|-------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Client behaviour | <p>Aggression.</p> <p>Drunkenness.</p> <p>Diving into a shallow pool.</p> <p>Lifting heavy weights without a spotter.</p> <p>Not cleaning machines after use.</p> <p>Failure to disclose essential information (e.g. medical conditions).</p> |
| Security | <p>Broken security camera.</p> <p>Faulty emergency exit door.</p> <p>Emergency doors left open in hot weather.</p> |
| Hygiene | <p>Insufficient cleaning rota.</p> <p>Bins not emptied regularly.</p> <p>Drinking fountains with lime scale build-up.</p> <p>Stretching mats not disinfected.</p> <p>Dirty toilets.</p> <p>Dirty CV machines.</p> |

Table 2.1 Potential hazards in a fitness environment



Assessing risk in a fitness environment

A **risk assessment** is a careful examination of what could potentially cause harm to people in the workplace, so that responsible people can decide whether appropriate precautions are in place or more needs to be done to prevent harm. The aim is to minimise the potential for accidents or incidents, so that nobody gets hurt or becomes ill.

The HSE provides five simple steps for assessing and managing risk:



Assessing the risk of possible hazards in a fitness environment

The HSE ‘five steps’ model should be used when assessing risks. The important things to decide are whether a hazard poses a significant risk and if there are satisfactory precautions in place to reduce the likelihood.

As an example, electricity can kill but the risk of this happening in an office environment is remote, provided that the ‘live’ components are insulated and metal casings properly earthed.

Evaluating risk

Risk assessments are rated using a numbered system from 1–5 according to:

- Likelihood of the risk occurring.
- Risk severity.

The two numbers are then multiplied together to give a risk rating. The result will determine what action needs to be taken.

| Score | 1 | 2 | 3 | 4 | 5 |
|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|------------------------------|----------------------|------------|
| Likelihood | 2% Unlikely | 5% | 10% | 25% | 50% Likely |
| Severity | Minor injury – near-miss | First aid – back to work | Off work for over three days | Major injury/disease | Death |
| Risk rating | 1–2: acceptable – low (no further action). 3–10: tolerable – medium (maintain controls). 11–25: danger – high (stop! Immediate action required). | | | | |

Table 2.2 Risk rating

As an example, the likelihood of an apparently healthy young adult, who exercises regularly, experiencing a cardiac emergency is unlikely (1–2), but the consequences would be severe if it were to happen (4–5). The likelihood of a client with an existing cardiac condition experiencing a cardiac emergency is much more likely (5) and the severity of the risk would be high (5).

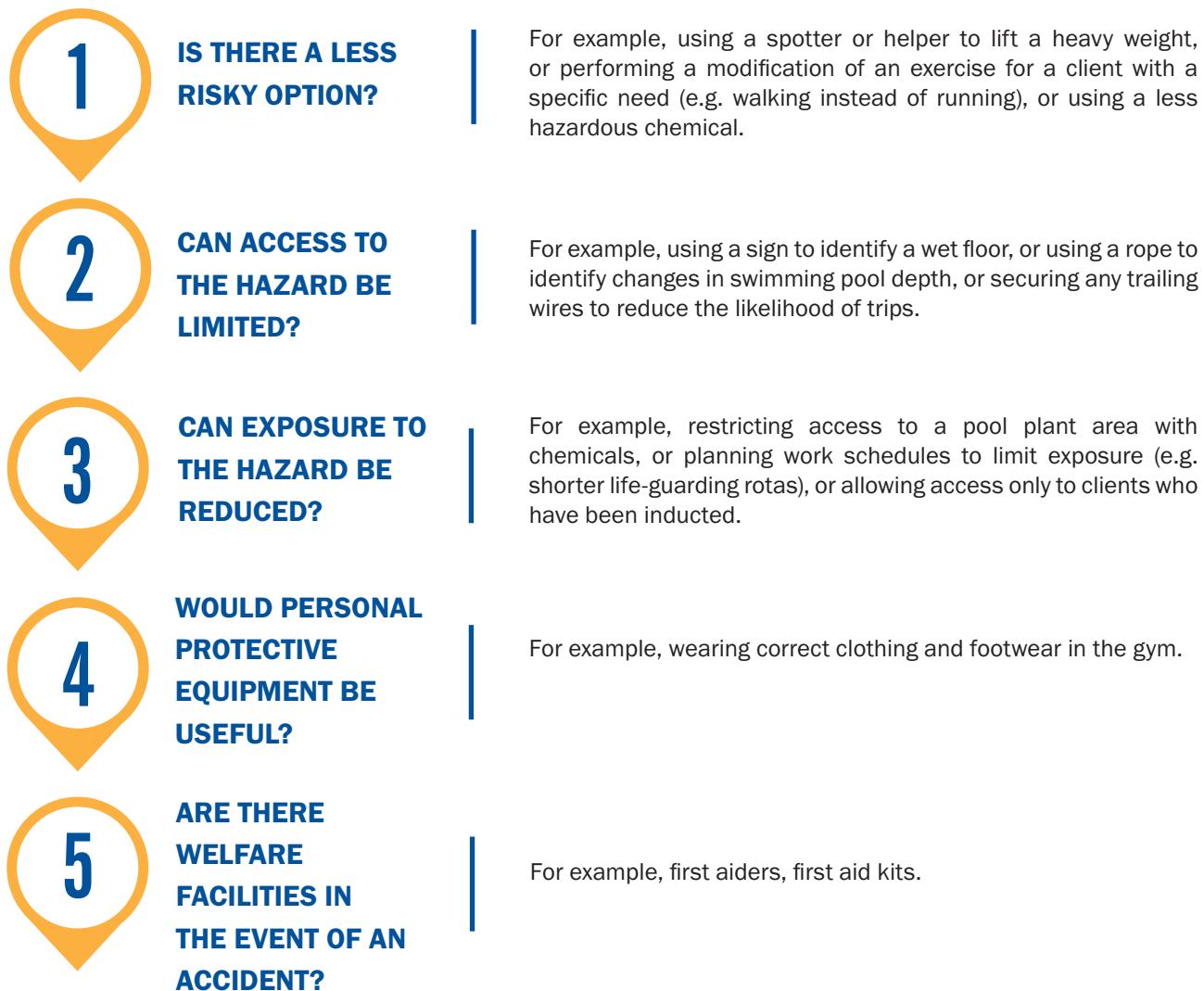
| Possible risk | Likelihood | Severity | Score | Risk and action | Actions |
|---------------------------------------------------------------------------------------------------------------|------------|----------|-------|--------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|
| An apparently healthy young adult, who exercises regularly, experiencing a cardiac emergency when exercising. | 1 | 4–5 | 4–5 | Medium – maintain controls. | Pre-screen. Monitor intensity. Warm up and cool down appropriately. Programme training to meet specific needs. |
| An inactive client with an existing cardiac condition experiencing a cardiac emergency when exercising. | 5 | 5 | 25 | High – stop! Immediate action required. | Signpost to GP. Specialist and clinically supervised exercise. |

Table 2.3 Risk rating example

Controlling risks associated with hazards in a fitness environment

The first consideration for controlling any hazard and potential risk is to eliminate the risk altogether, if possible. For example:

- Requesting GP clearance for some clients and not working with them unless qualified to do so (exercise referral).
- Not attempting to lift a weight that has been left on the floor and is too heavy to stack when tidying the gym area.
- Using professional services to move or maintain cardiovascular equipment.
- Asking clients to collect and return pins to a central point (reception or gym desk) before and after use, to eliminate the risk of clients leaving weight pins in resistance weight stacks.



Who to contact when hazards and risks cannot be controlled personally

When hazards or risks cannot be controlled personally, the person responsible for health and safety should be contacted. This may be:

- A duty manager.
- An appointed health and safety officer.
- A line manager who leads on health and safety for a specific department.

A risk assessment report will need to be completed. An example risk assessment report is available from the HSE website.

Manual handling and lifting

'Manual handling' is the term used to describe any activity in the workplace that involves lifting; it also typically includes climbing, pushing, pulling and pivoting objects. Manual handling and lifting can put safety at risk, so precautions are needed.

Potentially injurious tasks involve bending and twisting, repetitive motions, carrying or lifting heavy loads and maintaining fixed positions for a long time. These movement patterns can cause damage to muscles, tendons, ligaments, nerves and blood vessels. Potential musculoskeletal injuries, such as strains and sprains, often affect the lower back, shoulders and upper limbs. Any job that involves heavy labour or manual handling might pose a high risk of injury, e.g. lifting objects can place strain on the lower back musculature when performed incorrectly.

Ergonomic intervention in manual handling can decrease the likelihood of injuries and increase worker productivity. The first consideration is whether the object needs to be moved, i.e. don't move it unless you have to.

If the risk cannot be eliminated then the following ergonomic lifting techniques can provide controls to improve safety:

- Keep loads close to the body and near your centre of gravity.
- Use diagonal foot positions.
- Move loads at waist height rather than directly from the floor.
- Use a second person or mechanical device to assist lifting (as appropriate).



| Climbing | Pushing and pulling | Pivoting |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • If climbing with a load (e.g. using stairs or a ladder), safe manual handling entails maintaining contact with the ladder or stairs at three points (two hands and a foot or both feet and a hand). Bulky loads require a second person or a mechanical device to assist. | <ul style="list-style-type: none"> • Pushing is generally easier on the back than pulling. It is important to use arms and legs to provide leverage to start the push. | <ul style="list-style-type: none"> • When moving containers, it is safer to pivot the shoulders, hips and feet (keeping the load in front at all times) than to twist the back. The lower back is not designed to torque or twist repeatedly. |

Revision activities

Answer the following questions and make notes to revise this section.

- What is the difference between a **hazard** and a **risk**?
- What are some of the potential hazards for customers and staff in a fitness environment?
- What are the five stages of a risk assessment?
- Select 3 hazards and evaluate their risk using the 1–5 scale in this section of the manual.
- Who should you contact when a risk or hazard cannot be controlled personally?
- What manual handling and lifting techniques can help provide controls to improve safety when the risk cannot be completely eliminated?

Notes

Section 3: How to maintain a safe and effective gym-based exercise environment

Customer safety is important in all working environments. Within a fitness facility, the risk of injury and illness is higher than that of the average working environment, so it is vital that no stone is left unturned when it comes to ensuring the safety of customers and others.

Fitness instructors will be required to carry out maintenance checks of exercise equipment, report any broken or damaged items and ensure the exercise environment is safe and conducive to a positive customer experience.

Normal operating procedures (NOPs)

Normal operating procedures (NOPs) should clearly lay down instructions for the operation of all work-based activity; these in turn must take into consideration COSHH regulations, manual handling, safeguarding of children and other special populations, PPE (Personal protective equipment) regulations and quality requirements. The procedures should represent a definition of good or best practice that should be adhered to at all times.

Adequate training should be provided to ensure that employees are fully conversant with written procedures.

There have been numerous recorded incidents where major accidents have been primarily down to employees' errors. Provision of clear, concise and accurate operating procedures is the most effective measure for preventing, controlling and mitigating the risk of such events.

Emergency action plans (EAPs)

Emergency action plans (EAPs) set out the procedures to follow in the event of an accident or incident, e.g. bomb threat, evacuation, gas leak or fire. EAPs are generally specific to an environment, for example, the requirements for a poolside incident will be different to those for a gym-based incident. Staff training will be given to all employees and this is often followed by a competence test.

EAPs cover the following requirements:

- 1 • What to do in the event of the accident/incident.
- 2 • What to do during the accident/incident.
- 3 • What to do after the accident/incident.

Dealing with emergencies in a fitness environment

Emergency situations that can happen in a fitness environment include:

- Accidental injuries caused by unsafe exercise, spotting practices or lifting technique; dropping weights or falls (possibly on slippery floors). Examples of these injuries include strains, sprains, cuts and bruises.
- Sudden illness or medical emergencies brought on by existing medical conditions, e.g. fainting, hyperglycaemia, hypoglycaemia and asthma attacks.
- Other large- or small-scale emergencies, e.g. fire, chemical spillage or a bomb alert.

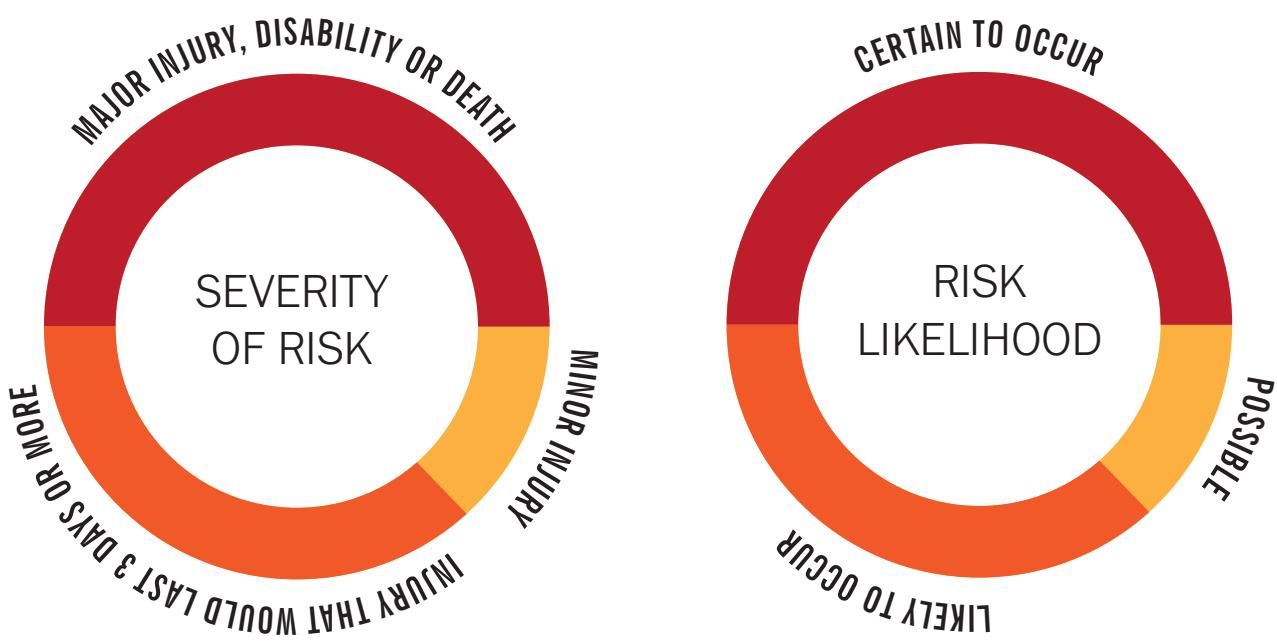


| Accidental injuries | Sudden illness or medical emergencies | Other emergencies |
|---------------------------------|---------------------------------------|-------------------|
| Strains and sprains | Asthma attack | Fire |
| Cuts, bleeding and bruising | Dizziness and fainting | Bomb alert |
| Back injuries | Dehydration | Chemical spillage |
| Collisions (contact sports) | Loss of consciousness | Missing child |
| Falls (especially older adults) | Heart attack or angina | Theft |
| Fractures | Hyperglycaemia or hypoglycaemia | Gas leak |
| Burns | | |

Table 3.1 Types of emergency that can happen in a fitness environment

Some of these emergencies are unlikely to happen and others are a very real possibility. Some pose a low risk to the person if they occur, while others can be life-threatening.

- HIGH RATING
- MEDIUM RATING
- LOW RATING



Maintenance checks

A very important part of a fitness instructor's role is to check and ensure that exercise equipment and the surrounding environment are both safe for use. Most fitness facilities will have a standardised maintenance checking procedure, which normally includes a **maintenance checklist**.

The table below is an example of a checklist covering a range of different types of equipment:

| Piece of equipment | Yes/no | What is wrong? | Action to be taken | Instructor initials |
|-------------------------------------------------|--------|----------------|--------------------|---------------------|
| Treadmill | | | | |
| Electronic display is clear | | | | |
| All buttons are working | | | | |
| Treadmill belt is moving smoothly and centred | | | | |
| Stop clip and button are working | | | | |
| Power cable is hidden away and free from damage | | | | |
| Plug is free from damage | | | | |
| Chest press | | | | |
| Cable is intact | | | | |
| Nuts and bolts are tight | | | | |
| All moving parts are intact | | | | |
| Pins are intact | | | | |
| Upholstery is in good order | | | | |
| Seat adjustments are secure | | | | |
| Cable crossover | | | | |
| Cable is intact | | | | |
| Nuts and bolts are tight | | | | |
| All moving parts are intact | | | | |
| Pins are intact | | | | |
| Attachments are secure | | | | |
| Machine is stable | | | | |
| Bench | | | | |
| Stable | | | | |
| Upholstery is in good order | | | | |
| All moving parts are intact | | | | |
| Gym balls | | | | |
| Inflated to correct pressure | | | | |

Table 3.2 Example maintenance checklist

Certain checks will require daily assessment, some weekly and others monthly. It is up to the fitness instructor to ensure they carry out their duties in accordance with the fitness facilities' specific policies and procedures.

The potential consequences of not adhering to these is high, as it could put customers and others at risk of serious harm if they were to use a faulty piece of equipment; this could lead to legal action, not only against the fitness facility but the individual responsible for failing to carry out their duties. These requirements form part of a fitness instructor's duty of care within the professional code of ethics and conduct.

Handover

Most fitness facilities open between 6 and 7am and close between 9 and 10pm. This means fitness instructors are typically expected to work varied shifts, e.g. an ‘open’ (6am-2pm), a ‘middle’ (12pm-8pm) and a ‘close’ (2pm-10pm). This arrangement varies considerably from one fitness facility to another.

It is important that any relevant information is passed from one fitness instructor to the next. This is commonly known as a ‘handover’ and is normally carried out both verbally and in writing in a ‘handover diary’ or via e-mail.

Examples of handover information include:

- The maintenance checks that have been carried out.
- The cleaning tasks that have been carried out and what still needs doing.
- Any faulty/broken pieces of equipment.
- Any relevant customer information, e.g. queries and complaints.
- Any specific manager requests that haven’t been completed.
- Any ad hoc promotions that are running.
- Any class cancellations or instructors that are covering.
- Any induction programmes booked in.

A fitness instructor working on an ‘open’ shift is responsible for switching on all of the equipment and televisions, making sure everything is working and ensuring the gym floor is clean and clear of any obstacles. A fitness instructor working on a ‘close’ shift is responsible for tidying up any loose free weights, switching off all of the machines and televisions and making sure that all workout areas are clean and tidy.

Supervision of the exercise environment

Whilst on shift, fitness instructors must supervise the exercise environment by ‘walking the gym floor’ to engage with customers and to ensure their safety by:

- Checking that the workout areas are clean and tidy, for example, by having a quick tidy up of any free weights left on the floor by customers and ensuring there are no spillages or slippery surfaces.
- Checking that customers are performing exercises with safe and effective technique.
- Ensuring customers are wearing appropriate clothing and footwear to reduce the risk of injury, e.g. are they wearing trainers that cover the toes and top of the foot?
- Checking that there isn’t any overcrowding in any particular areas that could increase the risk of someone getting hurt.



Revision activities

Answer the following questions and make notes to revise this section.

- › What types of emergencies could occur in the fitness environment?
- › What do NOP and EAP stand for and what do they entail?
- › What kind of information should be included in a ‘handover’?
- › When supervising the gym floor, what do you need to be regularly checking?

Notes

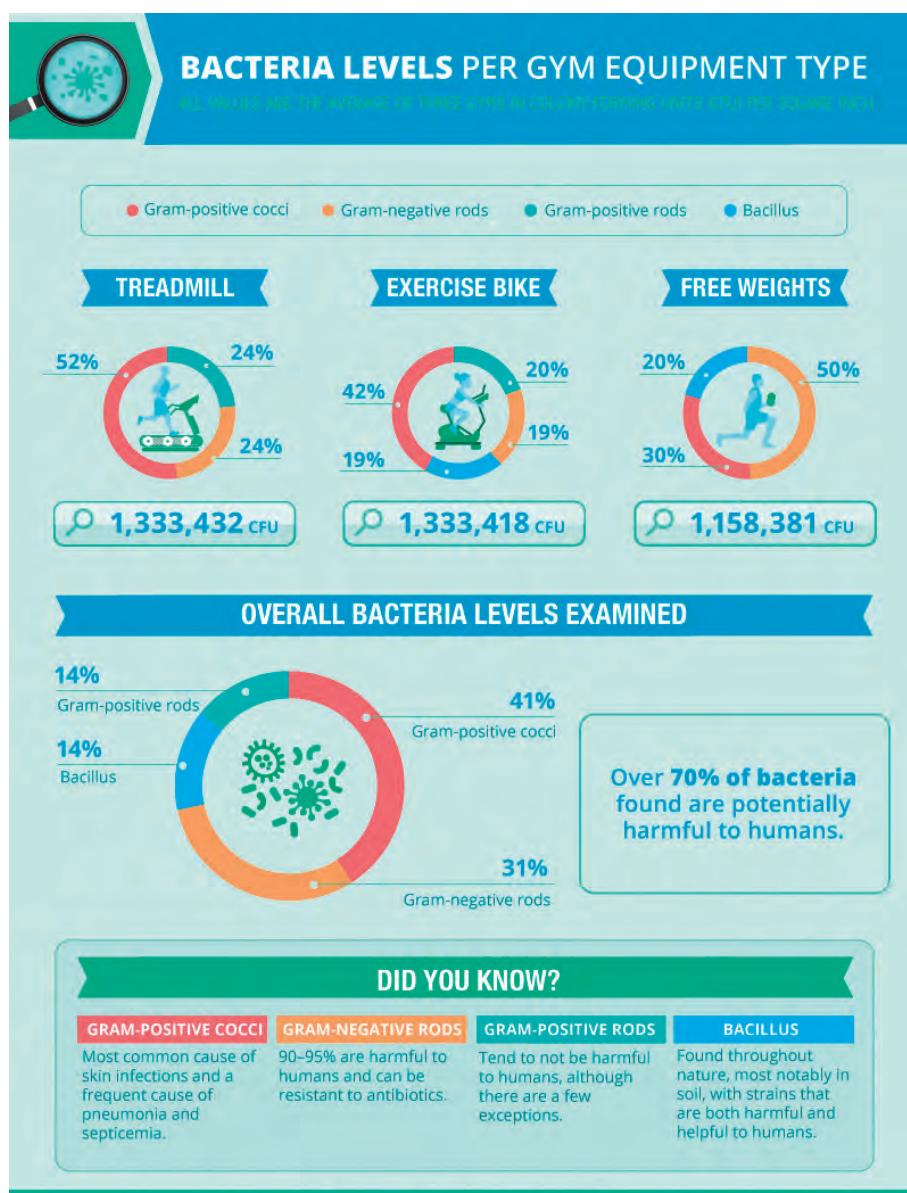
Section 4: Cleanliness in a fitness environment

One of the less glamorous – yet equally important – requirements of a fitness instructor's job in many health and fitness facilities is cleaning.

As can only be expected, fitness facilities are the perfect breeding ground for germs; lots of people, all in one place, sweating profusely and breathing hard means the risk of spreading germs is high if equipment and air handling systems are not cleaned regularly and effectively. This can lead to illness such as common colds and diarrhoea.

A recent study from FitRated* found some quite startling discoveries of germs on exercise equipment:

- Treadmill:** 74 times more bacteria than a tap in a public toilet.
- Free weights:** 362 times more germs than a toilet seat.
- Exercise bike:** 39 times more germs than a tray from a school canteen.



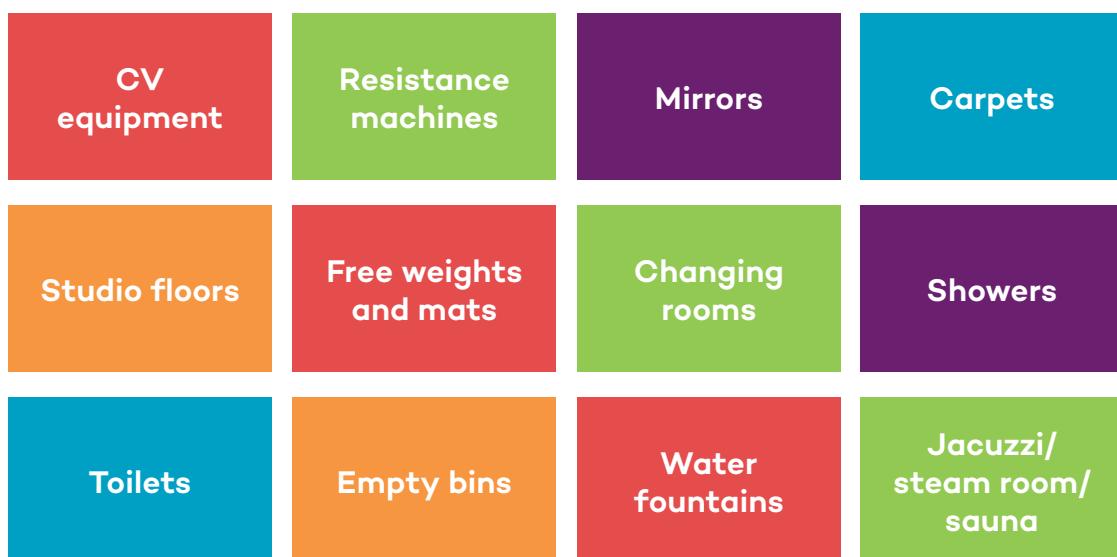
*This study was carried out in America across three gyms from one gym chain and may not be representative of all fitness facilities in the UK.

Benefits of a good cleaning regime

There are many benefits to be gained from a good cleaning regime, including:

- Hygiene; ensuring that the facility is clean minimises the risk of harmful disease spreading across customers and staff.
- Making the environment aesthetically pleasing; when facilities ‘look’ clean, the customer is more likely to want to use them and keep coming back. Customers will not appreciate dirty facilities and will likely choose not to use them if standards of cleanliness are visibly poor.
- A pleasant place to work; just like the customers, staff will not want to go to facilities that are not clean. By contrast, an organisation will increase its staff retention by ensuring that the environment is a safe, clean place of work.
- Avoidance of wear-and-tear; by cleaning things regularly, they tend to last longer, which means that the organisation will not have to spend unnecessary funds replacing equipment/facilities.

Things than need cleaning in a fitness environment include:



Most health and fitness clubs will have a cleaning rota, which all fitness staff will be responsible for maintaining and updating on a daily basis. These will vary from one fitness facility to another, with some having a morning and afternoon rota and others only cleaning certain things on certain days due to lower usage.

Example cleaning rota

| Gym | M | Tu | W | Th | F | Sa | Su |
|----------------------------------------------------|---|----|---|----|---|----|----|
| Hoover carpets (including under equipment) | | | | | | | |
| Empty bins | | | | | | | |
| Wipe down mirrors | | | | | | | |
| Clean and sanitise CV equipment | | | | | | | |
| Clean and sanitise resistance equipment | | | | | | | |
| Clean and sanitise free weights area | | | | | | | |
| Tidy loose free weights away | | | | | | | |
| Studio | | | | | | | |
| Brush and mop studio floor | | | | | | | |
| Empty bins and pick up any rubbish left | | | | | | | |
| Wipe down mirrors | | | | | | | |
| Clean mats and tidy away | | | | | | | |
| Clean and sanitise any portable equipment | | | | | | | |
| Changing rooms | | | | | | | |
| Empty bins | | | | | | | |
| Check toilet roll is full and replace if necessary | | | | | | | |

| | | | | | | |
|---------------------------------------|--|--|--|--|--|--|
| Clean and disinfect toilets | | | | | | |
| Clean mirrors | | | | | | |
| Brush and mop floor | | | | | | |
| Clean and sanitise sinks | | | | | | |
| Refill soap and shower gel dispensers | | | | | | |
| Clean showers | | | | | | |
| Clean and sanitise lockers | | | | | | |
| Replace empty air freshener | | | | | | |
| Reception and lounge area | | | | | | |
| Empty bins | | | | | | |
| Clean and polish surfaces | | | | | | |
| Hoover carpet area | | | | | | |
| Brush and mop wooden floor | | | | | | |

It is important that fitness facilities provide appropriate equipment and cleaning substances for employees to ensure they can keep the environment clean and safe and be sufficiently protected from hazardous substances.

Cleaning substances and equipment required in a fitness environment

| Cleaning substances | Equipment | Personal Protective Equipment (PPE) |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Polish. • Disinfectant. • Bleach. • Sanitiser. • Toilet cleaner. • Glass and mirror cleaner. • Floor cleaner. • Lime scale remover. | <ul style="list-style-type: none"> • Brush. • Hoover. • Spray bottles. • Cloths/sponges/squeegees. • Blue roll/hand towels. • Mop and bucket. • Bin bags. | <ul style="list-style-type: none"> • Rubber gloves. • Eye protection. • Face mask. |

Cleaning equipment

There is a huge amount of cleaning equipment that you may come across in an active leisure facility. Some of the most common include:

- **Spray bottles;** these are excellent for tackling hard-to-reach areas, as you can direct the nozzle exactly where you need to apply the cleaning substance. Solutions can also be diluted to the appropriate strength.
N.B. it is important to ensure that all spray bottles are labelled and **only** contain the solution that is named on the label. Remember not to ‘over-spray’ an area and only use the amount required.
- **Sponges;** these are generally able to hold a larger amount of solution than cloths. They are excellent for areas that may be damaged by abrasive cleaning.
N.B. sponges tend to harbour germs so remember not to use them on surfaces that may be contaminated. You must ensure that sponges are rinsed well and allowed to dry out before they are used again.
- **Squeegees;** generally, these will be used on large areas and are excellent for tiled and glass surfaces. They tend to remove moisture quickly and efficiently without smearing.
N.B. protect the blade of the squeegee and always clean it with a damp cloth to ensure it does not get damaged, otherwise it will eventually not ‘skim’ the area as effectively and the job will take longer.



- **Mops;** these are excellent for cleaning large floor areas and removing areas of unwanted water. Cleaning solutions can be diluted as required.
N.B. ensure that mop heads are changed regularly and well-rinsed after use.
- **Polishing cloths;** these are used to apply cleaning substances to many different surfaces and to give them a hard shine. Due to their soft texture, they are ideal to use on areas that may scratch easily.
N.B. ensure that polishing cloths are washed regularly.
- **Floor polishers.** Electric floor polishers have two main jobs: to remove any visible dirt and to apply a polish to buff the surface and bring out a hard shine.
N.B. the manufacturer's instructions for use must be carefully followed. When using this equipment, appropriate footwear should be worn to protect against slipping and any electrical short circuits that could occur; rubber boots are generally recommended.
- **Vacuum cleaners;** there are many different types of vacuum cleaner. Most vacuums are used to suck up loose dirt (and spills if the vacuum has a 'wet and dry' function).
N.B. ensure that bags are emptied regularly so that the vacuum maintains a good level of suction. Take care when emptying bags to avoid inhaling dust particles.

There are measures a fitness facility can put in place to keep the exercise environment as clean as possible for customers and employees; these include:

- Installing hand sanitisers (ideally hands-free).
- Making paper towels and mild disinfectant (or disinfectant wipes) available in the gym for customers to wipe down equipment before or after use
- Installing automated air fresheners to keep the atmosphere smelling fresh and clean throughout the facility.
- Providing soap/shower gel in toilets and showers.
- Providing hand dryers or paper towels in customer toilets rather than material towels, which can harbour germs.
- Use non-toxic or low hazard cleaning products.
- Ensuring the facility has good ventilation and air handling filters are cleaned often.
- Ensuring safety information and instructions for the use of hazardous substances are available to employees and clearly visible.
- Providing PPE, as appropriate.
- Providing training for the use of hazardous substances.
- Ensuring hazardous substances are stored away in air tight containers and are inaccessible to non-trained staff and customers.

It is important that customers are kept safe during the cleaning process and that they are not ignored, but remain the priority of any employee while at work. This can be achieved by:

- Cleaning during quieter times so fewer customers will be affected.
- Ensuring slippery surface signs are clearly visible to reduce the risk of customers slipping and falling.
- If you are approached by a customer during cleaning, it is important to deal with their query and, while you do so, ensure you leave the area and equipment in a safe manner so others are not put at risk.
- Always acknowledge customers in the same way you would if you were walking the gym floor. Customers like to see employees cleaning as it instils confidence that their health and safety are being considered.
- You may have to move equipment temporarily to clean and allow a safe walkway for customers. Always ensure that you minimise disruption for customers, and prioritise their safety throughout.



Hazardous waste and rubbish

Some types of waste are harmful to human health, or to the environment, either immediately or over an extended period of time. These are called ‘hazardous wastes’.

Wastes will fall into one of three categories – those that:

- Are always hazardous, e.g. lead acid batteries or fluorescent tubes.
- Are never hazardous, or non-hazardous, e.g. edible oil.
- May or may not be hazardous and need to be assessed, e.g. ink or paint.



Non-hazardous waste

Non-hazardous waste is waste which is not listed as hazardous in the European Waste Catalogue (EWC) 2002. The EWC categorises waste as either hazardous or non-hazardous.

Hazardous waste

There are many types of hazardous waste that pose varying degrees of danger to public safety and environmental health. Disposal of these materials can be challenging and often needs to be handled by professionals.

Chemical waste

Many cleaners and solvents used in active leisure organisations become hazardous waste after use. There are specific technical groupings based on whether they come from specific or non-specific industries or processes, as well as the degree of danger they pose. Examples of these include wood preservation chemicals, compounds that contain dioxin and refinery wastewater.

Universal waste

Universal waste is generated from a large variety of sources and consists of products that serve both commercial and personal use (e.g. batteries and light bulbs); for this reason, disposal of universal waste cannot be as closely monitored or controlled as industrial waste. Universal waste is typically thrown out with the rubbish and, as a result, ends up in landfills and incinerators where its toxic components are released into the environment.

Medical waste

Medical waste of certain types can be a biohazard and pose safety risks. It can also cause health problems if it is not properly managed, for example, discarded needles and blood products have the potential to spread diseases and cause injury. Most medical waste streams are regulated.

Construction site waste

Construction site waste can be hazardous. Asbestos tiles and insulation, lead pipes and certain chemicals used in maintenance all fall into this category. This type of waste is regulated.

Electronic waste

Many electronic products contain trace amounts of hazardous materials that can present problems if incinerated or disposed of in a landfill. Computers contain many components that fall into this category; their widespread use and unregulated disposal make them a real contributor to the overall hazardous waste problem (Agar R., 2011).

How do I know if my waste is ‘hazardous waste’ and what must I do if it is?

New regulations called the Hazardous Waste Regulations came into force in 2005 and, to accompany this, a list of wastes was published:

1. Hazardous waste must be recovered and disposed of:
 - Without endangering human health.
 - Without causing a nuisance through noise or odours.
 - Without processes or methods that could harm the environment, i.e. without risk to water, air, soil and plants and animals, and without adversely affecting the countryside or places of special interest.

You need to be aware of the legislation and its potential impact on your organisation. First of all, you need to audit your waste and verify whether it is defined as hazardous under the Hazardous Waste Regulations.

Often, it will be best to refer directly to the supplier or manufacturer. If your waste is defined as hazardous, you need to:

- i. Check that the waste is being and will be handled safely by staff.
- ii. Separate the waste from non-hazardous waste and other types of hazardous waste – mixing is not allowed.
- iii. Label the waste with a waste identification code.
- iv. Keep records of what you have in store.
- v. Arrange for an authorised disposal company to take away the waste.
- vi. Provide the removal company with a consignment note detailing the waste type.

Disposing of waste

For the most part, the chemicals we use to clean do not have any special disposal requirements. In fact, most can safely be rinsed down the drain with little environmental impact. That said, there are some cleaning chemicals for which there are certain guidelines for proper disposal. These guidelines have been put in place not only for personal safety, but for public safety as well:

- Pour chemicals that can be flushed into the toilet; it is best to flush them because they are being diluted with plenty of water during the process. Only dispose of one chemical at a time. Additionally, if you have a septic system, rather than public sewage, only dispose of small quantities of chemicals on your own; large quantities should be handled professionally.
- Prior to disposing of any chemical cleaning agents in the toilet, it is advisable for you to contact your wastewater treatment facility. This will ensure disposal is possible in your area, otherwise the chemicals may be released into local waterways untreated; these chemicals would include cleaners that are ammonia- or bleach-based, cleaners containing chemical disinfectants, glass cleaners and toilet bowl cleaners.
- Save items such as drain cleaner, furniture polish, floor wax stripper, metal cleaner, oven cleaner and spot remover for hazardous waste collection; local authorities should be able to provide information on collection times. Items should be stored in the original containers, out of reach of pets and children, until they can be collected (eHow, 2011).

Maintaining cleaning equipment

It is important to maintain cleaning equipment to ensure it remains fit for purpose and to reduce the costs of having to replace it as often. If cleaning equipment is not stored correctly, the bacteria that cleaning is supposed to eliminate will grow on or in the actual equipment.

To ensure cleaning equipment maintains its effectiveness and has longevity, the following guidance should always be adhered to by all fitness facility employees:

- Clean and store cleaning equipment correctly after every use.
- Remove any liquids that may have been contaminated.
- Never put equipment away unless it's ready for the next day's use.
- Electrical cleaning equipment should be serviced as per the manufacturer's guidelines.

Storage

A store with sufficient space should be available for chemicals. It should be well-organised, well-lit and well ventilated. The storage area should be designed to contain spills. Labels on chemical containers should be displayed clearly. The amount of products stored should be kept to a minimum. Spill clean-up kits should be provided.

COSHH regulations

COSHH is a regulation last updated in 2002, which all employers must adhere to. Where fitness facilities cannot completely eliminate the risk of COSHH-related illness, it is their responsibility – and that of its employees – to minimise the risk as much as possible.

Failure to adhere to COSHH regulations could result in serious sanctions against either the employer or employee, depending on the circumstances.

Hazardous substances are those that could put an individual's health at risk; they come in many different forms. In a fitness environment, these would include:

- Products containing chemicals, e.g. bleach.
- Gases.
- Dusts.

Risks associated with exposure to hazardous substances in a fitness environment include:

- Skin problems, e.g. rashes and burns.
- Irritation of the eyes and nose.
- Onset of asthma and other respiratory conditions.
- Infections.

Under COSHH regulations, it is the employer's responsibility to:

- Design and operate processes and activities to minimise the emission, release and spread of substances that are hazardous to health.
- Take into account all relevant routes of exposure – inhalation, skin absorption and ingestion – when developing control measures.
- Control exposure by measures that are proportionate to the health risk.
- Choose the most effective and reliable control options, which minimise the escape and spread of hazardous substances.
- Where adequate control of exposure cannot be achieved by other means, provide suitable PPE, in combination with other control measures.
- Check and regularly review all elements of control measures for their continuing effectiveness.
- Inform and train all employees on the potential hazards and risks from the substances with which they work and the use of control measures developed to minimise these risks.
- Ensure that the introduction of control measures does not increase the overall risk to health and safety.
- Provide an accurate and up-to-date **safety data sheet (SDS)** that describes each hazardous substance and how to use it safely.

It is the employee's responsibility to:

- Make use of control measures and facilities provided by the employer.
- Remove PPE that could cause contamination before eating or drinking.
- Ensure equipment is returned and stored properly.
- Make proper use of washing, showering and bathing facilities, when required.
- Report defects/insufficiencies in control measures.
- Maintain a high level of personal hygiene.
- Wear and store PPE.
- Comply with any information, instruction or training that is provided.

COSHH assessment

Identify the hazards

- Identify which substances are harmful by reading the product labels and SDS.
- If in doubt, contact your supplier.
- Remember to think about harmful substances produced by your processes, such as cutting or grinding, or that workers may otherwise be exposed to.

Decide who might be harmed and how

- Consider potential routes of exposure, as detailed previously. Think about how often people work with the substance and for how long.
- Think about anyone else who could be exposed (e.g. maintenance workers, contractors and other visitors or members of the public) especially those who could be subjected accidentally, e.g. while cleaning or if controls fail.

Evaluate the risks and decide on precautions

The next step is to think about preventing exposure, for example:

- Do you really need to use a particular substance or is a safer alternative available?
- Can you change the process to eliminate its use or avoid producing it? If this is not possible, you **must** implement adequate control measures to reduce exposure.

Potential measures for reducing the risk of exposure

Changing the process to reduce risks

Consider whether you can change existing processes to reduce the risk of exposure, for example, you could lower the ambient temperature to reduce the amount of vapour released into the air or use pre-formed chemical pellets instead of powders as they are less dusty.

Containment

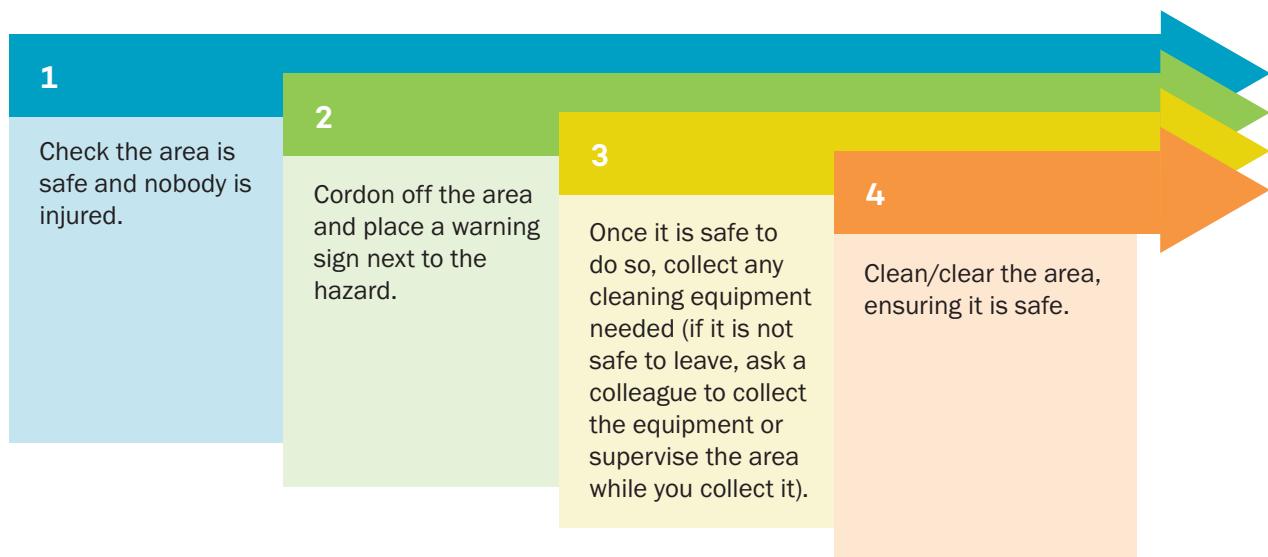
- Enclose the process or activity as much as possible to minimise the escape or release of the harmful substance.
- Use closed transfer and handling systems and minimise handling of materials.
- Extract emissions of the substance near the source.

Systems of work

- Restrict access to those who need to be present.
- Plan the storage of materials and use appropriate containers. Check that storage containers are correctly labelled and that incompatible materials, e.g. acids and caustics, are separated.
- Plan the storage and disposal of waste.

Dealing with spillages and breakages

If there is a spillage of fluid or breakage of anything that could pose a risk of injury to customers and employees, it is important to deal with it immediately by following these steps:



Revision activities

Answer the following questions and make notes to revise this section.

- › Why is it important to maintain a clean and tidy gym environment?
- › List ten things that should be kept clean in a fitness environment.
- › What type of cleaning substances are commonly used in a fitness environment?
- › What does COSHH stand for and what does it entail?
- › How should you deal with spillages and breakages?

KEY **LEGAL** AND **REGULATORY** REQUIREMENTS

- ✓ Health and Safety at Work Act, 1974
- ✓ Reporting of Injuries, Diseases and Dangerous Occurrences Regulations, 2013 (RIDDOR)
- ✓ Control of Substances Hazardous to Health Regulations, 2002 (COSHH)
- ✓ Manual Handling Operations Regulations, 1992
- ✓ Health and Safety (First Aid) Regulations, 1981



DUTY OF CARE FOR FITNESS PROFESSIONALS:

- ✓ Personal safety
- ✓ Client safety
- ✓ Environmental safety
- ✓ Equipment safety



HAZARDS IN A FITNESS ENVIRONMENT:

-  Facilities
-  Equipment
-  Working practices
-  Clients
-  Client behaviour
-  Security
-  Hygiene

HOW A FITNESS PROFESSIONAL **MAINTAINS SAFETY** OF THE GYM:

- ✓ Supervision of the gym environment
- ✓ Handover
- ✓ Maintenance checks
- ✓ Following Normal Operating Procedures
- ✓ Following Emergency Action Plans
- ✓ Reporting of incidents and accidents



RISK ASSESSMENT

FIVE STEPS TO RISK ASSESSMENT

CONSIDERATIONS

1

IDENTIFY THE HAZARDS

What are the hazards?

Slips, trips, falls, chemicals, machinery, electricity, manual handling, noise, exercise risks, poor lighting and temperature.

2

DECIDE WHO MIGHT BE HARMED

Who might be harmed and how could they be harmed?

Office staff, cleaners, visitors, contractors, gym members, gym staff (pay particular attention to people with disabilities). Is it a minor injury or are there more severe consequences?

3

EVALUATE THE RISKS & DECIDE ON PRECAUTIONS

Evaluate the risks and decide whether the existing precautions

are adequate or whether more should be done. Provide instruction or training where necessary, reduce risk as far as reasonably practicable. What is the likelihood of an accident occurring? What level of risk is attached? What control measures can be used to control the risk?

4

RECORD THE FINDINGS AND IMPLEMENT THEM

Use a risk assessment tool to report and manage all identified risks.

An example risk assessment report is available from the HSE website.

5

REVIEW THE ASSESSMENT & UPDATE (AS REQUIRED)

Review and update all risks and procedures at agreed intervals.

CONTROLLING RISKS

1

IS THERE A LESS RISKY OPTION?

For example, using a spotter or helper to lift a heavy weight, or performing a modification of an exercise for a client with a specific need (e.g. walking instead of running), or using a less hazardous chemical.

2

CAN ACCESS TO THE HAZARD BE LIMITED?

For example, using a sign to identify a wet floor, or using a rope to identify changes in swimming pool depth, or securing any trailing wires to reduce the likelihood of trips.

3

CAN EXPOSURE TO THE HAZARD BE REDUCED?

For example, restricting access to a pool plant area with chemicals, or planning work schedules to limit exposure (e.g. shorter life-guarding rotas), or allowing access only to clients who have been inducted.

4

WOULD PERSONAL PROTECTIVE EQUIPMENT BE USEFUL?

For example, wearing correct clothing and footwear in the gym.

5

ARE THERE WELFARE FACILITIES IN THE EVENT OF AN ACCIDENT?

For example, first aiders, first aid kits.



Notes

Conducting client consultations to support positive behaviour change

Aim

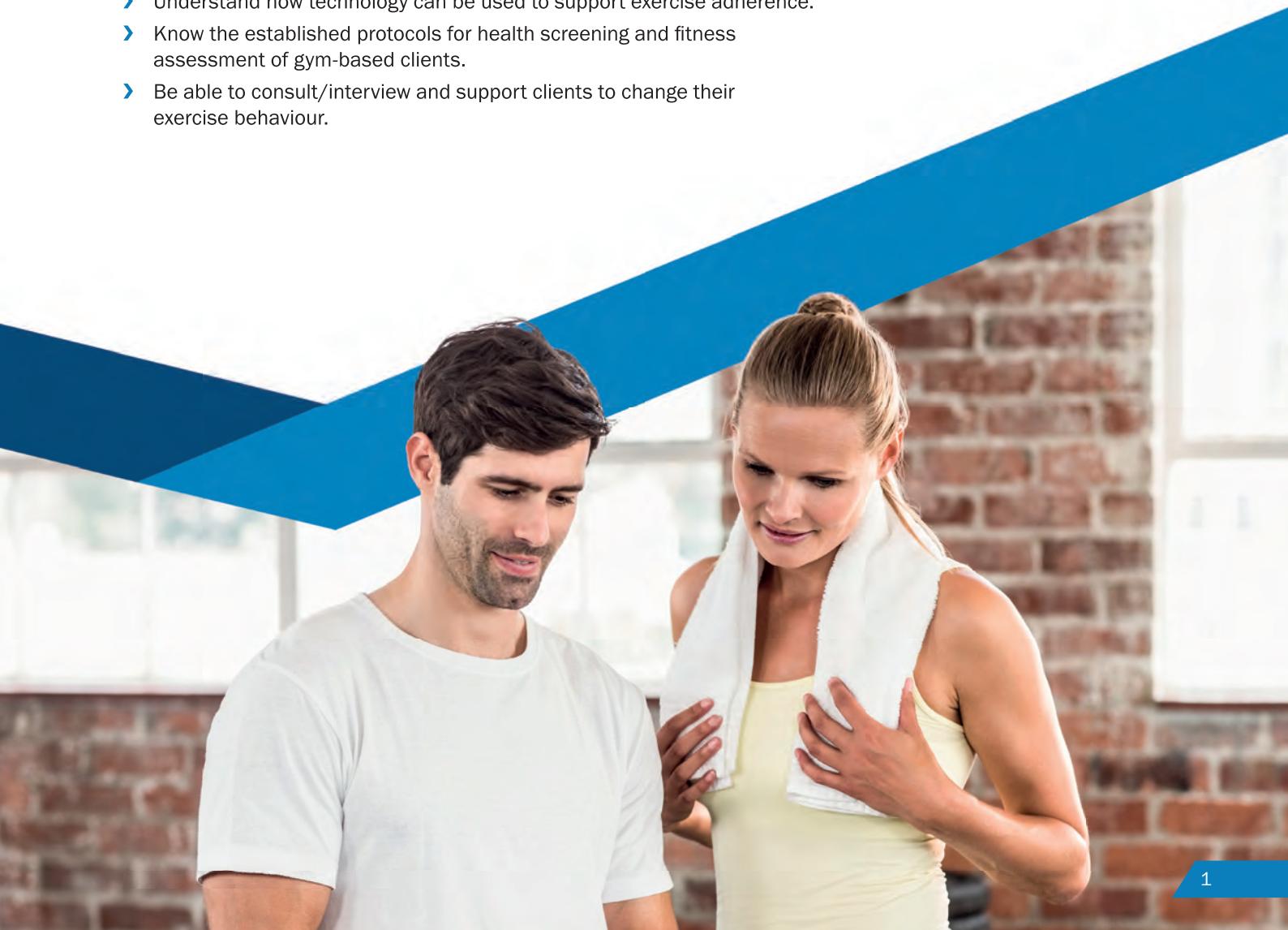
Before you can deliver a gym-based exercise session, you must plan it. Before you plan it, you must collect the necessary information about your client to ensure you plan and deliver a safe and effective session that is suitable for them and their exercise goals.

Fitness instructors need to understand how to collect information, what information to collect and how to support clients in making positive behaviour changes.

Learning outcomes

At the end of this unit you will:

- Know how to consult and support clients to change exercise behaviour.
- Understand the importance of a healthy lifestyle.
- Understand the importance of healthy eating.
- Understand how technology can be used to support exercise adherence.
- Know the established protocols for health screening and fitness assessment of gym-based clients.
- Be able to consult/interview and support clients to change their exercise behaviour.



Unit Contents

Conducting client consultations to support positive behaviour change

| | |
|-------------------------------------------------------------------------------------------------|----|
| Section 1: Collecting information | 3 |
| Section 2: Working with clients to make positive behaviour changes..... | 27 |
| Section 3: The importance of a healthy lifestyle | 47 |
| Section 4: The importance of healthy eating and hydration..... | 53 |
| Section 5: The use of technology for supporting clients in achieving their exercise goals | 63 |
| Please see end of manual for Glossary and References | |

Section 1: Collecting information

The importance of collecting client information

Exercising more often and increasing activity levels are commonly-held aspirations. Exercising regularly and avoiding a sedentary lifestyle enhance wellbeing, assist stress management and reduce the risk of developing chronic health conditions such as coronary heart disease (CHD), osteoporosis, obesity and diabetes.

Increasing activity levels carries far fewer health risks than potential benefits for ‘apparently healthy’ people with no known health conditions. Physical activity at an appropriate level is both safe and desirable.

By contrast, people with injuries or health conditions, such as hypertension, may be at a significant risk of further injury (e.g. strains and sprains) or medical emergencies (e.g. angina or heart attacks) when they participate in exercise. These risks need to be removed or managed before the client can exercise.

It is important to understand how to gather and use information from clients, identify any risks that exercise could pose and act appropriately.

How to collect appropriate client information

There are different types of client information required for planning a gym-based exercise programme.

This information includes:

- Informed consent to participate.
- Personal information and details.
- Medical history.
- Physical assessments (fitness and health).
- Lifestyle information, including personal habits.
- Motivation and preferences.
- Goals and reasons for exercise.

The information gathered will affect:

- The selection of exercises; this includes the type of activities planned.
- The frequency and duration of training; this includes the number and length of sessions.
- The exercise intensity, e.g. number of reps and sets, working heart rate, speed or range of motion.

Methods of gathering information

A number of different methods can be used for gathering information from clients, including:

- Questionnaires, e.g. health screening.
- Interviews or one-to-one consultations.
- Observation.
- Fitness and health assessments, e.g. heart rate and blood pressure.



Questionnaires

Questionnaires are useful for gathering specific information, especially when time is limited. By contrast, interviews allow clients to elaborate on objective responses. For example, if a client indicates that they are taking medication, it would be useful to know what they are taking and for what condition; it could mean that they need to work with a specialist instructor.

Written questionnaires, e.g. health screening, can be used to gather health and medical information. They can also be used to highlight lifestyle behaviours (e.g. smoking, diet or alcohol use).

There are a number of recognised questionnaires, including:

- Health screening forms for checking medical and health status.
- Questionnaires for gathering information on general wellbeing (e.g. EQ-5D) and physical activity levels (e.g. IPAQ). These are standard forms used in exercise referral.
- Specialist questionnaires used to gauge the level of pain, discomfort or distress caused by specific medical conditions, e.g. low back pain (Roland-Morris) or mental health (hospital anxiety depression scale or HADS).

N.B. Level 2 fitness instructors only use the health screening form. The EQ-5D, IPAQ, Roland-Morris, HADS and FRAT (falls risk assessment tool) are used by Level 3 exercise referral instructors and Level 4 specialist instructors.

| Advantages of questionnaires | Disadvantages of questionnaires |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Closed questions enable 'yes' or 'no' answers and are easy to complete (e.g. health screening). • Relatively quick to complete, depending on the number of questions. • Can be completed in one's own time. • Lots of people can complete them simultaneously. • Provide a written record which can be stored securely. • Information is immediate and accurate at the point of asking. • Questionnaires such as a health screening form are recognised as valid and reliable. | <ul style="list-style-type: none"> • Need to be able to read and write in the language used for the questionnaire (language and literacy barriers can hinder accuracy). • Can appear impersonal, unless discussed with the client. • Do not allow for clarification or explanation. • The instructor needs time to read and act on the responses. • Clients might require an explanation, otherwise they cannot fully understand the questions; they may not always answer truthfully or keep to relevant information. • Information may become out of date. • As a record of client information, they need to be updated regularly and stored securely in accordance with data protection and confidentiality legislation. • Some questionnaires require permission for use. • Instructor-designed questionnaires may lack the required validity and reliability. |

Health screening forms

Health screening forms are one of the most essential tools for gathering basic health information from clients.

The **Get Active questionnaire**, which has replaced the health screening form and par-q+, is provided by the Canadian Society for Exercise Physiology (CSEP) and includes a series of questions that clarify whether exercise needs to be delayed until GP clearance is obtained. It is a two-page questionnaire for clients aged 15–69, which includes ten questions and advises clients to go back to their GP if they answer ‘yes’ to any of them. Page two asks them to consider their current physical activity levels and provides general advice for becoming more active.



Get Active Questionnaire – Reference Document ADVICE ON WHAT TO DO IF YOU HAVE A YES RESPONSE

Use this reference document if you answered YES to any question and you have not consulted a health care provider or Qualified Exercise Professional (QEP) about becoming more physically active.

| 1 Have you experienced ANY of the following (A to F) within the past six months? | |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A Diagnosis of/treatment for heart disease or stroke, or pain/discomfort/presure in your chest during activities of daily living or during physical activity? | <input type="checkbox"/> YES Physical activity is likely to be beneficial. If you have been treated for heart disease but have not completed a cardiac rehabilitation program within the past 6 months, consult a doctor – a supervised cardiac rehabilitation program is strongly recommended. If you are resuming physical activity after more than 6 months of inactivity, begin slowly with light- to moderate-intensity physical activity. If you have pain/discomfort/presure in your chest and it is new for you, talk to a doctor. Describe the symptom and what activities bring it on. |
| B A diagnosis of/treatment for high blood pressure (BP), or a resting BP of 160/90 mmHg or higher? | <input type="checkbox"/> YES Physical activity is likely to be beneficial if you have been diagnosed and treated for high blood pressure (BP). If you are unsure of your resting BP, consult a health care provider or a Qualified Exercise Professional (QEP) to have it measured. If you are taking BP medication and your BP is under good control, regular physical activity is recommended as it may help to lower your BP. Your doctor should be aware of your physical activity level so your medication needs can be monitored. If your BP is 160/90 or higher, you should receive medical clearance and consult a QEP about safe and appropriate physical activity. |
| C Dizziness or lightheadedness during physical activity | <input type="checkbox"/> YES There are several possible reasons for feeling this way and many are not worrisome. Before becoming more active, consult a health care provider to identify reasons and minimize risk. Until then, refrain from increasing the intensity of your physical activity. |
| D Shortness of breath at rest | <input type="checkbox"/> YES If you have asthma and this is relieved with medication, light to moderate physical activity is safe. If your shortness of breath is not relieved with medication, consult a doctor. |
| E Loss of consciousness/fainting for any reason | <input type="checkbox"/> YES Before becoming more active, consult a doctor to identify reasons and minimize risk. Once you are medically cleared, consult a Qualified Exercise Professional (QEP) about types of physical activity suitable for your condition. |
| F Concussion | <input type="checkbox"/> YES A concussion is an injury to the brain that requires time to recover. Increasing physical activity while still experiencing symptoms may worsen your symptoms, lengthen your recovery, and increase your risk for another concussion. A health care provider will let you know when you can start becoming more physically active, and a Qualified Exercise Professional (QEP) can help get you started. |

After reading the ADVICE for your YES response, go to Page 2 of the Get Active Questionnaire – ASSESS YOUR CURRENT PHYSICAL ACTIVITY

© Canadian Society for Exercise Physiology, 2017. All rights reserved.

PAGE 1 OF 2



PARmed-X FOR PREGNANCY

Physical Activity Readiness Medical Examination

PARmed-X for PREGNANCY is a guideline for health screening prior to participation in a prenatal fitness class or other exercise.

Healthy women with uncomplicated pregnancies can integrate physical activity into their daily living and can participate without significant risk either to themselves or to their unborn child. Postulated benefits of such programs include improved aerobic and muscular fitness, promotion of appropriate weight gain, and facilitation of labour. Regular exercise may also help to prevent gestational glucose intolerance and pregnancy-induced hypertension.

The safety of prenatal exercise programs depends on an adequate level of maternal-fetal physiological reserve. PARmed-X for PREGNANCY is a convenient checklist and prescription for use by health care providers to evaluate pregnant patients who want to enter a prenatal fitness program and for ongoing medical surveillance of exercising pregnant patients.

Instructions for use of the 4-page PARmed-X for PREGNANCY are the following:

- 1 The patient should fill out the section on PATIENT INFORMATION and the PRE-EXERCISE HEALTH CHECKLIST (PART 1, 2, 3, and 4 on p. 1) and give the form to the health care provider monitoring her pregnancy.
- 2 The health care provider should check the information provided by the patient for accuracy and fill out SECTION C on CONTRAINDICATIONS (p. 2) based on current medical information.
- 3 If no exercise contraindications exist, the HEALTH EVALUATION FORM (p. 3) should be completed, signed by the health care provider, and given by the patient to her prenatal fitness professional.

In addition to prudent medical care, participation in appropriate types, intensities and amounts of exercise is recommended to increase the likelihood of a beneficial pregnancy outcome. PARmed-X for PREGNANCY provides recommendations for individualized exercise prescription (p. 3) and program safety (p. 4).

Note: Sections A and B should be completed by the patient before the appointment with the health care provider.

A PATIENT INFORMATION

| | |
|------------------------------------------------------|--------------------------------|
| NAME _____ | ADDRESS _____ |
| PHONE _____ | BIRTHDATE MM / DD / YEAR _____ |
| NAME OF PREGNATAL FITNESS PROFESSIONAL _____ | HEALTH INSURANCE No. _____ |
| PHONE NUMBER OF PREGNATAL FITNESS PROFESSIONAL _____ | |

B PRE-EXERCISE HEALTH CHECKLIST

PART 1: GENERAL HEALTH STATUS

In the past, have you experienced:

- 1 Miscarriage in an earlier pregnancy?
- 2 Other pregnancy complications?
- 3 I have completed a PAR-Q within the last 30 days.

If you answered YES to question 1 or 2, please explain:

Number of previous pregnancies: _____

PART 2: STATUS OF CURRENT PREGNANCY

Due Date: MM / DD / YEAR _____

During this pregnancy, have you experienced:

- 1 Marked fatigue?
- 2 Bleeding from the vagina ("spotting")?
- 3 Unexplained faintness or dizziness?
- 4 Unexplained abdominal pain?
- 5 Sudden swelling of ankles, hands or face?
- 6 Persistent headaches or problems with headaches?
- 7 Swelling, pain or redness in the calf of one leg?
- 8 Absence of fetal movement after 6th month?
- 9 Failure to gain weight after 5th month?

If you answered YES to any of the above questions, please explain:

PART 3: ACTIVITY HABITS DURING THE PAST MONTH

- 1 List only regular fitness/recreational activities:

| INTENSITY | FREQUENCY (times/week) | TIME (minutes/day) |
|-----------|------------------------|--------------------|
| Heavy | 1-2 | <20 |
| Medium | 2-4 | 20-40 |
| Light | 4+ | 40+ |

- 2 Does your regular occupation (job/home) activity involve:

- Heavy lifting?
- Frequent walking/stair climbing?
- Occasional walking (> once/hr)?
- Prolonged standing?
- Mainly sitting?
- Normal daily activity?

- 3 Do you currently smoke tobacco?*

- 4 Do you consume alcohol?*

PART 4: PHYSICAL ACTIVITY INTENTIONS

What physical activity do you intend to do?

Is this a change from what you currently do? YES NO

*Note: Pregnant women are strongly advised not to smoke or consume alcohol during pregnancy and lactation.

© 2015, Canadian Society for Exercise Physiology

Interview

One-to-one consultations are time-consuming but can be a richer source of information than objective questionnaires. Information can be verified and elaborated, and behavioural cues such as body language can be observed.

Interviewing is more personal than questionnaires and offers an opportunity for building rapport with the client. However, face-to-face meetings can sometimes be daunting for less confident clients and the instructor must be able to adapt their communication style to suit different client needs. Instructors need to be able to ask appropriate open questions to gather information and actively listen to check that they understand the client correctly. Additional training and practice is often required to develop these skills effectively.

| Advantages of interviews | Disadvantages of interviews |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Open questions can provide lots of information. A personal approach helps to establish rapport and trust. Questions can be clarified and client responses acknowledged (e.g. nodding), which can encourage elaboration. | <ul style="list-style-type: none"> Time-consuming. Remembering and recording information accurately requires skill. Information needs to be recorded and stored securely. Requires empathy and effective active listening and questioning skills. Risk of disclosure of information outside role boundaries, especially sensitive information, e.g. medical conditions. Need to be conducted in a private area. |

Observation

Observation is a quick, easy method of gathering information on subjects that do not require verbal questions or written information.

Observation can also be used to gather information on subjects that clients might find uncomfortable (e.g. body fat) without using potentially invasive or inappropriate health assessments (e.g. callipers or tape measures) which can cause embarrassment.

Some observations require a degree of experience and additional training to make an informed assessment that can be used to determine planning and exercise selection (e.g. posture assessments).

| Advantages of observation | Disadvantages of observation |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Quick and immediate. Effective for gathering information such as gender, age, posture, body composition, walking gait, facial expressions, skin colour changes during activity, clothing, footwear and whether the client is a healthy weight. | <ul style="list-style-type: none"> Some information must be checked for accuracy (e.g. age range) and recorded appropriately. Ineffective for gathering certain information, such as lifestyle behaviours and medical conditions that cannot be seen (e.g. depression, osteoarthritis). |

Physical assessments (health and fitness)

Physical assessments can be used to obtain detailed information about the client's current fitness and health status.

Health assessments include:

- Blood pressure.
- Heart rate.
- Height and weight.
- Body mass index (BMI).

Fitness assessments include:

- Flexibility assessments.
- Muscular assessments.
- Cardiovascular assessments.

| Advantages of physical assessments | Disadvantages of physical assessments |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> Provide baseline information that can inform programme design and exercise selection. Assessments gather specific information, e.g. blood pressure, heart rate, BMI, flexibility (sit and reach) and muscular fitness (curl-up or press-up). Heart rate and blood pressure can identify medical contraindications for exercise, e.g. severe hypertension or tachycardia. Assessments provide valid, reliable measurements. Comprehensive information can be gathered and can be retested to check developments and changes. | <ul style="list-style-type: none"> Informed consent is required. Some assessments can pose risks for clients (e.g. use of a cardiovascular step test for a client with a knee injury). Some assessments can be invasive or insensitive, e.g. using callipers on an obese client. Equipment needs to be calibrated to ensure valid, reliable readings. Equipment should be of good quality, regularly inspected and well maintained. Instructors need to be qualified and competent to conduct assessments. Test guidelines need to be followed to ensure results are accurate. Clients must be in a 'neutral state' (variables reduced) for test accuracy. Time is required to instruct clients properly and to complete. |

The process of gaining informed consent

Informed consent must be obtained from the client before:

- Any fitness testing.
- Any exercise sessions, including gym-based exercise.



Informed consent can only be given when certain information has been explained by the instructor and fully understood by the client.

The client must also understand that their participation is entirely voluntary (not compulsory) and be given the opportunity to ask questions, which must be answered; all questions and answers must be recorded on the informed consent document.

The informed consent document needs to be dated and signed by the client and the instructor, kept as a permanent record and stored securely with other client details.

The informed consent document is not a waiver of any rights or responsibilities; it is one of many records that can be produced in a court of law in the event of a lawsuit.

It is mandatory that you obtain informed consent and appropriate information from a client before you make any recommendations. This ensures that you are both adequately protected.

Summary of an informed consent record

The information presented on an informed consent record should be clearly typed and provide:

- An explanation of the purpose of the assessment or programme.
- A description of the components of the assessment or programme.
- An explanation of the potential risks, discomforts and benefits.
- Clarification of the client's and instructor's responsibilities.
- A reference to confidentiality and privacy.
- An emphasis on the client's voluntary participation and right to change their mind.
- The opportunity for the client to ask questions (with space for recording questions and answers).
- Signatures of the client and witness (instructor) and date.

Screening

In addition to giving informed consent, all clients should be screened before they start an exercise programme.

Screening clients and acquiring informed consent are compulsory legal and ethical duties of care for exercise and fitness instructors.

Information gathered from the various screening procedures:

- Governs the advice and guidance offered to clients.
- Influences the design of any exercise and activity programme, including the frequency, intensity and type of activity recommended.

The purpose of pre-exercise screening is to:

- Assess the client's readiness for exercise, health status and current activity and fitness levels.
- Identify medium- and high-risk clients who need clearance from their GP in order to participate.
- Inform the design and planning of the exercise programme.
- Maximise the benefits and minimise the risks of exercise participation for the client.
- Protect the instructor and organisation from litigation.
- Fulfil professional, legal and ethical requirements.



All clients should be screened before taking part in exercise; it is a legal and ethical requirement.

Factors that compromise the safety of exercise

In some instances, clients need to delay exercise or be referred to a qualified health professional before participation.

Reasons for temporary deferral of exercise include:

- Illness, such as a cold or flu. Sufferers are advised to delay exercise until they are feeling better.
- Pregnancy, which can require GP clearance before exercise can commence. It is covered in the PARmedX.
- Health changes; these should be reported and could require referral to a GP.
- Inappropriate clothing or footwear, e.g. no trainers for a gym session.
- Inebriation; gym equipment must not be used under the influence of alcohol.

Reasons for medical referral and clearance

GP consent and clearance for exercise are recommended in these cases:

Health screening response

If the client answers 'yes' to one or more of the questions on the screening form; if they have any diagnosed metabolic, pulmonary or cardiovascular disease (CVD) or if they are experiencing signs or symptoms of a pulmonary or cardiovascular disease then they are at a heightened risk of a medical emergency.

Combined risk factors

Exercise can be dangerous for clients who have several risk factors for CVD; they should check for these with their GP. CVD risk factors include inactivity, high blood pressure, smoking, age, obesity, stress, diabetes, high cholesterol and a family history of CVD (hereditary).

Injuries that can be aggravated by exercise

Clients with minor injuries such as sprains and strains might need clearance from their GP, as these can be exacerbated by exercise.

Instructor doubt or uncertainty

If the instructor has any doubts about the client's health, they should advise them to check with their GP for clearance.

Client preference or doubt

If the client wants to undergo a medical check before starting an exercise programme, they should be encouraged to pursue it with their GP.

Age

Clients aged over 69, who are unused to exercise or physical activity, should be assessed by their GP.

Risk stratification

If a client is considered unfit for exercise they can be referred to an appropriate healthcare professional, e.g. a GP. They must then obtain medical clearance before they can start the programme.

The client should be given an explanation for their referral and an opportunity for a follow-up after they have spoken with their GP. This can be done via a telephone or face-to-face appointment.

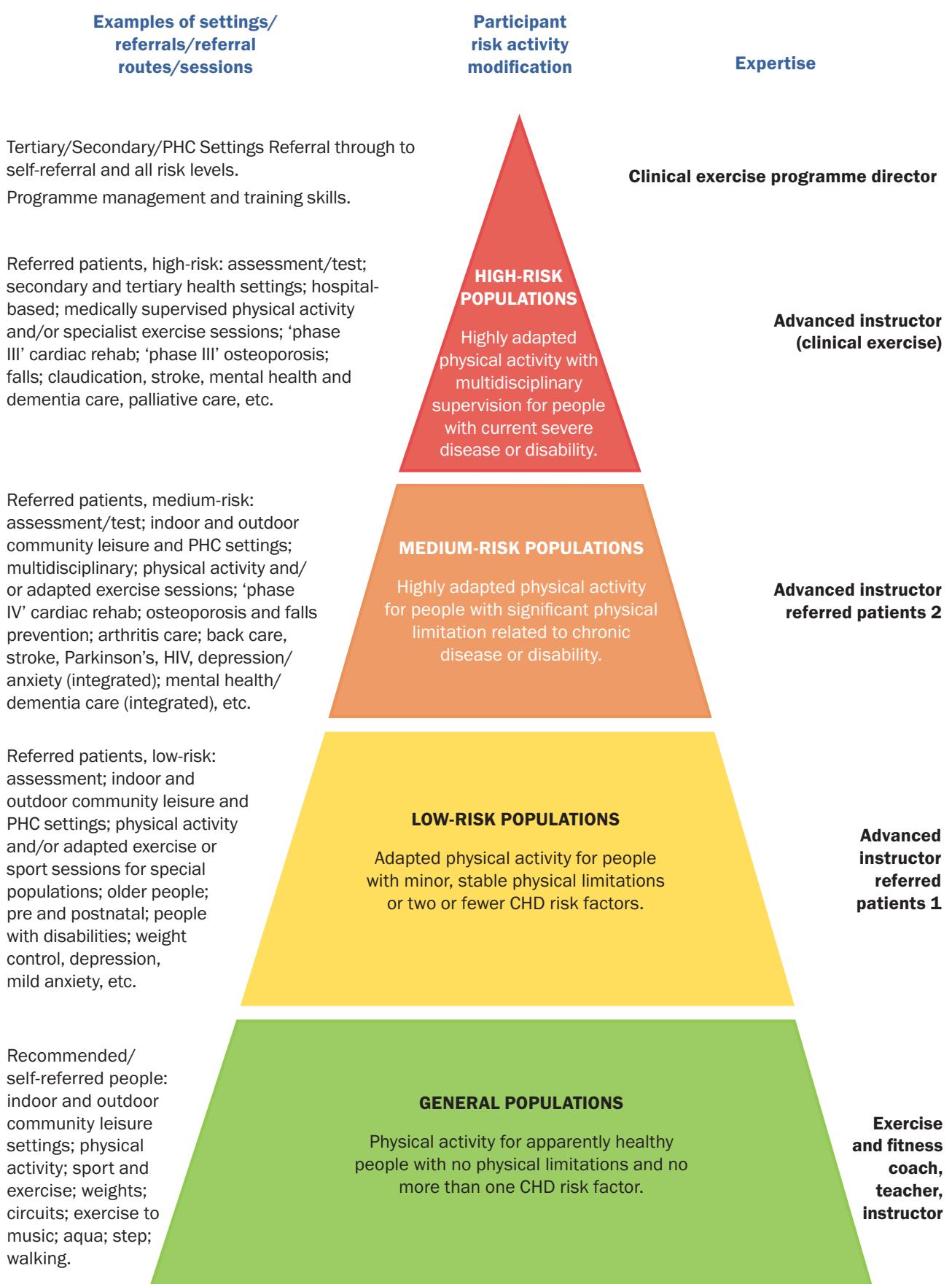
Fitness instructors are not qualified to work with clients with medical conditions, or to rehabilitate them from injury; these fall outside an instructor's scope of practice. Clients with medical conditions need supervised exercise sessions with a Level 3 exercise referral instructor or a Level 4 specialist instructor.

To ensure fitness instructors work within their professional scope of practice, wherever there is any doubt, they must risk-stratify their clients. There is a range of local and national tools for risk stratification, and it is important that fitness instructors are familiar and confident in using those prescribed within their place of work.

Two of the more common and accepted risk stratification tools are the National Quality Assurance Framework (NQAF) pyramid and the Irwin and Morgan risk stratification tool.

NQAF patient characteristics and exercise professional expertise pyramid

The diagram below identifies the exercise professionals that should be dealing with specific patient or client characteristics.



Irwin and Morgan risk stratification tool

| Low risk | |
|-----------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------|
| Overweight | No complications. |
| High normal blood pressure | (130–139/85–89mmHg) not medication-controlled. |
| Deconditioned | Due to age or inactive lifestyle. |
| Type 2 diabetes | Diet-controlled. |
| Older people aged >65 | No more than two CHD risk factors and not at risk of falls. |
| Prenatal | No symptoms of pre-eclampsia/history of miscarriage. |
| Postnatal | Provided 6/32 check complete and no complications. |
| Osteoarthritis | Mild where physical activity will provide symptomatic relief. |
| Mild bone density changes | BMD >150 and <2.5 SD below young adult mean. |
| Exercise-induced asthma | Without other symptoms. |
| Smoker | One other CHD risk factor and no known impairment of respiratory function. |
| Stress/mild anxiety | Asymptomatic. |
| Seropositive HIV | Asymptomatic. |
| Medium risk | |
| Hypertension stage 1 | (140–159/90–99mmHg) medication-controlled. |
| Type 2 diabetes | Medication-controlled. |
| Type 1 diabetes | With adequate instructions regarding medication of insulin dosage depending on time of exercise and warning signs. |
| Physical disabilities | No other risk factors. |
| Moderate osteoarthritis/rheumatoid arthritis | With intermittent mobility problems. |
| Clinical diagnosis osteoporosis | BMD <2.5 at the spine, hip or forearm or ≥4 on fracture index, with no history of previous low-trauma fracture. |
| Surgery – pre and post | General or orthopaedic, not cardiac . |
| Intermittent claudication | No symptoms of cardiac dysfunction. |
| Stroke/TIA | >1 year ago, stable CV symptoms, mobile – no assistance required. |
| Asthma | Mild (ventilatory limitation does not restrain submaximal exercise). |
| Chronic obstructive pulmonary disease (COPD) | Without ventilatory limitation but would benefit from optimisation of respiratory system mechanics and correction of physical deconditioning. |
| Neurological conditions | E.g. young-onset Parkinson's disease (stable), multiple sclerosis. |
| Early symptomatic HIV | Moderately diminished CD4 cells, intermittent or persistent signs and symptoms, e.g. fatigue, weight loss, fever, lymphadenopathy. |
| Chronic fatigue syndrome | Significantly deconditioned due to longstanding symptoms. |
| Depression | Mild or moderate. |
| Fibromyalgia | Associated impaired functional ability, poor physical fitness, social isolation, neuroendocrine and autonomic system regulation disorders. |
| High risk | |
| Older people >65 years at risk of falls, frail older people with osteoporosis and history of fracture | Refer directly to falls service (BMD >2.5 at the spine, hip or forearm in the presence of one or more documented low-trauma or fragility fractures). |
| Unstable and uncontrolled cardiac disease | |
| Claudication with cardiac dysfunction | |
| Orthostatic (postural) hypotension | Fall SBP <20mmHg within 3 minutes of standing. |
| Stroke/TIA | Recent (>3 months). |
| Severe osteoarthritis/rheumatoid arthritis | With associated mobility. |
| Type 1 or type 2 diabetes (advanced) | With accompanying autonomic, advanced retinopathy. |
| Moderate to severe asthma | Where ventilatory limitations restrain submaximal exercise. |
| COPD/emphysema | With true ventilatory limitation. |
| AIDS | With accompanying neuromuscular complications, severe depletion of CD4 cells, malignancy or opportunistic infection. |
| Psychiatric illness/cognitive impairment/dementia | AMT score <8. |

Summary of client information and exercise considerations

| Information | Method of collection | Checks to make | Factors that can affect safe participation and require consideration when planning |
|-------------------------------------------|------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Personal information and details. | <ul style="list-style-type: none"> • Questionnaire. • Interview. | <ul style="list-style-type: none"> • Name. • Address. • Emergency contact details. • Age. • Gender. • Ethnicity. • Disabilities. • Language spoken. | <ul style="list-style-type: none"> • Selecting activities that are appropriate for age-related physiological changes, e.g. loss of bone mass or joint deterioration. • Selecting culturally appropriate activities for some ethnic groups, e.g. women-only sessions. • Activity modifications for clients with disabilities. • Availability of written resources (e.g. screening forms) in other languages. |
| Medical history and risk category. | HEALTH SCREENING supported by interview. | <ul style="list-style-type: none"> • Current medical conditions and medications taken. • Relevant medical history. • Past surgery. • Injuries. | <ul style="list-style-type: none"> • Clients might need to defer exercise and be referred to a GP before embarking on a programme. • A client might need to work with a specialist instructor, e.g. exercise referral. • A client might need to be excluded from exercise, e.g. in case of medical contraindications (stage 3 hypertension or tachycardia). • A client may be able to participate, as long as their programme is adapted to reduce the risk of any problems occurring during exercise. |
| Health and fitness level. | Physical assessments. | <ul style="list-style-type: none"> • Blood pressure. • Heart rate. • Posture. • Flexibility. | <ul style="list-style-type: none"> • Checking current health status and identifying reasons for deferral (e.g. illness) or referral (e.g. high blood pressure or heart rate). • Providing baseline measures that gauge the starting point for any activity; these can be used to monitor progress. |

| Information | Method of collection | Checks to make | Factors that can affect safe participation and require consideration when planning |
|----------------------------------------|--------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Lifestyle information. | <ul style="list-style-type: none"> Interview. Questionnaire. | <ul style="list-style-type: none"> Occupation. Working hours. Stress. Manual or sedentary work demands and postures adopted. Leisure activities and postures adopted. Activity levels – sedentary, limited, moderately or highly active – and frequency. | <ul style="list-style-type: none"> Using this information to identify how much time the client has available and when they can attend. Using this information to assess the client's fitness levels and posture; if they're inactive, the programme must start at a lower level. Lifestyle activities, e.g. walking and using stairs more often, can be recommended to increase activity levels. Exercises can be programmed to improve posture. |
| Lifestyle habits. | <ul style="list-style-type: none"> Questionnaire. Interview. | <ul style="list-style-type: none"> Nutritional habits – types of food and drink and frequency of consumption. Alcohol consumption – estimated amounts and frequency. Smoking habits – smoker or non-smoker, amounts, frequency and length of habit. | <ul style="list-style-type: none"> Diet and eating behaviours can affect energy levels, mood, body fat levels (overweight and obesity) and management of health conditions (e.g. diabetes). Smoking is a major risk factor for CHD and COPD. It also hampers cardiorespiratory fitness, which can compromise exercise intensity. Multiple CVD risk factors (2 or more) – e.g. smoker, aged 59, male and overweight – may warrant concern and subsequent referral to a GP before the client can partake in exercise (even without experience of symptoms). |
| Motivation and preferences. | <ul style="list-style-type: none"> Interview. Questionnaire. | <ul style="list-style-type: none"> Activity preferences and previous exercise experiences. Personal goals and objectives. Level of motivation and readiness to start making changes. Support systems available, e.g. friends and family. | <ul style="list-style-type: none"> Client activity preferences and personal goals should influence the choice of activities. Levels of motivation and readiness influence a client's commitment, determination and potential for long-term adherence; they might need additional support. Support systems can influence client motivation and determine the level of support required. |
| Reasons for exercise and goals. | <ul style="list-style-type: none"> Interview. Questionnaire. | <ul style="list-style-type: none"> What the client wants to achieve and whether it is realistic or feasible. | <ul style="list-style-type: none"> Client goals influence the choice of activities and level of commitment they need to realise each objective. Goals can also highlight where additional support is needed. |

Table 1.1

Other information collected during a consultation

Available time

The duration and frequency of the workouts are determined by the time the client has available and their current activity and fitness levels.

All exercise and activity should fit well with the client's lifestyle or their exercise adherence could be compromised, especially if they are novice clients who are not accustomed to 'regular exercise' or patterns of active behaviour.

Clients who are inactive and have a low level of fitness may be best advised to start incorporating activities into their daily life, e.g. walking short distances and using stairs where possible; this means they can steadily increase their fitness by accumulating more regular physical activity.

Training status and fitness level

A beginner to resistance exercise would respond differently to a client with several years of training experience. It is important for the instructor to know:

- The length of any regular participation in training programmes (past and present) and reasons for discontinuation, where relevant.
- The type of training undertaken, e.g. resistance or cardiovascular, the equipment used and the exercises practised.
- The level of intensity involved in current or previous training, e.g. resistance lifted, number of repetitions, frequency and duration of sessions and type of system used.
- The degree of exercise technique; the client's skill level, posture and alignment and the extent to which they can perform exercises correctly.
- The 'training age' of the client – how long they have been training combined with their experience of different exercise modalities; this determines the type of programme the gym instructor can produce. Training a complete novice (training age of zero) would be completely different to training a client with a five-year history of structured and progressive resistance and aerobic training.

All of this information would directly influence the programme content, including the starting level of the programme, the type and number of exercises, the level of exercise intensity and complexity and ultimately the rate of progression.

Likes and dislikes

Knowledge of the client's exercise preferences should be used to influence programme design. Incorporating activities that the client enjoys will encourage adherence, whereas prescribing exercises that the client dislikes may cause a drop in motivation and hamper commitment.

It can be useful to explore the reasons why a client dislikes certain activities as these may be due to inaccurate preconceived ideas, a lack of understanding or anxiety over their ability to perform them. For example, a client who doesn't like stretching '*because it is boring*' would still need to incorporate flexibility activities to maintain their current range of motion and posture. Educating the client on the benefits of stretching may change their opinion and motivate them to stretch more often. Another example would be a client who doesn't want to use heavy weights on their upper body because they '*don't want big muscles*'; they would still need to include upper body activities to ensure muscle balance. It is important to educate your client, explore exercise myths and eliminate any misconceptions to help them achieve their goals.

When exploring a client's likes and dislikes it is useful for the instructor to ask:

1. Does the client dislike certain exercises because they are not good at them (they have an area of weakness or muscle imbalance) or they find them uncomfortable?
2. Would the client only adhere to the exercise programme if they were to stick to the activities they liked and avoid those that they don't?
3. Is there an alternative activity or exercise, which will bring about the desired outcome or a similar physiological effect that the client may be more likely to adhere to?

It is human nature for people to want to avoid the things they struggle with and concentrate their efforts in areas that play to their strengths. Performing well at a select group of exercises might boost a client's confidence, which is positive, but it could potentially exacerbate existing physical imbalances.

Likes and dislikes should certainly be taken into account, but not implemented in a way that compromises muscle balance or potential training outcomes. For example, a client who dislikes using the step machine could simply try an alternative option without it affecting the outcomes of the programme. A client who wants to exclude exercises for a specific body part could be at risk of imbalance and should be made aware of the merits of muscle balance and the inclusion of relevant exercises.

The client might be more inclined to follow a programme if they are educated on the benefits and reasons for including specific exercises.

How to choose the correct methods of gathering information

You should generally use a combination of methods to gather client information. Obtaining a health screening form and informed consent are minimum requirements – they are compulsory for legal and ethical reasons. Interviews are useful for planning individually tailored programmes; they can guide exercise selection to meet specific client needs. Physical assessments (health and fitness) are optional; they are useful for gathering baseline information that can determine the starting level of the programme, but some tests would not be appropriate for certain clients.

Other considerations when choosing methods for gathering information include:

- The time the client and instructor have available.
- The client's level of experience – some fitness assessments are inappropriate for certain clients.
- The language spoken by the client, e.g. clients who speak English as a second language may need written materials in their first language.
- Client disabilities that can get in the way of assessments, e.g. visually impaired or blind clients would require the health screening form to be read out, while deaf or partial hearing clients might need a signer. Injured and disabled clients would also need to be excluded from certain physical assessments.

ACTIVITY

Design your own consultation form that will support you in gathering the information identified above. Practise carrying out a 'mock' consultation on a friend and family member. Note down what you thought went well and what could be improved.

Assessing clients' current health and fitness using physical measurements

Taking physical measurements can be helpful when identifying a client's starting fitness level. This in turn helps decisions on how to tailor the training programme.

Test appropriateness

Tests should be chosen to match the needs, goals and capabilities of the client. Bear in mind that different tests suit different clients; do not take a one-size-fits-all approach!

As an example, some people might feel uncomfortable about having physical measurements taken, or embarrassed by certain tests. You need to be sensitive to these requests, for example, it might be unwise to take skinfold or girth measurements on a notably overweight client.

Some tests might be inappropriate or unsafe for certain clients. A client with a joint injury should not perform assessments that put stress on the injured area, for example, a timed press-up test would be unsuitable for a client with a wrist, elbow or shoulder injury; a timed sit-up test could be harmful for a client with low back pain or neck problems and a step test could exacerbate a knee injury.

Sub-maximal or maximal assessments (cardiovascular or resistance), or high-intensity assessments (e.g. VO_2 max or repetition maximum tests), might be unnecessary and too stressful for untrained clients. An inactive client would need to develop muscular fitness gradually; starting them with a test that measures muscular power through a vertical jump could carry a high risk of injury.

Test conditions

The environment where tests are conducted can influence the accuracy (validity and reliability) of the results. Other factors to take into account when conducting tests are:

Time of day

Tests and retests should be scheduled at consistent times, in the interest of accuracy. If this is not possible it needs to be noted and taken into account.

Time of day can influence the results as clients' body temperatures, hydration levels and activity levels change throughout the day. A female client's phase of the menstrual cycle can also influence the accuracy of results due to fluctuation in body temperature and fluid levels.

Environmental factors

These should be kept constant at each assessment. Temperature (and humidity) affects the heart rate response to exercise, so any differences in environmental temperature between tests should be recorded and taken into account.

You might need to postpone tests that affect heart rate if the temperature is especially hot and postpone flexibility tests if it is very cold.

Privacy

A private area should be used for physical tests relating to body composition and girth measurements; the client needs to feel comfortable.

All procedures

Test procedures should be explained, and informed consent obtained, before the programme can begin.

Client instructions – pre-test information

Clients should be fully informed of the guidelines or pre-test procedures before any physical testing begins. Pre-test procedures can be listed on the back of an appointment card and given to the client on the initial booking. It is important to check that the guidelines have been followed before testing.

| Pre-test guidelines for clients | |
|---------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Consumption | <ul style="list-style-type: none"> Avoid eating heavy meals less than three hours before the test. Avoid excessive alcohol consumption on the day before the test and avoid any alcohol on the day of the test. Avoid caffeinated drinks, e.g. coffee, two hours before the test. Avoid smoking for at least two hours before the test. |
| Action | <ul style="list-style-type: none"> Avoid exercise or strenuous physical activity on the day of the test. Have a good night's sleep on the night before the test. Avoid using a Jacuzzi, sauna or sunbed less than two hours before the test. |
| Medical | <ul style="list-style-type: none"> Cancel the assessment if you have a temperature or feel unwell. Bring any medication you take (e.g. inhalers) with you on the test day. |
| Clothing | <ul style="list-style-type: none"> Wear appropriate exercise clothing and footwear, e.g. trainers. |

Table 1.2 Pre-test procedures

Grounds for stopping tests

As well as telling the client what to expect and how they may feel in each test, it is part of an instructor's duty of care to ensure the client is comfortable at all times; this entails keeping an eye out for any signs of discontent.

Tests should be stopped immediately and/or clients referred to their GP in the event of:

- Chest pain and the onset of angina-like symptoms (N.B. this can also require emergency response).
- Significant drop (10mmHg) in systolic blood pressure with increased work rate.
- Excessive rise in blood pressure: systolic pressure >250mmHg or diastolic pressure >115mmHg.
- Shortness of breath, wheezing, leg cramps or claudication.

- Signs of poor perfusion: light-headedness, confusion, ataxia, pallor, cyanosis, nausea or cold, clammy skin.
- Failure of heart rate to increase with heightened exercise intensity.
- Noticeable change in heart rhythm.
- Client requests to stop.
- Physical or verbal signs of severe fatigue.
- Failure of testing equipment.

(ACSM, 2017)

Weight and height

Height and weight tables provide guidelines for a healthy body weight. They are also a valid method of gauging body mass index (BMI).

These tables are not a measure of body composition – they do not assess the proportion of body fat – but are a reliable gauging method for the majority of the population. They can be compared with a waist measurement or body composition analysis if the participant is active or muscular.

Total weight indications are a useful starting point for assessing health status, but body composition must ultimately be taken into account. There is a difference between weight loss and fat loss.

Test guidelines

- | | |
|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| WEIGHT ASSESSMENT | <ul style="list-style-type: none"> • Use calibrated scales, make sure the client removes shoes and heavy clothing and ensure all retests are scheduled for the same time of day. |
| HEIGHT ASSESSMENT | <ul style="list-style-type: none"> • Make sure the client removes shoes and stands tall. Take the highest part of the head as the measurement (be aware that height decreases as the day goes on). |

Body mass index (BMI)

BMI is the standard measure used for clinical diagnosis of obesity. It predicts health risks for most people accurately. It is not a reliable indicator for strength athletes and bodybuilders (around 2% of the population) because it only takes height and weight into account – not body composition. Bodybuilders with very low levels of fat are often classified as ‘obese’ by this method.

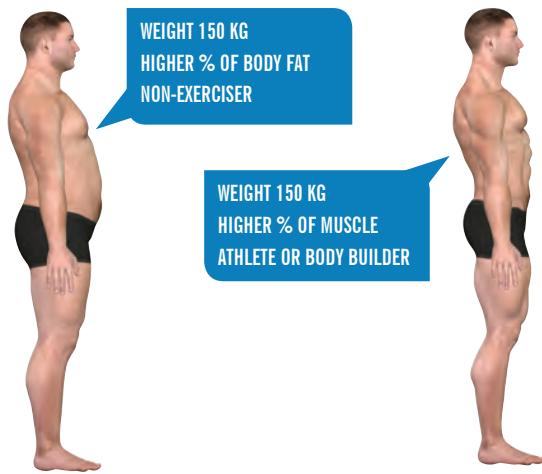
BMI is a quick and easy gauging method. A BMI reading of 30 or more is classified as obese.



| BMI (kg/m^2) | Description |
|--------------------------------|-----------------|
| <18.5 | Underweight |
| 18.5–24.9 | Normal |
| 25–29.9 | Overweight |
| 30–34.9 | Obese Class I |
| 35–39.9 | Obese Class II |
| ≥40.0 | Obese Class III |

(ACSM, 2017)

Table 1.3 BMI classifications

**Example**

BMI is calculated using this equation:

$$\text{BMI (kg/m}^2\text{)} = \text{Weight (kg)} \div \text{Height (m)}^2$$

Example BMI calculation:

If a 70kg man (2.2lbs = 1kg) is 1.72m tall (2.54cm = 1inch) then:

$$\text{BMI} = 70 \div (1.72 \times 1.72)$$

$$= 70 \div 2.96$$

$$= 23.6 \text{ kg/m}^2$$

Body composition

Body composition describes the percentages of fat, bone and muscle in human bodies. The body fat percentage is of most interest because it is used as a measure of health.

Two individuals may be of equal weight and height, but their body composition and appearance may be totally different. Muscular tissue takes up less space in the body than fat tissue and this influences how lean people appear.

Body fat percentages viewed as satisfactory for optimal health are:

Men: 8–25% of total body weight.

Women: 21–36% of total body weight.

Body composition can be differentiated as:

Fat mass (FM): the proportion of total weight that is fat. This includes internal and external fat (adipose tissue).

Fat-free mass (FFM or lean mass): the proportion of total weight that is not fat. This includes muscle, bone and internal organs.

The percentage of body fat is important information for assessing health.

ACTIVITY

Calculate the BMI of a client with a weight of 94kg and a height of 164cm.

Identify their BMI classification using the table on the previous page.

Circumference measurements

The pattern of body fat distribution is recognised as a key indicator of health risk. Fat stored in the abdominal region (as opposed to the legs, hips and arms) is considered a particular risk factor for CHD as it is a simple, crude measurement of visceral obesity, which correlates with a number of CHD risk factors such as hypertension, metabolic syndrome and type 2 diabetes (Chiba et al, 2007).

Waist circumference

Central adiposity is often measured in adults by waist circumference. For this reason, there are different risk classifications for waist circumference measurements.

| Classification | Male | Female |
|------------------|--------|--------|
| Low risk | <94cm | <80cm |
| High risk | >102cm | >88cm |

(NICE, 2017)

Table 1.4 Waist circumference

BMI and waist circumference

Current guidance suggests that the assessment of the health risks associated with overweight and obesity should be based on both BMI and waist circumference (ACSM, 2017).

| BMI | Waist circumference and health risk | |
|---------------------------------|--------------------------------------------|-----------------------------------------|
| | Men <102cm, Women <88cm | Men >102cm Women >88cm |
| 18.5–24.9 (ideal) | No increased risk | No increased risk |
| 25–29.9 (overweight) | Increased | High |
| 30–34.9 (obese class I) | High | Very high |
| 35–39.9 (obese class II) | Very high | Very high |
| ≥40 (obese class III) | Extremely high | Extremely high |

(ACSM, 2017)

Table 1.5 Waist circumference and health risk

Waist-to-hip ratio

Waist-to-hip ratio is another measurement for assessing central obesity. Health risk increases with waist-to-hip ratio to varying degrees, depending on age and gender.

Waist-to-hip ratio measurements take longer to perform and are less accurate for predicting health risk than a waist circumference alone, which is why one should use the latter to stratify risk. Many clients are interested in changing their body shape and waist-to-hip ratio may be of value to these clients, as it would indicate where they are losing fat from – not just how much.

To calculate waist-to-hip ratio, follow the formula below:

Waist measurement divided by hip measurement ($W \div H$).

For example:

76cm waist and 97cm hips

$76 \div 97 = 0.78$

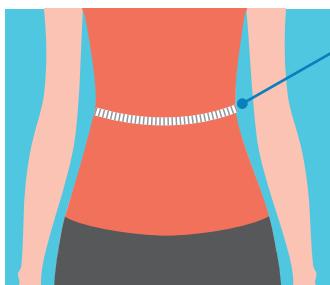
| Classification | Male <60 years | Female <60 years | Male 60–69 | Female 60–69 |
|-----------------------|--------------------------|----------------------------|-------------------|---------------------|
| Desirable | ≤ 0.95 | ≤ 0.86 | ≤ 1.03 | ≤ 0.90 |
| Very high risk | >0.95 | >0.86 | >1.03 | >0.90 |

(ACSM, 2017)

Table 1.6 Waist-to-hip ratios

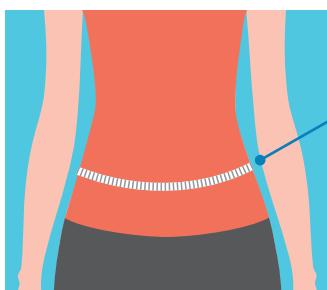
Taking circumference measurements

Circumference measurements are quick, easy and straightforward to take. Measurement sites include the waist, thigh, hips, arm and chest.

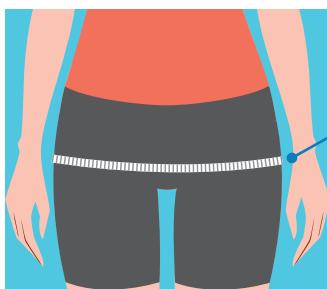


Waist

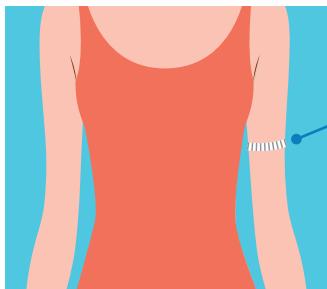
A horizontal measurement is taken (with the subject's abdomen relaxed) at the level of the narrowest part of the torso, above the iliac crest and below the 12th rib. The level of the umbilicus is also commonly used, but this is inaccurate for people with excess fat whose umbilicus has dropped, so above the bony marker of the iliac crest is the most consistent one to use. The measurement is taken after a normal expiration.

**Abdomen**

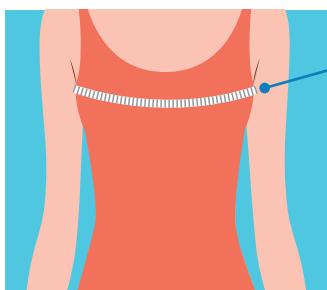
A horizontal measurement is taken (with the subject's abdomen relaxed) at the level of the umbilicus (the navel). The measure is taken after a normal expiration.

**Hips**

A horizontal measurement is taken at the maximum circumference with the person standing straight with feet together.

**Arm**

A horizontal measurement is taken (with the subject's arm relaxed) at the mid-point between the acromion process (shoulder) and the olecranon process (elbow).

**Chest**

With the subject standing erect, a measurement is taken at the maximum circumference.

NB: When taking this measurement on women, it might be appropriate to ask the client to place the tape in the correct position at the front of her body, with the instructor taking the measurement from the side or back.

Resting heart rate

Resting heart rate (RHR) is the amount of times the heart beats each minute (recorded as bpm, i.e. beats per minute). It can be a loose indicator of cardiovascular health as a lower resting heart rate may suggest a fitter client. However, hereditary factors can also play a significant part, which may affect readings.

In middle-aged, sedentary people the resting heart rate can exceed 100bpm, while highly trained endurance athletes can have resting rates between 28 and 40bpm (Wilmore and Costill, 1999).



A resting heart rate of 100bpm is a contraindication for exercise; sufferers must be referred to their GP before they can participate in an exercise programme.

| Resting heart rate (bpm) references | | |
|---------------------------------------|----------|----------|
| | Men | Women |
| Normal | 60–80bpm | 60–80bpm |
| Average | 70bpm | 75bpm |
| Special attention | 90bpm | 90bpm |
| Medical referral (tachycardia) | 100bpm | 100bpm |

Table 1.7 Resting heart rate (RHR) categories

| Bradycardia (Slow resting heart rate) | Tachycardia (Rapid resting heart rate) |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>A RHR of less than 60bpm.</p> <p>Causes include:</p> <ul style="list-style-type: none"> • High levels of fitness. • Low body temperature (hypothermia). • Low thyroid function (hypothyroidism). • Higher than normal level of potassium in the bloodstream (hyperkalaemia). • Myocardial infarction (damage or death of heart tissue). • Genetics. • Prescription drugs (beta blockers). | <p>A RHR of more than 100bpm (increased CVD risk).</p> <p>Causes include:</p> <ul style="list-style-type: none"> • Exposure to alcohol, caffeine or nicotine. • Stress, anxiety or arousal. • Heart failure. • Pulmonary embolism. • Abnormal decrease in blood volume or blood plasma (hypovolaemia). • Hypermetabolic states (such as fever or a raised body temperature). • Certain drugs (adrenaline, ephedrine and atropine). • Poor cardiovascular fitness levels. |

Location of the carotid and radial pulse

Carotid pulse

The common carotid artery sites are located on both sides of the front of the neck. Both are in the groove formed by the larynx (Adam's apple) and the sternocleidomastoid muscles (muscles on the side of the neck) just below the mandible (lower jawbone).

Radial pulse

The radial artery runs deeply on the anterolateral (thumb side) aspect of the forearm and becomes superficial near the distal head of the radius (directly in line with the base of the thumb).



ACTIVITY

Practise taking resting heart rate at both sites on family members, colleagues or friends. Note down the readings and how easy/difficult it was to locate the pulse on each person.

Cardiovascular fitness testing

Oxygen is breathed in and transported to working muscles to be used for energy production. During exercise, there is an increase in the work performed, meaning that more energy is needed and consequently more oxygen. Eventually a point is reached at which the cardiorespiratory system cannot supply enough oxygen to meet the increased energy needs.

When a point of 'maximum oxygen uptake' has been reached, it is universally expressed as $\text{VO}_2 \text{ max}$. Functionally, $\text{VO}_2 \text{ max}$ reflects the maximal ability of the lungs, heart, blood and vascular system to transport oxygen and the ability of the tissues to extract and use it (Laukkanen et al, 2002).

There are lots of tests that can be used to assess cardiovascular fitness. The Rockport walking test is easy to implement and appropriate for beginners with a low level of fitness.

Trainer Tip

A person's $\text{VO}_2 \text{ max}$ is a good indicator of how aerobically fit they are. In other words, an aerobically fit client is better able to take in, transport and utilise oxygen than an unfit person.

Rockport walking test

- The client walks as fast as possible for 1 mile (1.6km).
- Pulse rate is taken immediately after they have completed the mile.

N.B. if the instructor does not have a heart rate monitor, this can be done manually by counting the number of beats for a period of 30 seconds and then multiplying that by 2.

- The time it takes to complete the mile should be recorded.
- The instructor calculates the client's estimated VO₂ max.

N.B. the fitness instructor needs to know the client's age and body weight (taken before the test).

The calculation for estimating a client's VO₂ max (Kline et al, 1987):

$$\text{VO2 max} = 132.853 - (0.0769 \times \text{weight}) - (0.3877 \times \text{age}) + (6.315 \times \text{gender}) - (3.2649 \times \text{time}) - (0.1565 \times \text{heart rate})$$

Key

- Weight is in pounds (lbs).
- Gender: male = 1 and female = 0.
- Time is expressed in minutes and 100ths of minutes.
- Heart rate is in beats per minute.
- Age is in years.

The score obtained can be measured against the norms for different fitness levels. Improvements are expected to be noted, with appropriate training given between tests.

| Fitness categories for males, based on VO ₂ max (mL . kg ⁻¹ . min ⁻¹) | | | | | | |
|---------------------------------------------------------------------------------------------------------|-----------|------|------|------|-----------|----------|
| Age (years) | Very poor | Poor | Fair | Good | Excellent | Superior |
| 20–29 | 29.0 | 40.1 | 48.0 | 55.2 | 61.8 | 66.3 |
| 30–39 | 27.2 | 35.9 | 42.4 | 49.2 | 56.5 | 59.8 |
| 40–49 | 24.2 | 31.9 | 37.8 | 45.0 | 52.1 | 55.6 |
| 50–59 | 20.9 | 27.1 | 32.6 | 39.7 | 45.6 | 50.7 |
| 60–69 | 17.4 | 23.7 | 28.2 | 34.5 | 40.3 | 43.0 |

(ACSM, 2017, adapted from Mayo Clinic Proceedings, 2015)

Table 1.8a Rockport test norms – males

| Fitness categories for females, based on VO ₂ max (mL . kg ⁻¹ . min ⁻¹) | | | | | | |
|-----------------------------------------------------------------------------------------------------------|-----------|------|------|------|-----------|----------|
| Age (years) | Very poor | Poor | Fair | Good | Excellent | Superior |
| 20–29 | 21.7 | 30.5 | 37.6 | 44.7 | 51.3 | 56.0 |
| 30–39 | 19.0 | 25.3 | 30.2 | 36.1 | 41.4 | 45.8 |
| 40–49 | 17.0 | 22.1 | 26.7 | 32.4 | 38.4 | 41.7 |
| 50–59 | 16.0 | 19.9 | 23.4 | 27.6 | 32.0 | 35.9 |
| 60–69 | 13.4 | 17.2 | 20.0 | 23.8 | 27.0 | 29.4 |

(ACSM, 2017, adapted from Mayo Clinic Proceedings, 2015)

Table 1.8b Rockport test norms – females

Muscular endurance fitness testing

There is a variety of tests for measuring endurance and strength. A person's fitness level and experience are key determinants for the tests you should choose.

It would not be advisable to test a beginner or newcomer to resistance training to the point of exhaustion at any number of reps. Muscular endurance tests are often preferable to strength tests because:

- An all-out (maximal) test is hard work and painful, and can put some clients off further resistance training.
- An all-out (maximal) test can result in delayed onset muscle soreness (DOMS), which is also likely to put some clients off.
- If the client focusses on working to the maximum, good form will almost certainly be lost. Good technique is much more important than maximal exertion in the early days of resistance training.
- A beginner is at particular risk of injury if they are exercising to maximum exertion – especially in their ligaments and tendons, which take longer to gain strength than muscles (this develops through training). Using heavy free weights before coordination is developed is potentially dangerous.

Press-up test



Instructions

- The client assumes the normal press-up position with the body rigid and straight and the arms shoulder-width apart.
- The client must lower himself or herself to 90° of elbow flexion.
- The test is the total number of completed press-ups to exhaustion.
- An alternative press-up method, where the client raises from a position with the knees in contact with the ground, is available for those who cannot complete the normal version.

Press-ups completed by age and sex

| Age | 20–29 | | 30–39 | | 40–49 | | 50–59 | | 60–69 | |
|--------------------------|-------|----|-------|----|-------|----|-------|----|-------|----|
| Sex | M | F | M | F | M | F | M | F | M | F |
| Excellent | 36 | 30 | 30 | 27 | 25 | 24 | 21 | 21 | 18 | 17 |
| Very good | 35 | 29 | 29 | 26 | 24 | 23 | 20 | 20 | 17 | 16 |
| | 29 | 21 | 22 | 20 | 17 | 15 | 13 | 11 | 11 | 12 |
| Good | 28 | 20 | 21 | 19 | 16 | 14 | 12 | 10 | 10 | 11 |
| | 22 | 15 | 17 | 13 | 13 | 11 | 10 | 7 | 8 | 5 |
| Fair | 21 | 14 | 16 | 12 | 12 | 10 | 9 | 6 | 7 | 4 |
| | 17 | 10 | 12 | 8 | 10 | 5 | 7 | 2 | 5 | 2 |
| Needs improvement | 16 | 9 | 11 | 7 | 9 | 4 | 6 | 1 | 4 | 1 |

(CSEP in ACSM, 2017)

Table 1.9 Fitness categories for the press-up test

Flexibility testing

Flexibility is the potential for movement at a joint and the ability to lengthen a muscle without causing structural damage. Flexibility is affected by many factors, including muscle mass, bone structure, adipose tissue and skin.

There are a number of tests used to measure flexibility.

Where possible, it is advisable to gauge flexibility through observation of a client's range of movement, although this can be difficult to ascertain without actual measurement.

ACTIVITY

Practise the press-up and see how you score. Practise administering the test on your family, friends or colleagues. Compare your scores with the norms charts.

Sit and reach test

The sit and reach test assesses the flexibility of the hamstrings and lower back.

The test is relatively safe to perform, provided the client is warm and has no low back injury (e.g. a prolapsed disc).

Clients with back injuries should be referred to their GP for further evaluation before exercise and might need to follow a specialist programme.



Instructions

- This test should only be performed after a thorough warm-up.
- The client should remove shoes and items of clothing that restrict movement.
- The client sits with their feet flat against the board – their legs and back should be straight.
- The client reaches forward slowly and smoothly, maintaining a straight back for as long as possible.
- The instructor records the distance reached at the point where the client starts to bend their back; this is a measure of hamstring flexibility.
- The instructor asks the client to continue to reach forwards as far as possible (bending their back) and record the furthest point. This is a measure of hamstring and lower back flexibility.

Recording and storing client information

It is an essential part of a fitness professional's duty to ensure all client information is recorded and stored appropriately.

Any confidential information must be stored securely and not be shared with anyone else without sound, professional reasoning. This forms part of the Professional Code of Ethics and Conduct to which all fitness professionals must adhere.

All client records should be stored securely and in accordance with data protection legislation. This entails:

- Keeping paper records in locked files.
- Storing electronic records using secure systems with passwords.
- Not disclosing client information to other people or third parties.
- Ensuring information is transferred securely.
- Only using information for its intended purpose.
- Only keeping records for as long as they are required.
- Disposing of records securely.

N.B. The Data Protection Act 1998 is regularly reviewed. To check updates, visit the Government's main web portal (www.gov.uk). Alternatively, use an internet search engine and search for 'Data Protection Act'.

Working with other professionals and sharing client information

There are occasions when fitness instructors will need to work with other professionals which, at times, means that client information must be shared.

Examples of these situations:

- The client's needs are beyond a fitness instructor's scope of practice, e.g. the client has a physical or psychological condition identified as medium or high-risk when using risk stratification models.
- The client requires complex dietary advice.
- You have concerns over the client's welfare, or other people's welfare, in relation to the client.

You must only share client information with others if you:

- Get the client's permission; or:
- Feel the client or others are at risk of harm.

Other professionals you may need to signpost your client to include:

GP

Dietitian

Physiotherapist

**Counsellor/
psychologist**

Chiropractor

**Sports massage
practitioner**

**Exercise referral
instructor**

**Level 4 specialist
exercise instructor**

**Pre and postnatal
instructor**

Data protection and confidentiality

Client records need to be checked regularly to ensure the information is current.

Clients should be encouraged to advise the instructor of any changes to their health at each visit; it is important to make the client aware of this responsibility.

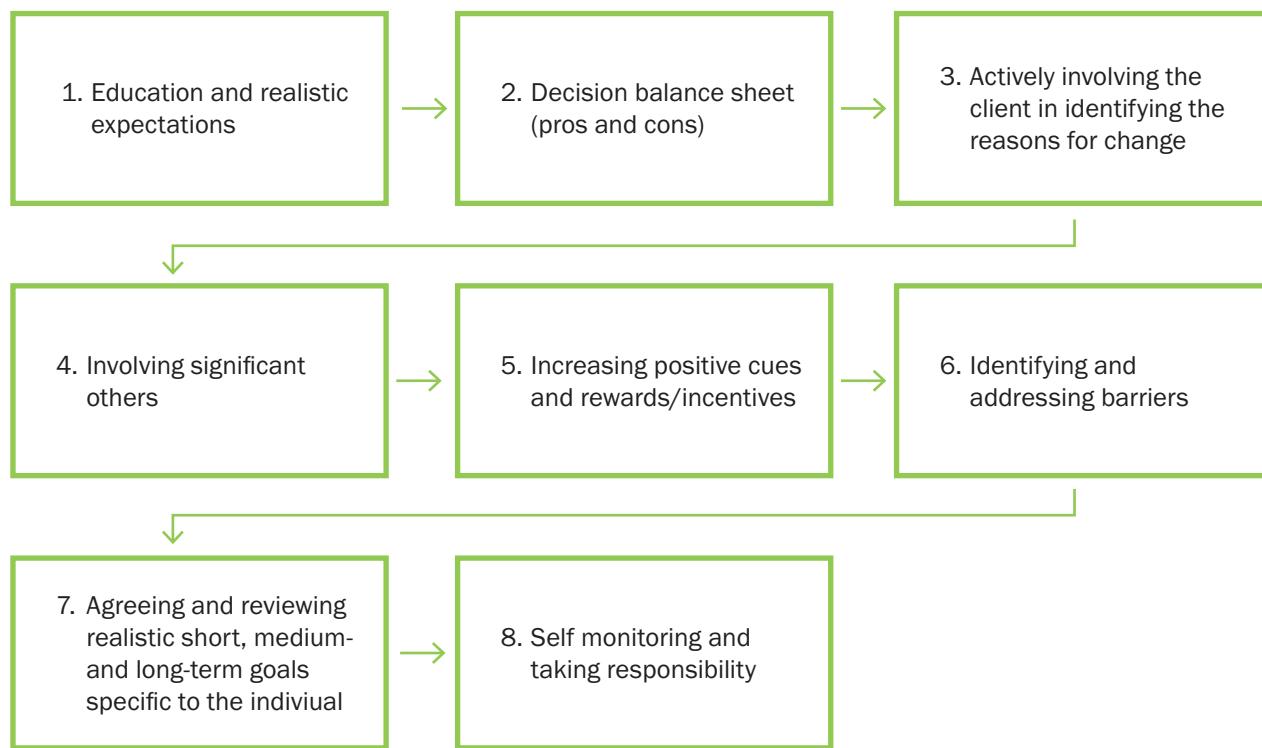
Answer the following questions and make notes to revise this section.

- Identify two legal documents that a fitness professional is obliged to collect during the first consultation with a client.
- Identify the different types of information that can be collected during a consultation.
- What are the advantages and disadvantages of interviews?
- Describe the process of gaining informed consent.
- What are the reasons for temporary deferral of exercise?
- When would you refer your client to another professional?
- What are the two most common risk stratification models used?
- How would you maintain client confidentiality and why is it important?
- When carrying out health and fitness measurements and assessments, why must clients adhere to pre-test guidelines?
- What grounds are there for stopping fitness tests?
- What information would BMI provide?
- What are the benefits of recording resting heart rate?
- What does the Rockport walk test measure?
- What do the press-up and abdominal curl tests measure?
- What does the sit and reach test measure?

Section 2: Working with clients to make positive behaviour changes

Increasing activity levels is a process of acquiring new behaviours and giving up old habits of inactivity. Recent studies have found that the traditional approach of prescriptive exercise and diet is not sufficient for ensuring clients adhere to long-term changes and that a more multi-faceted approach needs to be adopted, with a greater impetus on **behaviour change** (Dalle Grave et al, 2011).

In order to give clients the best possible chance of achieving their goals and instilling long-term behaviour change, all of the following areas should be considered and implemented:



1. Education and realistic expectations

The first step is to educate clients on the benefits of physical activity and exercise. It is important to dispel any misconceptions the client may have and to ensure their expectations are realistic. Recent studies have found that one of the key reasons for non-adherence to regular exercise is high expectations not being met, particularly in the early stages of a new behaviour change.

2. The decisional balance sheet (pros and cons)

The decisional balance sheet (figure 2.1) can be used with individuals when they are considering making changes. It requires the individual to sit down and consider all the gains they will experience from starting a programme of exercise, as well as any losses. It is advised to start with the cons and for clients to consider the long-term effects and not just the immediate factors. Hopefully, the gains will vastly outweigh the losses and provide the impetus to start exercise and continue the programme. The decisional balance sheet could be displayed in a prominent place in the home and serve as a continual motivating factor, especially in times of weakness or uncertainty.



Figure 2.1 Decisional balance sheet

ACTIVITY

Think about something you may like to change and complete the decisional balance sheet to explore the advantages and disadvantages for this change.

3. Actively involving the client in identifying the reasons for change

It is important to help clients reach the conclusion that adopting an active lifestyle will be a positive opportunity for a new and healthy life. A key aspect of a client's active involvement is to encourage them to make spontaneous statements such as '*If I start exercising I will ...*' because it is a sign that **they** see the need to change their lifestyle. In these cases, fitness professionals should make a confirmatory statement such as '*I realise that you have decided to try and change your exercise habits*'.

Positive affirmations

Affirmations are the beliefs a person holds about themselves. A positive attitude and self-perception brings more benefits and builds far more motivation than a negative mindset.

The aim is for clients to become mindful of any negative thinking patterns and attitudes and when they arise, so that they can challenge their thinking and rebalance their thoughts with positive, self-enhancing thought patterns.

Examples of positive affirmations are:

- ‘I have the power to make positive changes.’
- ‘I enjoy exercise.’
- ‘I deserve to have good health.’
- ‘I take good care of my body.’
- ‘I feel positive and energetic.’
- ‘My actions are making a difference.’

Reasons for exercising

Knowing why a person wants to be more active and exercise more often can help to identify their level of self-determination (how much they want something). It can also help to develop strategies that promote motivation and adherence.

Enjoyment

One of the main motivators for regular, sustained participation in any sport or exercise is enjoyment. If the person is used to an inactive or sedentary lifestyle, this enjoyment might be compromised. However, as their level of fitness improves – especially if they get to try different types of activity – exercise can become increasingly enjoyable and rewarding.

Health

People are becoming much more aware of the benefits of health-related exercise as a way of preventing illnesses such as heart disease, hypertension and stress-related conditions. They might decide to embark on an active exercise programme to improve their health, especially if it has been recommended by their doctor or specialist, following medical examination or illness.

Appearance and weight control

The largest proportion of people joining health clubs or attending exercise sessions is probably made up of those aiming to enhance their appearance by improving their body composition, general muscle tone and posture.

Social and fashion status

A significant number of people take up exercise because others are doing so. Membership of a particular health club can be a status symbol; alternatively, people might simply enjoy the social aspect of group exercise. People who participate for these reasons should ideally continue exercising because they enjoy the activities.

Rehabilitation

A programme may be started following illness or injury, when the need for rehabilitation requires exercise participation.

General fitness

Some people take up exercise for general fitness goals; they might want to improve their cardiovascular fitness, muscular tone, endurance or strength, or lose body fat.

General wellbeing

Sometimes, people feel lethargic, moody and mentally drained before the day has even begun. They might try to improve their general sense of wellbeing by joining a fitness facility to increase their activity levels.

Sport-specific fitness

Anyone taking up a new sport or returning to a sport after a long absence might wish to start a fitness programme before competing. It needs to be specific in its objectives, in order to prepare them physically for the demands of the sporting activity and improve their levels of performance.

4. Involving significant others

Social networks, such as family, friends or training buddies, can help to boost motivation and offer encouragement. A common reason for giving up on exercise programmes is a feeling that no one will notice or care; the aim of a social support network is to give the client the necessary encouragement, especially if they are not getting it at home.

Group training (small personal training groups or larger group exercise sessions) and group exercise classes are very effective methods for encouraging commitment. The social aspect of training promotes enjoyment and motivation among clients who do not want to let down their peers.



5. Increasing positive cues and rewards/incentives

Positive cues

Clients should be encouraged to not only address barriers to exercise, but also to increase positive cues to exercise and adopt a healthier lifestyle. The aim is to make the external environment as conducive to making positive choices as possible. Examples include:

- Packing a gym kit the night before work and putting it in the car.
- Doing food shopping online or making a list so as not to be tempted to ‘add things to the trolley’. Another effective strategy is to avoid going shopping when hungry.
- Adding ‘go the gym’ to calendars/diaries as a constant reminder.

Rewards/incentives

Incentives and rewards can be valuable ways of strengthening a client's motivation and commitment.

Incentives can include:

- A free t-shirt or water bottle with membership.
- A free training session for every ten sessions booked.
- Special deals for introducing friends, e.g. a complimentary training session.

Rewards can include:

- Praise and encouragement, reinforcing what the client has achieved.
- A free gift after a specific period of attendance or achievement of a target or goal.
- Displaying the top ten attendances on an organisation's noticeboard or newsletter.

This system of positive reinforcement is valuable because it shows people that their efforts have been recognised and rewarded. Praising a client for any small step forward is the key to positive reinforcement. Sometimes clients will not realise what it is they have achieved and need to be reminded of where they started; this serves as an excellent motivator for adherence.

It is important to ensure that rewards given do not involve indulging in previous bad habits such as eating high-fat foods or having a week off exercise.

N.B. any system of rewards or incentives should be applied with discretion as some could introduce competition, which may lead to counterproductive overtraining.

6. Identifying and addressing barriers

To ensure a degree of reasonably regular participation, experiences of activity and exercise need to be rewarding and positive; they must provide a sense of satisfaction and success.

There will always be issues that can prevent people from being active. The role of the instructor is to help people to identify and work through these barriers so that they can make positive changes.

Typical barriers to exercise and physical activity

Barriers to physical activity can manifest themselves in a number of forms.

Barriers can be:

Intrinsic

Something the person perceives as a barrier, e.g. a belief or attitude

Extrinsic

Something that constitutes an actual barrier, e.g. an exercise contraindication

All barriers – real or perceived – tend to fall within one of three categories:

- 1** • PHYSICAL e.g. an injury or illness
- 2** • PSYCHOLOGICAL e.g. an attitude, belief or state of mind.
- 3** • SOCIAL e.g. something in the environment, such as transport or availability of services.

Finding ways to remove or overcome the barrier can often incite the motivation needed to make changes.



| Type of barrier | Barrier | Strategy |
|----------------------|-------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Physical | Lack of fitness. | Plan a programme that is appropriate for their starting level of fitness and progress steadily. Build activity into their daily lifestyle (e.g. walking and moving more) before they embark on the programme. |
| | Injury, illness or medical condition. | Ensure the client has medical clearance prior to exercise. Signpost them to a specialist instructor if necessary (exercise referral). |
| Psychological | Self-conscious or embarrassed to use a gym or studio. | Provide a home activity programme that is appropriate to their level of fitness. Discuss times when the studio or gym is less busy. Suggest attending with a friend or family member. Offer newcomer and induction sessions for groups of clients who have similar fears. |
| | Previous failure (e.g. dropping out). | Explore their reasons for dropping out. Explore their activity preferences; look for things they like and enjoy. |
| | Struggling to motivate themselves. | Work with an instructor or personal trainer. Attend with their family or friends. Establish a training partner and buddy system. |
| | Dislike exercise. | Explore activities they like and find ways of making them more active, e.g. gardening, walking or playing a sport. |
| Social | Lack of time. | Build activity into everyday life, e.g. take the stairs instead of the lift, do exercises at home and take short journeys on foot or by bicycle. |
| | No transport or local services available. | Go for a walk in the park; gym and studio activities are not the only ways of improving fitness. |
| | Can't afford gym membership. | Plan activities for daily living. Offer off-peak membership or reduced rates at quiet times. |

Table 2.1 Barriers to activity with example strategies

Barriers are the reasons people give as to why they can't do something.

Motivation describes the reasons people give for doing or wanting to do something.

Clients use both types of language when they speak.

The first steps for helping clients overcome their barriers to engaging in physical activity are to help them:

- **Identify their barriers.**
- **Explore their motivations.**

This is where the client is the expert; they know all the factors that stop them from doing something. The role of the instructor is to facilitate a conversation and explore these reasons. This is the essence of the helping method: motivational interviewing.

The next step, which should not be hurried until the client is ready (**once** they have fully explored the 'why' and 'why not' for making changes) is to explore how they could make the changes. This is where the instructor has the expertise; they will know different ways of improving fitness and being active and should be able to discuss lots of possibilities with the client, rather than prescribing one type of programme.

ACTIVITY

Think back to when you first enrolled on this course. Write down the barriers at the time, whether they were intrinsic or extrinsic, and what strategies you put in place to overcome them.

Taking account of clients' activity preferences when designing a programme

Incorporating clients' exercise and physical activity preferences into their programme can strengthen their motivation and commitment.

It is important to select and plan activities that clients enjoy; that they find fun and pleasurable and that help them to relieve stress. This promotes commitment and motivation by allowing for positive associations with exercise.

It is best to avoid asking a client to do something they don't like because this reinforces negative associations, as long as alternatives that achieve the same outcome can be prescribed instead.

Experiencing too many negative thoughts and feelings during an exercise programme ultimately lowers motivation levels; this can hamper participation and commitment. It can also lead to relapse and a return to old habits.

Variety

Giving clients the opportunity to experience new activities or try different training methods can be a powerful incentive.

For example: '*You managed this really well today, how about we try some stability exercises with equipment next week?*'

Varying the activities and types of exercise makes a programme more interesting and allows the client to try activities that they might enjoy; these are all helpful for motivation and adherence.

Changing variables (such as intensity, duration and frequency) enables progression and this, in itself, can be a motivator. Examples include walking for longer or at a faster pace; increasing the number of repetitions of an exercise and attempting to hold a balancing posture (e.g. a yoga position) for longer.

7. Agreeing realistic short-, medium- and long-term goals specific to the individual

Goal-setting can be used as a strategy to enhance motivation and commitment.

It is important to set goals in the interests of:

- **Persistence;** goals can help the client to continue a task over time and keep their objectives in mind.
- **Attention;** goals help to keep a client directed to the important aspects of their programme.
- **Effort;** goals help to mobilise and direct the intensity of effort towards a specific task or outcome.
- **Strategies;** goals can help clients to develop new approaches for achieving their desired outcomes.

The reasons why people might not set goals could be that:

- They don't understand the importance or value of goal-setting.
- They don't know how to set goals effectively.
- They fear failure to achieve goals.
- They don't know what they want to achieve.

Types of goal

Goal-setting can be used in different areas of life, as well as aspects of health, wellbeing and personal growth. The main categories of goals are:

- **Personal goals,** which relate to personal life, such as family, social commitments, relationships, sporting aims, health and fitness objectives and pursuits we enjoy.
- **Business, career and economic goals,** which relate to the development of a career or working role and the necessary financial rewards.
- **Self-improvement goals,** which relate to aspects of personal growth and development.
- **Outcome goals,** which focus on the result of an event or situation, such as winning a race or beating an opponent. Achieving an outcome goal depends on individual effort and the opponent's ability and performance.
- **Performance goals,** which focus on making comparisons against one's own performance; they differ from outcome goals because they are within the athlete's control.
- **Process goals,** which focus on the course or actions that a person must take in order to perform well; this could be emphasising a particular technique or the components within it.

Short-, medium- and long-term goals

Goals must be set for short-, medium- and long-term time frames. It is important to set short-, medium- and long-term goals because the fulfilment of short-term goals ultimately contributes to the achievement of longer-term objectives.

| Goal categories | |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short-term goals | These goals are set over a period of one day to one month. A short-term goal can relate to something the client aims to achieve in one session or within a one-month time frame. |
| Medium-term goals | These are goals set over a period of one to six months; one-month and three-month goals are the most common. |
| Long-term goals | These goals relate to time frames that range from six months to several years. People might set 'lifetime goals' which cannot be assessed until retirement. Most long-term goals in sport are set for achievement over the course of a year or competitive season. |

Principles of goal-setting

There are seven principles that must be considered to make goals realistic, achievable and motivating (O'Connor, 2001):

1

Say what you want, not what you want to avoid.

This means using positive language to state the goal, which helps to put the client in the right emotional state to achieve it. As an example, '*I will avoid gaining body fat*' should be replaced by '*I will improve my body fat percentage*'.

2

Make goals challenging but realistic.

This means setting achievable goals; setting a goal too high can cause stress, due to fear of failure or overtraining in an attempt to improve performance. In turn, goals that are too easy hamper motivation.

3

Influence the result directly.

This means that the goal must be under the person's control and not reliant on the actions of other people. The goal should always start with '*I*' and be in the present tense; a goal such as '*I will win this race*' is not always appropriate because it relies on the performance of the other competitors – aiming for a specific race time would be better.

4

Measure progress.

Goals should always have a deadline with a specific date or time frame, e.g. a number of weeks or months. Goals should be a combination of short-, medium- and long-term objectives.

It is important to be able to measure goals in numerical terms, e.g. '*I want to get stronger*' is not as good as '*I want to improve my bench press by 25%*'; this makes it clear whether the goal has been reached or not.

5

Check resources.

Identify what sort of help is available for achieving the goal. This could involve people who have an interest in the achievement of the goal, such as a coach, team mate, friend, family member or partner. Resources can include facilities, books and equipment.

6

Count the cost.

What will be the cost of working towards the goal? This doesn't just involve money, but expenditure of time and loss of social opportunities.

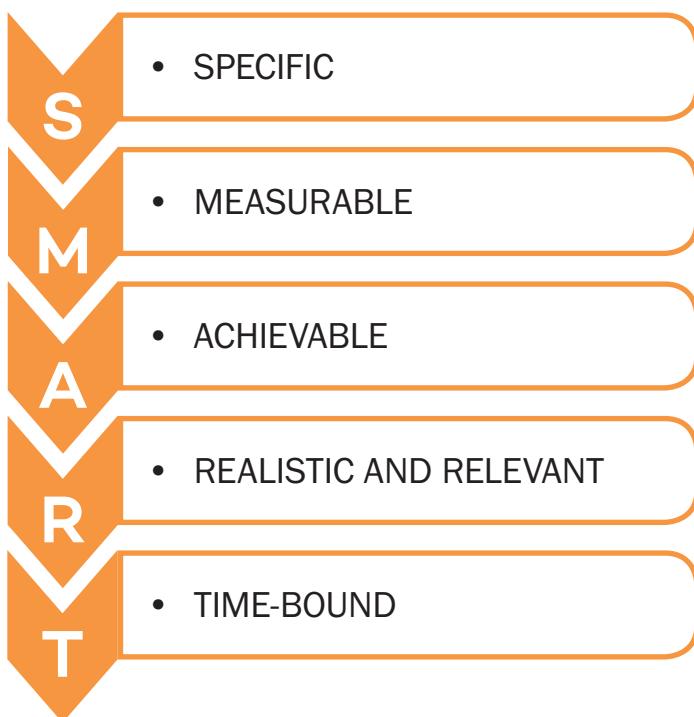
7

Provide rewards.

Goal achievement should be congratulated and recognised with an appropriate reward. Do not give rewards that involve indulging in previous bad habits!

SMART formula

When setting goals, it is useful to use the acronym, SMART, to ensure that they are:



Specific means that goals must relate to particular actions: something the client is going to do, e.g. walk to the park, go to the gym or attend a class. It can also relate to specific aspects of fitness. It is not enough to want to get fitter; the goal must be specific and state whether the aim involves aerobic fitness, flexibility, core stability, balance, fat loss, muscle development or another aspect of fitness.

Measurable means that goals must be quantifiable; they should be stated in measurable figures. As an example, ‘I want to walk more’ is not measurable, whereas an aim to walk for 30 minutes on 2 days next week is measurable. ‘I want to lose weight’ or ‘I want to change shape’ are not measurable, but statements such as ‘I want to lose 1 stone’ or ‘I want to fit into 32-inch waist jeans’ are measurable.

Achievable means that the targets need to be humanly possible for the person. It is important to take into account both the intrinsic and extrinsic factors that may affect success (e.g. barriers and motivation).

Goals should be moderately difficult but realistically achievable. If goal-setting is not done carefully it could be demotivating; if goals are too hard to achieve or the timescale is too long, motivation will be lost because the client might be put off and not make the necessary behaviour changes.

While over-ambitious goals can place a lot of stress on a person as they seek to achieve them, goals that are too easy also won’t achieve the desired effect because they can cause the client to resume previous behaviours after they have been achieved.

Realistic and relevant mean that the goal should fit with the client’s values, wants and needs. Goals must be devised and agreed by the instructor and client, not dictated or enforced.

Allow for client input in the development of goals. Lots of psychological theories state that people do not respond well to imposed restrictions or bombardment with commands or instructions. Clients are more likely to feel committed to their goals if they have contributed towards making them; this approach helps them to develop their own strategies for motivation and adherence.

Time-bound means that there must be a timescale to accompany the goal, so that the client can measure their success with a clear deadline or target. An example would be improving their aerobic capacity by 10% in 3 months.

An effective goal would take all of the SMART criteria into account. For example, an outcome goal to reduce body fat by 3% in 3 months is specific to a particular aspect of fitness, measurable, time-bound and can be achieved if it is something the client wants – it is relevant to their values and needs.

Identifying safe and realistic time frames for achieving clients' goals

Agreeing safe and realistic time frames for achieving clients' goals will be determined by a number of variables; these include:



It is important to carry out research using reputable sources to ensure specific goals are realistic when considering these variables. For example, it wouldn't be safe or realistic for an average client to lose half a stone per week for 4 weeks (2 stone in a month). Safe and effective weight loss should be agreed at 1–2lbs/week.

Additional strategies for goal-setting

Write goals down

All goals must be committed to paper with both the client and the instructor keeping copies for their records. The client should be encouraged to display the goals in a clearly visible place.

Use imagery

The client should be encouraged to visualise how they might look and feel when they have achieved their goal. Linking mental images and emotions to goal achievement makes the process more real and intense.

Goals will only be achieved if there is the **determination**, persistence and resolve not to give up; these qualities need to be instilled in the client.

Have a support system

All clients experience times of weakness and doubt in their ability to achieve their goals. At these times, they need a support network; this could include the instructor, a friend or a family member.

Bear in mind that changes in behaviour might not always be supported, as they can affect the client's relationships. For example, if the client decides to stop drinking alcohol this could hamper their social life and cause them to lose contact with friends. Friends might also try to prevent behavioural changes which are not in their interests.

Use reminders

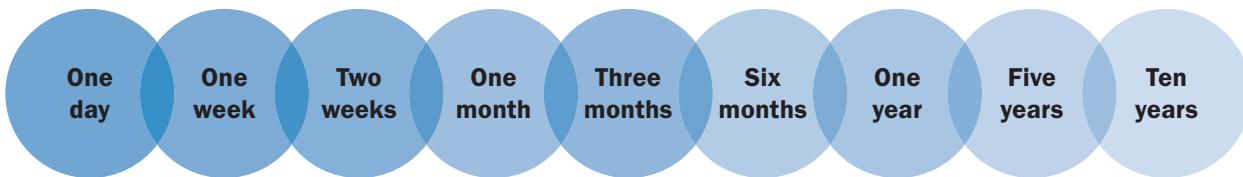
Anything that can be done to help the achievement of goals is useful. Putting up pictures of an ideal body image, writing notes to oneself or publishing motivational phrases can all help to keep a person motivated. For example, the client might have a note on the fridge saying 'think before you eat' or a note on the bathroom door saying 'go to the gym today'. Using modern technology can also help, by setting calendar reminders or alarms on their phones. These can only work for a short time because clients can train themselves to ignore them.

Reviewing goals

Setting and defining goals is of limited value without a follow-up procedure, which evaluates progress and helps the development of future goals.

Reviewing goals on a regular basis serves two very important purposes:

- **Accountability:** Taking time to stop and check progress and achievements can spur on motivation and a sense of ownership.
- **Feedback:** A review of goals allows for easy evaluation of how realistic, effective and motivational they were. It helps to clarify which actions worked and which ones did not, and to identify where a change of strategy might be needed.



It is important to set specific dates at the outset for goal review and progress evaluation. Breaking long-term goals down into smaller, manageable time periods helps to motivate the client and allows for regular minor adjustments; this in turn makes achieving the outcome much more likely.

Revising goals

Unless there are major problems with the original goals, it would be expected that the periodic goal reviews would only bring about minor modifications to make them as effective as possible.

ACTIVITY

Write down your personal short-, medium- and long-term SMART goals. Keep them safe for review.

8. Self-monitoring and taking responsibility

Self-monitoring

Self-monitoring is a key facet to effective behaviour change. For example, studies in obese patients have found that the higher the use of self-monitoring (e.g. calories in/calories out), the greater the weight loss. Self-monitoring helps to raise clients' awareness of their own exercise and dietary habits, and helps them find ways to maximise their physical activity and exercise potential. It is useful for the client to record any activities they have undertaken to achieve their goal, with full details of training sessions or food they have eaten.

Writing a diary can help clients to be honest with themselves and use visible progression to aid motivation.

The importance of clients taking personal responsibility for their fitness and motivation

To sustain any long-term commitment and adherence to exercise, it is important for the client to take personal responsibility for their own fitness and motivation. Taking responsibility increases the likelihood of independence and commitment to the strategies implemented for reaching fitness goals. Relying solely on other people, such as instructors or doctors, can encourage the client to blame other people for a lack of results. They might also become overly reliant on other people to do the work for them; this can leave them unable to do anything about their health and fitness without the presence of the person on whom they have become dependent.

Taking personal responsibility requires you to be actively involved in goal-setting, exercise choices, commitment to attend, monitoring of progress and changes and overcoming the desire to revert to old behaviours. It also means making some sacrifices, for example, in order to be more active, the desire to be inactive has to be minimised. These responsibilities require a high level of self-determination and a shift in attitude towards wanting to do or achieve something for its own sake, and for personal intrinsic fulfilment.

Key consulting skills

The key consulting skills are comprised of:



1. The Core Conditions

- **Unconditional positive regard** is about accepting and showing respect and warmth for the client. It is about valuing who they are without making judgements that they should be any other way. This includes not passing judgement if they lapse or relapse from their desired pathway of making changes (Lawrence and Bolitho, 2011).
- **Congruence** is about being 'real' and honest and living life according to standards and values that are one's own. From an exercise professional's perspective, maintaining a non-judgemental stance and trusting the client to find their own right answers and solutions will support their own development of congruence.
- **Empathy** is seeing and experiencing life from the other client's perspective and being concerned about the challenges they face. To demonstrate empathy, the exercise professional needs to put to one side any prejudices, closed-mindedness and the need to analyse and evaluate as this serves only to view the client from one's own perspective. It does help to understand the world from the client's perspective.

For an exercise professional, the most challenging time for demonstrating the core conditions occurs when a client is ambivalent or resistant to making changes, and/or when a client lapses or relapses. However, for a skilled exercise professional, ambivalence, resistance, lapses and relapses are perfect opportunities for exploring the client's world and finding out more about them.

If a client is ambivalent, the exercise professional can sensitively question this, for example:

'I notice that you say you are not really the exercise type, so I am wondering what has motivated you to come here today.'

If a client is resistant to any activity options or suggestions being offered, then the exercise professional can acknowledge that they are perhaps being too didactic (expert) and can instead ask the client, '*what would you really like to achieve from our work?*' (best hope) and/or say '*perhaps we can explore different options for you to get what you would like.*'

During relapse, the exercise professional can help to minimise the stress the client may feel by remaining non-judgemental and normalising lapse and relapse as part of the process of making changes.

They can also help the client to get back on track, if this is what the client chooses.

2. Professionalism

When working with clients, the fitness instructor should maintain a professional approach, which involves keeping to specific boundaries within the role and relationship.

As with other professional occupations, exercise professionals must also adhere to a code of ethical practice.

Professional and ethical practice includes:

- Treating all people with respect and dignity, regardless of difference (equality legislation).
- Providing a safe environment (health and safety legislation).
- Enabling access to services (equality and inclusion legislation).

- Delivering information and services within the boundaries of professional competence (e.g. only delivering services that one is qualified to deliver).
- Maintaining client boundaries (not over-stepping the relationship boundary into becoming a friend. In instances where a friendship develops, it may be appropriate to refer the client to work with another exercise professional to safeguard all involved).

3. Motivational interviewing (MI)

Motivational interviewing is a method of gathering information to explore a client's readiness to make changes. It can be used to elicit information about a client's specific medical condition (including medication and co-morbidities); concerns about certain areas of their life that they may like to change, such as becoming more active or improving their eating behaviours, and their goals and objectives (what they want).

The information gathered can then be used as the base for further discussion and exploration; to identify their level of motivation, readiness to make any changes and the advantages and disadvantages of them making changes they propose (decisional balance) and to assist them in finding the solutions that work for them.

The key principles of MI are illustrated by the acronym, RULE (The National Obesity Observatory, 2011).

Exercise professionals need to:



Brief: Motivational interviewing (MI)

Where time is often limited, a more succinct approach to MI may be required (Miller and Rollnick, 2002).

A short 'menu' of communication skills and strategies can be carried out in sequence and, with practice and confidence, these techniques can be performed quickly and congruently in single sessions as brief as 10 minutes. Some of these components are as follows:

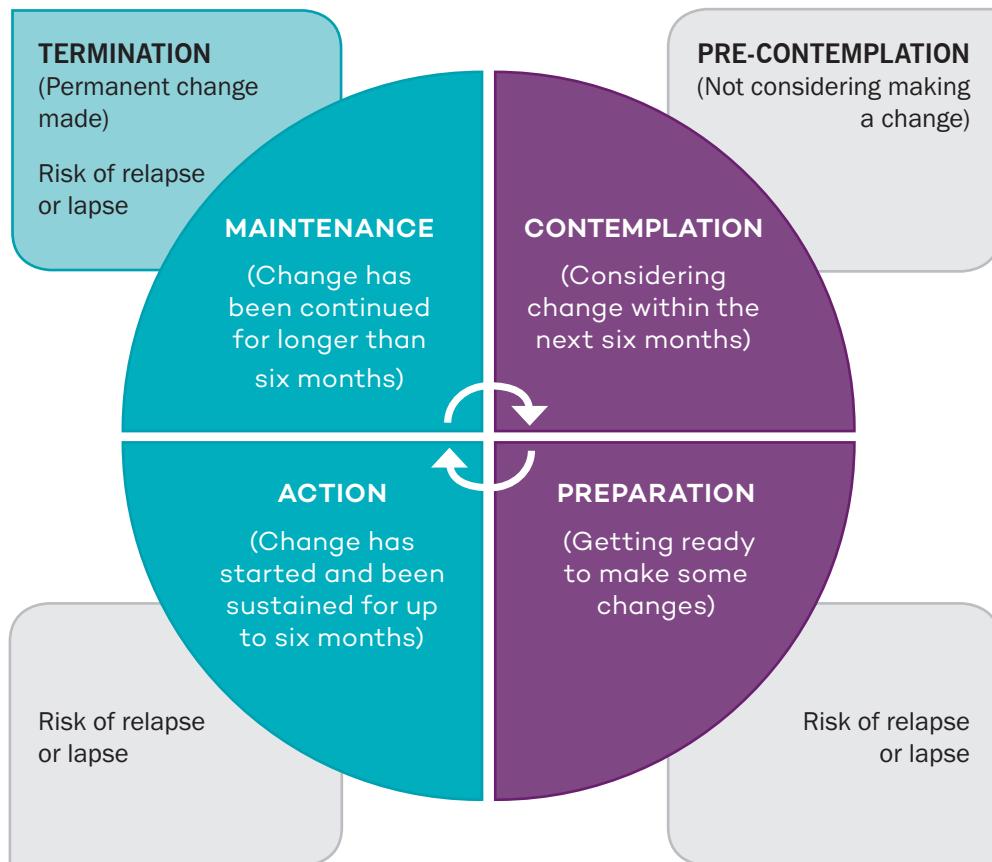
1. **Building rapport** establishes a relationship of mutual understanding, trust and agreement.
2. **Opening the discussion and setting an agenda** gives the client the opportunity to revise the agenda, emphasising their freedom of choice and seeking agreement to proceed.
3. **Assessing readiness to change** encourages the client to begin thinking and talking about their readiness to exercise.
4. **Tailored intervention** uses specific MI strategies based on the client's readiness to change, e.g. open-ended questions, brainstorming, and option-setting.
5. **Closing the session** requires the exercise professional to summarise the outcomes of the session using a positive communication style.

4. Awareness of psychological state of change

The information collected during a motivational interview can indicate where the client is in relation to the stage of the model and their psychological state of readiness.

From an exercise professional's perspective, this information enables them to identify and provide the appropriate support and interventions to help the client navigate and make the choices they need to make to work towards their own goals (Lawrence and Barnett, 2006).

The transtheoretical model (TTM)



Stages of change

It is important to be aware of the different stages and to develop strategies that facilitate the client's progress throughout each step.

The role of the instructor is to:

- Identify where the client falls within the change cycle (their psychological readiness).
- Provide support for their processes by using appropriate cognitive (thinking) or behavioural (action) strategies.

Pre-contemplation

At this stage, clients are inactive and have no serious intention of starting an exercise programme. It requires the instructor to develop an interest by ensuring information is readily available. This information should use clear, simple messages and easily comprehensible language. The instructor should also educate the client, offer incentives and banish any myths and preconceptions. It is their responsibility to be a suitable role model and offer instructions on the next move.

Contemplation

At this stage, the client is still inactive but intent on starting an exercise programme within six months. At this point, the instructor provides realistic goals, a choice of enjoyable activities, flexible activity packages and short-term ideas for stimulating interest and uptake.

Preparation

During this stage, clients are planning to make specific changes or experimenting with small changes. It is the point at which they're ready for change.

Action

This stage is the most important in terms of offering feedback and support, as it tends to be the most difficult time. Clients start to see and feel changes in their body and health but may reach a plateau and need motivation to carry on.



The TTM is a cyclical process; clients may move forwards or backwards (lapse) through the cycle, or even leave it (relapse). A person might need to travel through the stages of the cycle a number of times before permanent behavioural changes are achieved.

Maintenance with a risk of relapse

This stage requires motivation, support, goal reinforcement and monitoring; it is the most unstable stage, as motivation can be difficult to maintain at the required levels. The instructor might wish to encourage the use of fitness diaries to ensure adherence.

Relapse

At this point, the instructor would need to redefine goals and offer more support than before to prevent relapse or to redirect clients who have relapsed back to the 'action' stage.

ACTIVITY

Choose five people you know, taking what you have learnt from the information above. Identify which stage of the TTM each person is at and justify your reasoning as to why they are at this stage.

Strategies for supporting change

The strategies that can be used to help the client make changes involve:

Cognitive reframing: This is the process of changing negative experiences and thoughts into more positive ones through rational thinking, as opposed to irrational thinking. The main point of cognitive reframing is to find a more positive interpretation, view or experience of unexpected adverse events, concepts or even ideas that are disliked. With cognitive reframing, the client challenges themselves to illuminate positive sides of challenging situations, avoid seeing only the negative and identify a brighter narrative of what is happening.

Understanding to application

It should be considered that some clients, possibly due to low confidence and self-efficacy, may have difficulty in setting goals and may often express goals in a negative way.

In these situations, the exercise professional can adopt a different approach that engages the client outside of fixed patterns of thought and moves them towards a proactive way of thinking.

One of the most simple and elegant ways of doing this is to use **positive questioning** and **presupposition**, which, when used effectively, can form the basis for further goal-setting discussions.

Consider the following example of an instructor-client dialogue:

Instructor: 'What's an important goal for you?'

Client: 'Well...I don't want to feel embarrassed about my body anymore and I hate the feeling of breathlessness just walking up the stairs, it makes me anxious about doing any kind of exercise' (The client expresses their goal in a negative way.)

Instructor: 'OK. Let's imagine you woke up tomorrow with the body shape you are not embarrassed about and you feel fit and healthy – what would you do differently?'

(The instructor acknowledges the negative goal and reframes the question to elicit a positive goal instead. This question also makes use of a **presupposition**, i.e. it presupposes that the client will act differently in the absence of anxiety and embarrassment. This forces the client to begin to create options, which can become the basis for positive goals.)

Client: 'Well, I would definitely start swimming regularly again and would feel more confident going out with my friends.' (The client has re-stated their goals in a more positive way, and in a way that is action-orientated, i.e. they are now beginning to take responsibility for their own health and fitness. These 'performance-based' goals can now be further modified to form 'process-orientated' goals.)

Taking action (behavioural strategies): This is the process of deciding what is going to happen in order to implement new behaviours that will support the expectations of the client, i.e. what needs to happen for these expectations to become reality.

In the early and contemplative stages, the focus is on cognitive strategies and reframing clients' thinking – increasing their motivation to exercise and be more active. This process can incite the client to explore the reasons why they think they should exercise and be more active (their 'motivation to change' talk).

Once the client has decided to make a change and become more active, the focus shifts to behavioural and action strategies, such as goal-setting and how they can achieve them. This process includes cognitive strategies for supporting the change, such as discussing possible ways in which they could achieve their goal and how they can make it happen (their change and action talk).



| Stage | Attitude | Intervention |
|--------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pre-contemplation | <ul style="list-style-type: none"> Denial of need to change. Resistant. 'I don't like exercise.' 'I don't need to exercise.' | <ul style="list-style-type: none"> Facilitate conversation. Use active listening skills. Provide information handouts on the benefits of exercise and ways of increasing activity levels. |
| Contemplation | <ul style="list-style-type: none"> Considering making changes. Managing internal conflicts of barriers against motivations. 'I know I need to start exercising.' | <ul style="list-style-type: none"> Facilitate conversation. Use active listening skills. Explore the client's motivations and barriers to get a decision balance. |
| Preparation | <ul style="list-style-type: none"> Small changes have been made. 'I have joined the gym.' | <ul style="list-style-type: none"> Use active listening skills. Offer praise and encouragement for small changes. Implement goal-setting. Explore additional support systems. Explore rewards and incentives. Explore relapse prevention strategies. |
| Action | <ul style="list-style-type: none"> Changes have been made (one day to six months). 'I attended my first session.' | <ul style="list-style-type: none"> Use active listening skills. Offer praise and encouragement for changes. Review goals. Explore other possible rewards and incentives. Explore relapse prevention strategies. |
| Maintenance | <ul style="list-style-type: none"> Changes sustained for more than six months. Some coping strategies are in place. 'I'm active on most days now.' | <ul style="list-style-type: none"> Use active listening skills. Offer praise and encouragement for changes. Review goals. Build the client's confidence. Highlight successes. Discuss triggers for relapse. Increase strategies to prevent relapse. |
| Relapse | <ul style="list-style-type: none"> Return to previous behaviour. 'I haven't been able to get back into my programme since I got back from holiday.' | <ul style="list-style-type: none"> Facilitate conversation. Use active listening skills. Explore causes and triggers. Be empathetic and non-judgemental. Reframe the situation as an opportunity to learn rather than a failure. Discuss re-planning. Offer support to manage the upset; use empathetic listening and reflect any positive changes made. Provide a review and action plan. |

(Lawrence and Bolitho, 2011)

Table 2.2 Stages of change and interventions

Answer the following questions and make notes to revise this section.

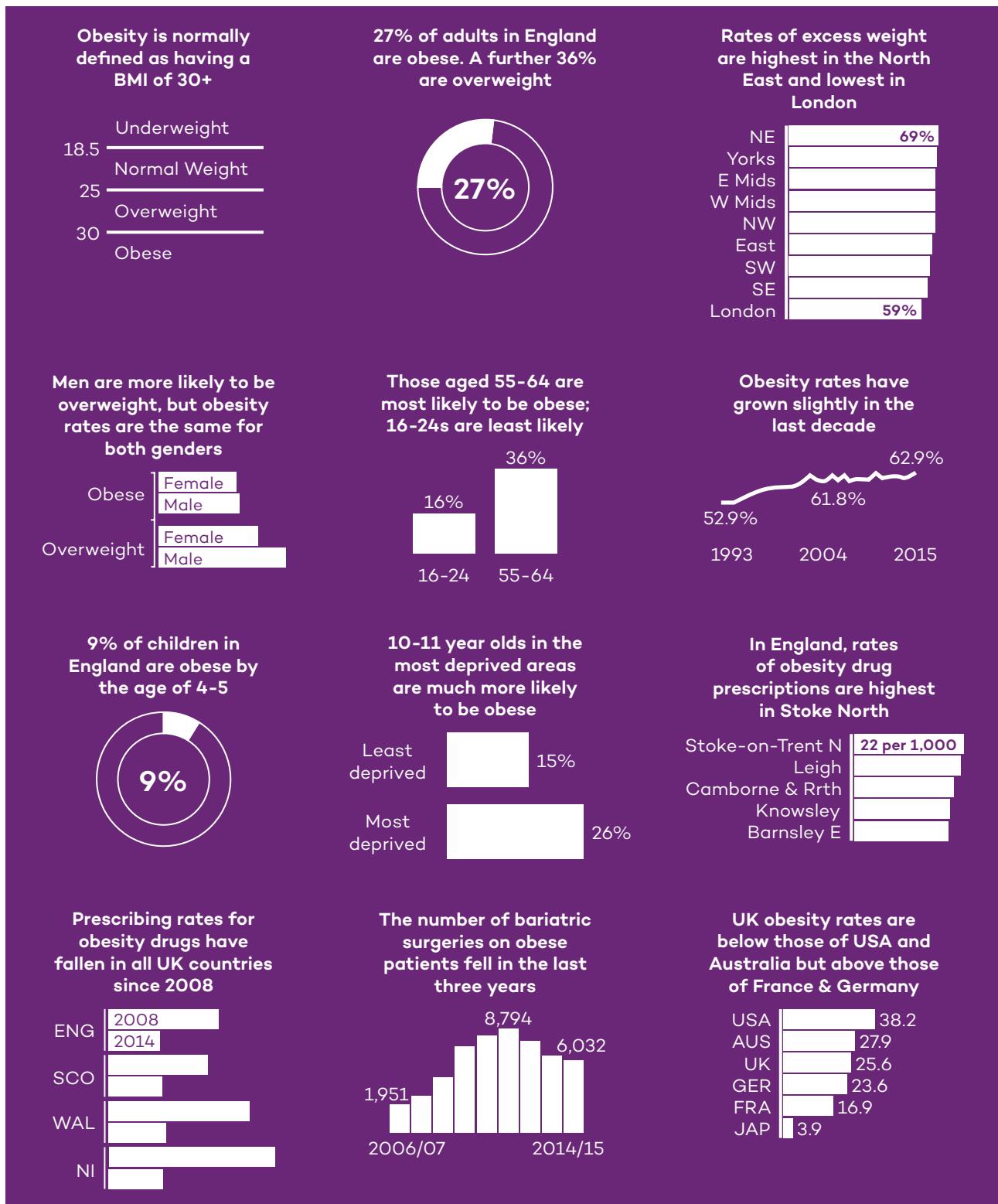
- Why is it important to instil long-term behaviour change in clients?
- What are ‘positive cues’ and what would be an example of one?
- What are the common barriers to exercise adherence?
- What is the difference between an intrinsic and an extrinsic barrier?
- What does ‘SMART’ stand for in goal-setting?
- Why is it important to agree SMART goals with clients?
- What would be an example of a SMART goal for a client?
- Why is it important for clients to take responsibility for their own health and fitness?
- What are the four key consulting skills?
- What is motivational interviewing?
- What are the different stages of the transtheoretical model of change?
- What is cognitive reframing?
- What is the importance of client confidentiality?
- What other professionals might a fitness instructor need to share client information with?

Notes

Section 3: The importance of a healthy lifestyle

Current prevalence of obesity in the UK

27% of adults in England are obese and a further 36% are overweight. A summary of the most recent findings can be found below:



House of Commons briefing paper – Obesity statistics, 2017



Defining obesity

The most widely used measure of obesity is Body Mass Index (BMI), which is explained earlier in this unit. A person is classified as obese if their BMI is 30 or higher. A BMI of 40 or more is often known as 'morbid obesity'.

Health risks associated with obesity

Public Health England, which was set up by the Department of Health to protect and improve the nation's health and wellbeing and reduce health inequalities, identifies the following health risks associated with being overweight and obese:

- Joint problems.
- Low back pain.
- Hypertension (high blood pressure).
- Depression and anxiety.
- Type 2 diabetes.
- Coronary heart disease and stroke.
- Deep vein thrombosis.
- Menstrual abnormalities.
- Erectile dysfunction.
- Respiratory problems.
- Endometrial, breast and colon cancer.

The snowball effect of obesity on health

Over a period of time, due to a poor diet and reduced physical activity, a client may become overweight and eventually obese; this may lead to body-conscious feelings and avoidance of any kind of exercise, which may in turn lead to stiffness in joints and further reduce physical activity levels. This may lead to heart and respiratory problems, which may lead to mental health problems caused by anxiety over feeling short of breath when moving and depression due to lack of social life. These may drive the client to comfort eat more highly palatable foods, which may cause type 2 diabetes.

The cost of obesity-related conditions to the NHS is estimated at £2.5billion per year, and the cost to the economy through sickness is estimated at £3.6billion per year.

Health benefits associated with lifestyle behaviours

There are many benefits of adopting a healthy lifestyle, which includes regular physical activity and exercise, healthy eating, getting sufficient sleep and a positive work-life balance.

| Benefits of a healthy lifestyle |
|----------------------------------------|
| Improved quality of life. |
| Increased life expectancy. |
| Improved mood and self-esteem. |
| Reduced risk of illness and disease. |
| Weight loss and management. |
| Increased independence in older age. |

BMI was designed and intended as a convenient means of assessing population wide obesity statistics and serves this purpose very well. However, it may not be effective in identifying obesity in all individuals as it does not consider body composition, i.e. fat and muscle mass. For example, some bodybuilders would be considered obese on the BMI chart, however their body fat percentage could be less than 10%.

The effect of physical activity on the causes of chronic health conditions

Physical activity and exercise have a specific impact on many of the modifiable risk factors that contribute to cardiovascular disease (CVD).

- It contributes to weight management (achievement and maintenance of weight loss) and reduces the risk of obesity.
- It maintains optimal blood pressure.
- It improves cholesterol levels.
- It prevents or delays the development of type 2 diabetes.
- It facilitates stress management and reduces stress levels.
- It helps with smoking cessation (activity can be a replacement and more positive activity for some smokers).

Table 3.1 outlines the effects of physical activity on the causes of various chronic health conditions.

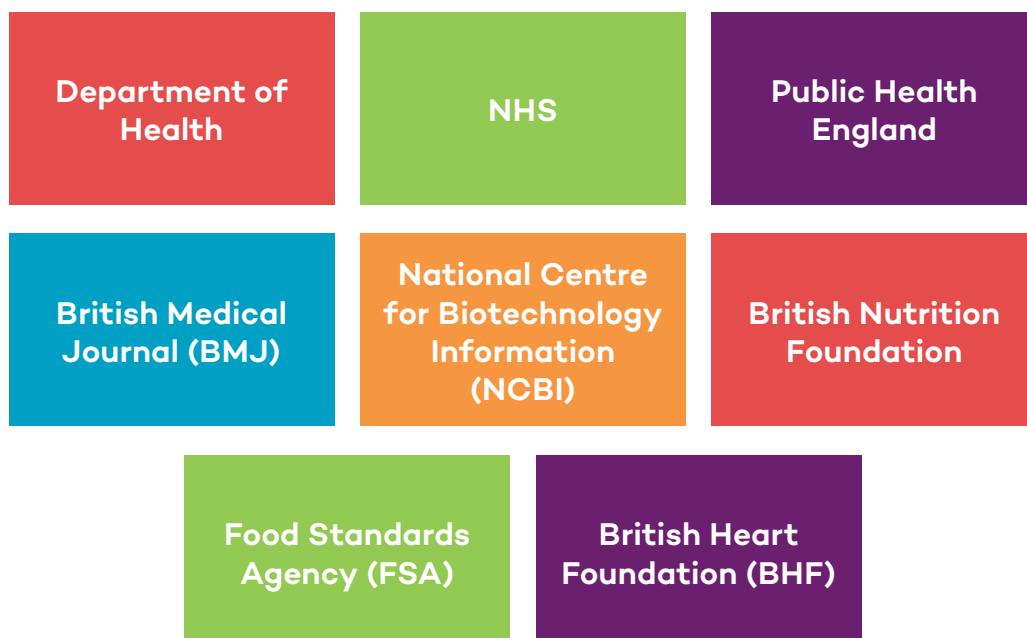
| Chronic health condition | Effects of exercise on causes |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Hypertension High blood pressure increases the risk of CVD and stroke. | <ul style="list-style-type: none"> • Helps to reduce and normalise mild hypertension. • Prevents age-related increases in blood pressure (longevity of exposure risk). • Helps with stress and weight management (risk factors for developing hypertension). |
| Hypercholesterolaemia High levels of blood cholesterol, specifically high levels of low density lipoproteins (LDLs), are considered one of the major risk factors for death from coronary heart disease (CHD). | <ul style="list-style-type: none"> • Offers a preventative effect. • Increases high density lipoprotein (HDL) levels, which reduces the risk of CHD. • Decreases LDL levels. • Decreases overall cholesterol levels. • Reduces other modifiable cardiovascular disease risk factors. |
| Diabetes Diabetes is linked with CHD, obesity, hypertension and hypercholesterolaemia; 50% of people with diabetes will die from CHD. | <ul style="list-style-type: none"> • Offers a preventative effect. • Reduces the risk of developing type 2 diabetes. • Helps with the management of glycaemic and blood sugar levels. • Improves insulin sensitivity. • Assists weight management; carrying excess weight can contribute to the onset of type 2 diabetes. |
| Obesity Obesity is linked with increased risk of CVD and loss of independence. | <ul style="list-style-type: none"> • Offers a preventative effect. • Assists weight management. • Increases caloric expenditure. • Increases resting metabolic rate. • Helps to reduce body fat. • Reduces other CVD risk factors. |
| Osteoarthritis Osteoarthritis is the most common joint disease and nearly every person over the age of 60 has affected joints (Department of Health, 2007). | <ul style="list-style-type: none"> • Has a preventative effect. • Improves range of movement. • Improves joint and muscle strength. • Nourishes cartilage (synovial fluid). • Reduces stiffness and pain. • Improves functioning and reduces disabling effects. |
| Osteoporosis Osteoporosis increases the risk of fracture (from falls) in frail older adults. The two primary risks for osteoporosis are peak bone mass and bone loss. | <ul style="list-style-type: none"> • Helps to develop peak bone mass (being active in formative years, up to age 30, will help to develop bone strength and reduce bone loss in later years). • Maintains bone mass in pre-menopausal women. • Reduces the rate of bone loss post menopause. • Improves strength, coordination and balance and will help to reduce the risk of falls and bone fractures in people diagnosed with osteoporosis. |

| Chronic health condition | Effects of exercise on causes |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Low back pain (LBP) <p>80% of the UK population experience LBP at some point in their lives and 31 million working days are lost each year because of the condition (Office for National Statistics, 2013).</p> | <ul style="list-style-type: none"> Prevents the occurrence and recurrence of LBP. Assists rehabilitation. Promotes a return to work. Reduces stress and anxiety, which may contribute to LBP. |
| Anxiety and depression <p>It is estimated that around one in four people experience a mental health condition every year in the UK.</p> | <ul style="list-style-type: none"> Reduces the risk of clinical depression. Helps with stress management. Provides a distraction from negative thinking patterns and worries. Offers an opportunity for socialising, which can reduce isolation. Helps to manage physical co-morbidities and reduces other CVD risk factors. Can be as successful as psychotherapy and medication in the longer term (Department of Health, 2014). Reduces anxiety and improves mood, self-esteem, confidence and body image. |
| Cancer <p>In England, approximately 300,000 people are diagnosed with cancer every year – equivalent to 822 per day – with more than 120,000 dying from the disease (Department of Health, 2014).</p> | <ul style="list-style-type: none"> Reduces the overall risk. Has a preventative effect against colon cancer. Reduces the risk of breast cancer in post-menopausal women. By reducing the risk of obesity, it offers a secondary preventative effect against cancer (Department of Health, 2014). |

Table 3.1 The effects of physical activity on the causes of various chronic health conditions

Credible sources of information

It is important to source credible, evidence-based information about health and wellbeing to support clients in improving their health and fitness. Always consider carefully where the information has come from – does the writer have a vested interested in the outcome, e.g. are they looking to sell you something? Some examples of credible resources include:



Revision activities

Answer the following questions and make notes to revise this section.

- What measurement is most widely used to define obesity?
- What health risks are associated with obesity?
- What health benefits are associated with adopting positive lifestyle behaviours?
- Identify eight credible sources of evidence-based information to support clients in improving their health and fitness.