UV20525

Principles of exercise, fitness and health

It is the aim of this unit to develop your knowledge and understanding of safe and effective exercise for a range of clients, the health benefits of physical activity and the importance of healthy eating.

Level

2

Credit value

4

GLH

28

Observation(s)

0

External paper(s)

1

Principles of exercise, fitness and health

Learning outcomes

On completion of this unit you will:

1. Understand the effects of exercise on the body
2. Understand the components of fitness
3. Understand how to apply the principles and variables of fitness to an exercise programme
4. Understand exercise contra-indications and the key safety guidelines for special populations
5. Understand how to safely monitor exercise intensity
6. Understand the health benefits of physical activity
7. Understand the importance of healthy eating

Evidence requirements

1. *Knowledge outcomes*
   There must be evidence that you possess all the knowledge and understanding listed in the 'Knowledge' section of this unit. This evidence may include projects, assignments, case studies, reflective accounts, oral/written questioning and/or other forms of evidence.
2. *Tutor/Assessor guidance*
   You will be guided by your tutor/assessor on how to achieve learning outcomes and ranges in this unit. All outcomes must be achieved.
3. *External paper*
   Knowledge and understanding in this unit will be assessed by an external paper. **There is one external paper that must be achieved.**

Developing knowledge

Achieving knowledge outcomes

You will be guided by your tutor and assessor on the evidence that needs to be produced. Your knowledge and understanding will be assessed using the assessment methods listed below:

- Observed work performance
- Witness testimony/statements
- Audio-visual media
- Evidence of prior learning or attainment
- Written questions
- Oral questions
- Assignments
- Case studies
- Professional discussion
- Employer-provided question papers and tests
- E-assessment.

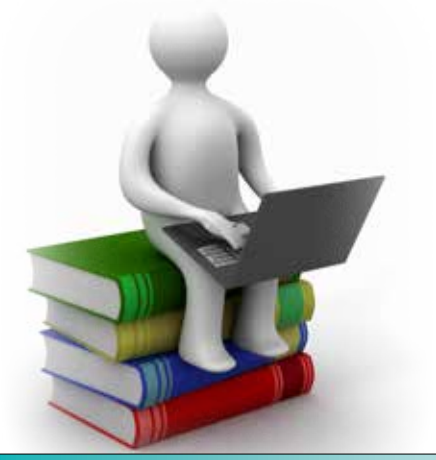
Achieving the external paper

The external paper will test your knowledge of all criteria in this section. **A pass mark of 70% must be achieved.**

Your assessor will complete this table when the 70% pass mark has been achieved.

Paper	Date achieved	Assessor initials
1 of 1		

Knowledge



Outcome 1

Understand the effects of exercise on the body

You can:	Portfolio reference / Assessor initials*
a. Describe cardiovascular and respiratory adaptations to endurance/ aerobic training	
b. Identify the short and long term effects of exercise on blood pressure	
c. Describe the 'blood pooling' effect following exercise	
d. Describe the effects of exercise on bones and joints including the significance of weight bearing exercise	
e. Describe Delayed Onset of Muscle Soreness (DOMS)	
f. Identify exercises or techniques likely to cause DOMS	
g. Describe the short and long term effects of different types of exercise on muscle	
h. Describe different exercises that can improve posture	

**Assessor initials to be inserted if orally questioned.*

Outcome 2

Understand the components of fitness

You can:	Portfolio reference / Assessor initials*
a. Define the components of health related fitness	
b. Define the components of skill related fitness	
c. Identify the factors that affect health and skill related fitness	

**Assessor initials to be inserted if orally questioned.*

Outcome 3

Understand how to apply the principles and variables of fitness to an exercise programme

You can:	Portfolio reference / Assessor initials*
a. Describe the physiological implications of: • specificity • progressive overload • reversibility • adaptability • individuality • recovery time	
b. Explain the principles of FITT (Frequency, Intensity, Time and Type)	
c. Explain the principles of a progressive training programme in developing components of fitness	
d. Explain how to recognise when and how to regress a training programme	
e. Explain the principles of adaptation, modification and progression for each component of FITT	
f. Describe the effect of speed on posture, alignment and intensity	
g. Describe the effect of levers, gravity and resistance on exercise	
h. Describe the differences between programming exercise for physical fitness and for health benefits	

**Assessor initials to be inserted if orally questioned.*

Outcome 4

Understand exercise contra-indications and the key safety guidelines for special populations

You can:	Portfolio reference / Assessor initials*
a. Describe the exercise contra-indications and key safety guidelines for working with older people (aged 50+)	
b. Describe the exercise contra-indications and key safety guidelines for working with antenatal and postnatal clients	
c. Describe the exercise contra-indications and key safety guidelines for working with young people (aged 14-16)	
d. Describe the key safety considerations for working with disabled people	

**Assessor initials to be inserted if orally questioned.*

Outcome 5

Understand how to safely monitor exercise intensity

You can:	Portfolio reference / Assessor initials*
a. Describe the benefits and limitations of different methods of monitoring exercise intensity including: • the talk test • Rating of Perceived Exertion (RPE) • heart rate monitoring and the use of different heart rate zones	

**Assessor initials to be inserted if orally questioned.*

Outcome 6

Understand the health benefits of physical activity

You can:	Portfolio reference / Assessor initials*
a. Describe the health benefits of physical activity	
b. Describe the effect of physical activity on the causes of certain diseases including: • coronary heart disease • some cancers • type 2 diabetes • hypertension • obesity • osteoporosis	

**Assessor initials to be inserted if orally questioned.*

Outcome 7

Understand the importance of healthy eating

You can:	Portfolio reference / Assessor initials*
a. Describe the national food model/guide	
b. Describe key healthy eating advice that underpins a healthy diet	
c. Explain the importance of adequate hydration	
d. Explain professional role boundaries in relation to offering nutritional advice	
e. Explain the dietary role of the key nutrients	
f. Identify the common dietary sources of the key nutrients	
g. Describe the energy balance equation	
h. Explain the health risks of poor nutrition	

**Assessor initials to be inserted if orally questioned.*

Unit content

This section provides guidance on the recommended knowledge and skills required to enable you to achieve each of the learning outcomes in this unit. Your tutor/assessor will ensure you have the opportunity to cover all of the unit content.

Outcome 1: Understand the effects of exercise on the body

Adaptations to endurance training: Cardiovascular (improved oxygen transport, increased heart size, increased stroke volume, decreased resting heart rate, increased cardiac output, improved blood flow distribution, increased blood volume, capillarisation, decreased blood pressure, respiratory (improved pulmonary ventilation, improved pulmonary diffusion, arterial-venous oxygen difference, decreased resting breathing rate, increased lung capacity).

Effects of exercise on blood pressure: Short term effects of exercise (no change in diastolic pressure, progressive increase in systolic pressure), long term effects of exercise (reduction in overall resting blood pressure, improved regulation of overall blood pressure).

Blood pooling: In the extremities, venous return (skeletal muscle pump, non-return valves), associated risks (dizziness, fainting), prevention of blood pooling through progressive cool down.

Effects of exercise on bones and joints: Improved bone density, increased joint stability, improved mobilisation and range of motion at joints, significance of weight bearing exercise (bone structure, ageing and osteoporosis), types of weight bearing exercise (walking, running, resistance training), potential risk of injury.

Effects of exercise on muscles: Short term (increased contractility, increased excitability, increased elasticity, increased energy metabolism, heat generation), long term effects of aerobic exercise (increased concentration of aerobic enzymes, increased size and number of mitochondria, increased ability to use fat as an energy source, increased storage of muscle glycogen, increased supply of intramuscular fat), hypertrophy (increase in muscle mass and cross-sectional area, possible increase in number of muscle fibres, increased motor unit recruitment).

Delayed onset of muscle soreness (DOMS): Structural muscle damage (microscopic fibre tears, muscle cell leakage), effects of eccentric muscle contra-actions, causal exercises and techniques (e.g. plyometrics, eccentric resistance training, isometric training, downhill running, higher than normal exercise intensity).

Exercises to improve posture: Floor based core stability exercises, equipment based core stability exercises, exercise starting positions (standing, seated, lying prone, lying supine, lying sideways, hand and knees), equipment (swiss ball, stability discs, cable machines), other functional multi-joint exercises, progression of exercises (resistance through levers and external, combined movements, rate and speed of movement, repetitions, range of motion), technique consideration (correct pelvic tilt, neutral spine, engaging core muscles).

Outcome 2: Understand the components of fitness

Components of fitness: Definitions of health related fitness components (cardiovascular endurance, muscular endurance, muscular strength, flexibility, body composition), definitions of skill related fitness components (speed, power, agility, balance, co-ordination, reaction time), importance of fitness components for different activities.

Factors affecting fitness: Genetics, gender, age, body type, training status, lifestyle factors (nutrition, smoking, alcohol, drugs, rest, stress).

Outcome 3: Understand how to apply the principles and variables of fitness to an exercise programme

Principles and variables of training: Definitions (specificity, progressive overload, reversibility, adaptability, individuality, recovery time), associated physiological implications, application for each component of fitness.

FITT principles: Definitions for health and fitness (Frequency, Intensity, Time, Type), American College of Sports Medicine (ACSM) standard guidelines (application for each component – cardiovascular health, cardiovascular fitness, muscular strength and endurance, flexibility, physical activity).

Progression of a training programme: Training needs analysis, specificity, adaptation, overload, recovery (adaptation), reversibility, ACSM progression guidelines using FITT principles, SMART goal setting (Specific, Measurable, Achievable, realistic, Time bound).

Regression of a training programme: Causes of overtraining (inadequate recovery, overparticipation in competition, repetitive and boring training, consistent high intensity, high levels of non-training stress), recognising signs and symptoms of overtraining (condition and performance, psychological, movement co-ordination), periodisation through manipulation of training principles and variables (intensity, volume), guidelines for prevention and recovery of overtraining, importance of rest and recovery.

Effect of speed: Slow exercise speed (allows strict posture, allows accurate alignment), faster exercise speed (increases intensity, increases potential for injury risk, increases potential for improper posture and alignment).

Effect of levers, gravity and resistance: Levers during exercise, effects of levers on exercise (speed of movement, force generation, range of motion, torque loads), gravity (speed and control of eccentric movements, power generation), resistance (intensity, speed of movement).

Exercise programming differences: Differences between programming for health and physical fitness, reasons for differences.

Outcome 4: Understand exercise contra-indications and the key safety guidelines for special populations

Exercise contra-indications and key safety guidelines for older adults (50+): Clients (screened and asymptomatic, little or no experience of the type of exercise, only 1% of the 50+ population is highly trained, activity levels are low and decline with age, 1-2% loss in physical components of fitness each year), contra-indications (loss of physiological and psychological function, poor functional status, signs and symptoms of a potentially serious disease, sensory and cognitive declines), safety guidelines (undertake a pre-exercise health screening, refer to other professionals if required, undertake longer and more gradual mobility and warm-up, undertake a gradually tapered cool down, exercise intensity must be at a challenging but health related level, use RPE scale to monitor intensity, emphasise correct exercise technique, increase duration of transitions, simplify exercise when required, learn new exercises at the most basic level, avoid extreme spinal flexion).

Exercise contra-indications and key safety guidelines for antenatal and postnatal women: Clients (normal and healthy adult women, normal and healthy pregnancy, normal and healthy birth, previously normal and healthy pregnancies and births), contra-indications (injury, joint misalignment, muscle imbalance, motor skill decline, embolism, thrombosis, haemorrhage, pelvic floor dysfunction, neck and shoulder pain, experiencing other pregnancy related symptoms), safety guidelines (non-exercisers should begin with 15 minutes continuous aerobic activity gradually increasing to 30 minutes, do not exceed 45 minutes duration, maintain adequate hydration and calorie intake, avoid exercising in hot and humid conditions, use the RPE scale to monitor intensity not heart rate, avoid supine exercise after 16 weeks of pregnancy, avoid prone exercise, avoid prolonged motionless standing, avoid heavy isometric or overhead resistance exercise, avoid leg adduction and abduction against resistance, avoid loaded forward flexion, avoid rapid changes of direction, avoid uncontrolled twisting or ballistic movements, avoid risk of falling or trauma, avoid high intensity or impact exercise, re-educate post-birth women on posture and joint alignment before progressing, avoid crunching and twisting abdominal exercises, babies should be excluded from the exercise area, ensure instructor's first aid skills are up-to-date, follow exercise guidelines for trimesters of pregnancy,

Exercise contra-indications and key safety guidelines for young people (aged 14-16): Clients (screened and asymptomatic, apparently healthy young people), contra-indications (stage of growth and development, musculoskeletal injuries), safety guidelines (wear appropriate clothing and footwear, undertake a gradual warm up and cool down, avoid heavy resistance exercises, use RPE to monitor exercise intensity, resistance training should use light weights and high reps, emphasise correct exercise technique, avoid ballistic stretching, ensure adequate hydration and calorie intake).

Exercise contra-indications and key safety guidelines for disabled people: Contra-indications (impaired physical condition and function, impaired motor skills, impaired neurological or cognitive function, impaired sensory

Outcome 4: Understand exercise contra-indications and the key safety guidelines for special populations (continued)

function, musculoskeletal imbalances and postural deviations), safety guidelines (undertake exercise in a safe and supportive environment, make reasonable adjustments to enable access, refer to other professionals if required, adapt exercise for the disability, provide specialist assistance if required, incorporate functional and life related movement, use specialist equipment if required).

Outcome 5: Understand how to safely monitor exercise intensity

Methods of monitoring exercise intensity: Talk test, visual signs, rating of perceived exertion (RPE), heart rate monitoring, using different heart rate training zones (for health benefits, for specific fitness improvements), benefits and limitations of methods (specific clients needs, safety, practicality, reliability, validity).

Outcome 6: Understand the health benefits of physical activity

Health benefits of physical activity: Reduced early mortality, reduced morbidity (coronary heart disease, diabetes), improved mental health and psychological wellbeing (anxiety, depression, stress, mood), cardio-protective mechanisms, improved weight management and body composition, improved posture, prevention of lower back pain, reduced risk of injury, improved joint stability, increased bone density, improved ability to perform active daily living tasks.

Effect of physical activity on disease causes: Coronary heart disease (reduced blood pressure, improved blood cholesterol profile, improved elasticity of blood vessels, capillarisation, improved blood flow distribution), some cancers (reduced stress and lifestyle changes), type 2 diabetes (improved regulation of insulin, improved blood glucose regulation), hypertension (reduced blood pressure, improved blood flow distribution, improved elasticity of blood vessels, reduced muscular tension, reduced stress level), obesity (improved fat metabolism, increased calorie expenditure), osteoporosis (increased bone formation, improved density, improved posture, reduced risk of injury).

Outcome 7: Understand the importance of healthy eating

Healthy eating: Principles of a healthy balanced diet, National Food Guide, Food Standards Agency (FSA), eat well plate (balance of good health), Government Department of Health 'five a day' recommendation.

Importance of hydration: Type of drink, intake quantity, timing of intake, importance (maintain body balance/ homeostasis, maintain body processes and functions, maintain physical and mental performance).

Professional role boundaries: Code of Ethics, when to refer to GP or dietary professionals (obesity, malnutrition, excessively underweight, eating disorders).

Key nutrients: Macronutrients (carbohydrates, fats, proteins), micronutrients (water soluble vitamins C and B, fat soluble vitamins A, D, E and K), minerals (calcium, copper, iron, magnesium, phosphorus, potassium, sodium, selenium, zinc), water.

Dietary role of key nutrients: Carbohydrate (energy, digestion, nervous system function), fats (provide essential fatty acids, insulation, protection of vital organs, energy, transport fat-soluble vitamins), protein (muscle growth, muscle repair, oxygen transport, fight disease, energy), vitamins (energy metabolism, protein synthesis, glycogen synthesis, blood clotting, red blood cell formation, aid growth, maintenance of teeth and bones, aids vision), minerals (bone growth, teeth growth, energy production, enzyme function, nerve and muscle function, water balance, blood clotting, oxygen transport in red blood cells), water (maintain hydration, maintain homeostasis, heat regulation, maintain blood plasma volume, removal of waste products).

Dietary sources of the key nutrients: Simple carbohydrates (sugar, sweets, chocolate, fruit), complex carbohydrates (beans, bread, pasta, potatoes, rice, corn), fats (meat, dairy products, processed foods cakes, biscuits, pies, oils), protein (meat, fish, eggs, dairy products, grains, beans, leafy vegetables), vitamins (vegetables, fruit, milk, fish, eggs), minerals (milk, nuts, vegetables, meats).

Energy balance equation: Energy needs for different activities, energy intake, energy expenditure, positive energy balance, negative energy balance, basic metabolic rate (BMR), physical activity levels, calculating energy intake and expenditure.

Health risks of poor nutrition: Obesity, diabetes, malnutrition, heart disease, stroke, osteoporosis, cancer, poor circulation, hypertension, arthritis, mental health problems (depression, anxiety, low self image).