

SkillsActive Exercise and Fitness NOS Core Knowledge Requirements

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This Exercise and Fitness NOS Core Knowledge Requirements document contains underpinning core knowledge requirements that could not be included within the National Occupational Standards templates but are required by the sector

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SkillsActive Exercise and Fitness Core Knowledge Requirements

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SkillsActive Exercise and Fitness Core Knowledge Requirements

Instructing Exercise and Fitness

The following Exercise and Fitness Core Knowledge Requirements underpin the below NOS:

SKAEF1	Health, safety and welfare promotion in active leisure and recreation
SKAEF2	Assist participants to develop and maintain the motivation to adhere to exercise and physical activity
SKAEF3	Plan and prepare gym-based exercise
SKAEF4	Instruct and supervise gym-based exercise
SKAEF5	Plan and prepare group exercise
SKAEF6	Instruct group exercise
SKAEF7	Plan and prepare group exercise, movement and dance
SKAEF8	Instruct group exercise, movement and dance
SKAEF9	Plan and prepare water-based exercise
SKAEF10	Instruct water-based exercise
SKAEF11	Plan health related exercise and physical activity for children
SKAEF12	Instruct children in health related exercise and physical activity

Exercise and Fitness Generic Core Knowledge Requirements

1. Health benefits of physical activity and risks of inactivity
2. Healthy eating
3. The components of fitness
4. The principles and variables of fitness training
5. The anatomy and physiology of the heart, lungs and circulatory systems in relation to exercise
6. The skeletal system in relation to exercise
7. The muscular system in relation to exercise
8. Energy systems in relation to exercise
9. The nervous system in relation to exercise
10. Stabilisation of the body during exercise
11. Duty of Care (law of tort in England, or law of delict in Scotland) and professional role boundaries in relation to special populations
12. Antenatal and postnatal women
13. Older people
14. Disabled people
15. Young people
16. How to safeguard children and vulnerable adults

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1. Health benefits of physical activity and risks of inactivity

1.1 General benefits of physical activity:

- physical benefits, such as reduced blood pressure, improved body composition, reduced risk of certain diseases including coronary heart disease (CHD), some cancers, Type 2 Diabetes, Hypertension, Obesity and Osteoporosis
- psychological benefits, such as reduced risk of stress, depression and anxiety

1.2 Key health implications of inactivity, such as obesity, increased incidence of certain diseases as listed in 1.1

2. Healthy eating

2.1 Understanding of the National food guide/model and general healthy eating advice that can be given to clients

2.2 The importance of adequate hydration (water)

2.3 Familiarity with professional role boundaries in relation to offering nutritional advice

3. The components of fitness

3.1 Components of health related fitness (strength, aerobic endurance, muscular endurance, flexibility, body composition) and skill related fitness (agility, balance, coordination, power, reaction time, speed)

3.2 Factors that affect health and skill related fitness

3.3 Differences between programming exercise for physical fitness and health benefits

4. The principles and variables of fitness training

4.1 Physiological implications of:

- specificity
- progression
- overload
- reversibility
- adaptability
- individuality
- recovery time

4.2 The FITT principle (Frequency, Intensity, Time, and Type)

4.2.1 Adaptation and modification of each component of FITT in relation to the principles of training

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- 4.3 How to set, review and revise short, medium and long-term SMART goals
- 4.4 The principles of a progressive training programme in developing components of fitness
- 5. The anatomy and physiology of the heart, lungs and circulatory systems in relation to exercise**
 - 5.1 Location and function of the heart and lungs
 - 5.2 Structure of the heart and how blood is moved through the four chambers of the heart
 - 5.3 Structure of the lungs, the mechanism of breathing (inspiration and expiration) and contraction and relaxation of the muscles involved
 - 5.4 Passage of air through nasal passages, pharynx, larynx, trachea, bronchi, bronchioles, alveoli and capillaries
 - 5.5 Gaseous exchange of oxygen and carbon dioxide in the lungs
 - 5.6 Relative composition of oxygen and carbon dioxide gases in inhaled and exhaled air and the relationship to aerobic respiration
 - 5.7 Systemic and pulmonary circulation to include structure and functions of the arteries, veins and capillaries and how they link to the heart, lungs and muscles
 - 5.8 Short and long term effects of exercise on blood pressure (including blood pressure classifications)
 - 5.9 Venous return and the implications of “blood pooling” on the exercise session
 - 5.10 Different methods of monitoring exercise intensity to include benefits and limitations (talk-test, Rate of Perceived Exertion scale (RPE), heart rate monitoring and the use of different heart rate zones)
 - 5.11 Cardiovascular and respiratory adaptations to endurance/aerobic training
 - 5.12 Exercise implications of the key cardiovascular and respiratory differences between special population groups including children/young people, ante/postnatal and older adults
- 6. The skeletal system in relation to exercise**
 - 6.1 Function of the skeleton (movement - muscle attachments and levers, protection of internal organs, provides shape, red and white blood cell production, mineral storage)
 - 6.2 Structure of the skeleton to include:

Axial skeleton:

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- cranium
- cervical vertebrae
- thoracic vertebrae
- lumbar vertebrae
- sacral vertebrae
- sternum
- ribs
- coccyx
- pubis

Appendicular skeleton:

- scapula
- clavicle
- humerus
- ulna
- radius
- carpals
- metacarpals
- phalanges
- ilium
- ischium
- femur
- patella
- tibia
- fibula
- tarsals
- metatarsals

- 6.3 Classification of bones (long, short, flat, sesamoid, irregular)
- 6.4 Structure of long bone (compact and spongy/cancellous tissue, articular cartilage, epiphysis, diaphysis, periosteum, epiphyseal (growth) plates, bone marrow)
- 6.5 Stages of bone growth and the effects of exercise on bones and joints including:
- the remodelling process and the role of osteoblasts and osteoclasts
 - the significance of weight bearing exercise, hormones, body weight, calcium, vitamin D and the ageing process
 - considerations during childhood/adolescence (growing pains, development of peak bone mineral density, common overtraining/overuse injuries)
 - the effect of pregnancy on joint alignment
- 6.6 The role of tendons, ligaments and cartilage
- 6.7 Acute and chronic effects of exercise on bones and joints (to include the significance of weight bearing exercise)

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- 6.8 Classification of joints (immovable (fibrous), semi-movable (cartilaginous), moveable (synovial))
- 6.9 Structure of synovial joints (articular cartilage, fibrous capsule, joint/synovial cavity, synovial membrane, synovial fluid)
- 6.10 Types of synovial joints and their range of motion (gliding, hinge, ball and socket, pivot)
- 6.11 Joint movement potential and joint actions (flexion, extension, hyperextension, adduction, abduction, circumduction, supination, pronation, plantar flexion, lateral flexion, horizontal flexion, horizontal extension, dorsiflexion)

7. The muscular system in relation to exercise

- 7.1 Types, function and basic characteristics of muscle including cardiac, smooth and skeletal
- 7.2 Structure of skeletal muscle (epimysium, fascicle, perimysium, muscle fibres, endomysium)
- 7.3 Name and location of muscles:
 - pectoralis major
 - deltoids
 - biceps
 - rectus abdominis
 - obliques
 - transversus abdominis
 - trapezius
 - rhomboids
 - triceps
 - latissimus dorsi
 - erector spinae
 - hip flexors
 - quadriceps
 - adductors
 - tibialis anterior
 - gluteals
 - abductors
 - hamstrings
 - gastrocnemius
 - soleus
- 7.4 Structure and function of the pelvic floor muscles
- 7.5 Principles of muscle action (antagonistic pairs, prime mover (agonist), antagonist, synergist, stabiliser and fixator) and the four main types of muscular contractions (concentric, eccentric, isometric, isokinetic)
- 7.6 Joint actions brought about by specific muscle group contractions

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- 7.7 Muscle fibre types and their characteristics including slow twitch - Type 1 (slow oxidative) and fast twitch - Type 2a (fast oxidative glycolytic or FOG) and Type 2b (fast glycolytic or FG)
- 7.8 Delayed onset of muscle soreness (DOMS) and its likely causes
- 7.9 Short and long term effects of different types of exercise on muscle
- 8. Energy systems in relation to exercise**
- 8.1 The use of ingested carbohydrates, fats, and in extreme circumstances, proteins, in the production of energy/ATP
- 8.2 The three energy systems (Phosphocreatine (PCr)/Creatine Phosphate (CP), Lactic acid/anaerobic system, Aerobic system) and a basic understanding of their use in relation to aerobic and anaerobic exercises
- 8.3 The by-products of the three energy systems and their significance in muscle fatigue
- 9. The nervous system in relation to exercise**
- 9.1 Role and basic functions of the nervous system
- 9.2 Principles of muscle contraction (the stimulation of the nervous system to carry an electrical/nervous impulse to muscle to produce movement)
- 9.3 Motor unit recruitment in relation to strength/force of muscle contraction (an overview of the 'all or none law')
- 9.4 How exercise can enhance neuromuscular connections and improve motor fitness
- 10. Stabilisation of the body during exercise**
- 10.1 Posture (curves of the spine, neutral spine alignment, potential ranges of motion of the spine, postural deviations including kyphosis, lordosis, scoliosis and the effect of pregnancy)
- 10.2 Appropriate core stabilisation exercise activities, such as
- floor based exercises
 - exercises using equipment
 - functional movement exercises (e.g. balance, stability, flexibility)
- The importance of progressive core stabilisation exercises
- 10.3 Reasons and procedures for referring on to an appropriate professional

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- 11. Duty of Care (law of tort in England, or law of delict in Scotland) and professional role boundaries in relation to special populations**
- 11.1 Duty of care is the obligation to exercise a reasonable level of care towards an individual, to avoid injury to that individual or his/her property
- 11.2 Duty of care and liability with regard to a breach in duty of care is based upon the relationship between the parties, the negligent act or omission and whether the loss to the individual was reasonably foreseeable
- 11.3 A negligent act is an unintentional but careless act which results in loss
- 11.4 Duty of care is said to be greater when working with vulnerable adults. A vulnerable adult is defined by the UK government as: - “a person aged 18 years or over, who is in receipt of or may be in need of community care services by reason of 'mental or other disability, age or illness and who is or may be unable to take care of him or herself, or unable to protect him or herself against significant harm or exploitation”
- 11.5 Instructors have a greater duty of care to vulnerable clients and any client undergoing a ‘special’ physiological lifespan process that puts them at greater risk of an exercise related event, such as childhood, ageing, ante and postnatal
- 11.6 The acquirement of base knowledge* on special populations (young people, older people, ante/postnatal women and disabled people) as part of core instructor qualifications does NOT qualify instructors to:
- be a specialist instructor in the area, or advertise as such
 - instruct special population clients, 1:1 or in groups, on a regular and/or frequent progressive basis
 - plan a progressive, long-term special populations physical activity programme
- *Base knowledge is the minimum information required to enable an instructor to accommodate appropriately screened and asymptomatic** special population clients within a mainstream studio, aqua or gym exercise session on an occasional basis.
- **Asymptomatic is the term used by the American College of Sports Medicine/American Heart Association (ACSM/AHA) to denote the absence of any of the specified key symptoms of disease (that are considered to put an individual at risk of an adverse event related to participation-during or following-exercise) identified in the Physical Activity Readiness Questionnaire (PARQ) and AHA/ACSM pre-exercise screening tools.
- 11.7 Where appropriate, Instructors should inform clients that they do not have the specialised qualification and training in the adaptation of exercise for special populations and only possess basic knowledge regarding recommended guidelines. Clients should then be given the choice to stay in the session and follow the basic recommended guidelines and/or seek further guidance from an appropriate special populations qualified instructor
- 11.8 Where Instructors find themselves frequently working with special population clients they should endeavour to obtain the relevant qualification/s. Failure to do so could render them in breach of their duty of care

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- 11.9 Instructors should ensure that their insurance policy covers their instruction, however brief, of special population clients

12. Antenatal and postnatal women

This information relates only to normal, healthy, adult women experiencing a normal, healthy, singleton pregnancy, or who have had a normal, healthy birth, and who have had previous normal, healthy pregnancies and births

- 12.1 In most cases exercise is safe for both mother and baby. Exercise at appropriate intensity for the individual concerned is not associated with adverse pregnancy outcome
- 12.2 Women who have not exercised prior to pregnancy should begin with 15 minutes continuous aerobic activity, increasing gradually to 30 minutes continuous low-moderate intensity aerobic activity
- 12.3 Pregnant women should maintain adequate hydration during exercise, avoid exercising in very hot or humid conditions, consume adequate calories, and restrict exercise sessions to no longer than 45 minutes, according to recommended guidelines
- 12.4 Heart rate should not be used to monitor exercise intensity during pregnancy. Women should be advised to exercise according to how they are feeling and encouraged to use the talk-test to monitor appropriate, individual intensity
- 12.5 Pregnant women should avoid:
- exercising in the supine position after 16 weeks of pregnancy; the inclined position is unlikely to be a successful alternative to flat supine
 - exercising prone
 - prolonged, motionless standing
 - overhead resistance exercise
 - 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 de-stabilisation techniques
- 12.6 Pregnant women should stop exercising immediately if they experience:
- dizziness, faintness or nausea
 - bleeding or leakage of amniotic fluid
 - abdominal or contraction type pain
 - unexplained pain in the back, pelvis, groin, buttocks or legs
 - excessive shortness of breath, chest pain or palpitations

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- 12.7 Hormonal and postural changes make pregnant women vulnerable to injury, joint misalignment, muscle imbalance and motor skill decline, especially if they are genetically hypermobile. These changes may start from very early on in pregnancy and gradually become more significant as pregnancy progresses
- 12.8 High intensity or impact exercise in pregnancy and post birth carries the risk of long-term pelvic floor muscle support and control dysfunction
- 12.9 Certain conditions, such as air embolism, thrombosis and haemorrhage, have elevated risk during the first weeks post birth. Women should not begin exercising post birth until they have received the permission of their health care professional, usually at the post-partum 6 to 8 week check
- 12.10 The physiological and postural changes of pregnancy persist post birth for several months, 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 6 months and introduced progressively thereafter
- 12.11 Ideally, post birth, women should be encouraged to re-educate posture, joint alignment, muscle imbalances, stability, motor skills, transversus abdominis muscle recruitment and pelvic floor muscle function before progressing to more vigorous exercise
- 12.12 'Sit up', 'crunch' or 'oblique cross-over' type exercises are not an appropriate choice for abdominal muscle re-education post birth*
- *For at least 12 months post birth, the rectus abdominis is mechanically weaker (Coldron, 2007). Excessive obliques' training may cause downward pressure through the pelvic floor (O'Dwyer 2008) and anatomically will probably cause lateral pull on a weaker linea alba. Transversus abdominis and pelvic floor muscles are unlikely to be recruiting effectively to provide adequate abdominal compression and support
- 12.13 Women in the child-bearing period are habitually forward flexed with shoulder girdle protraction, thoracic kyphosis, long, weak upper back extensors, and short tight pectoral muscles and are prone to neck and shoulder pain
- 12.14 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, low back pain or difficulty walking, even if mild and intermittent
 - abdominal muscle weakness, excessive abdominal doming, abdominal muscle separation or softness/sinking at the umbilical mid-line, umbilical hernia
- 12.15 Babies should not be used as resistance or a weight for exercise and should be excluded from the exercise area
- 12.16 Instructors should be aware that women in the childbearing period are vulnerable to injury, nausea, dizziness and fainting. Instructors should therefore have up to date first aid skills

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13. Older people

This guidance relates to clients aged 50 and over. 50 is the current internationally recognised age at which there is significant reduction in the safety margins relating to exercise and when pre-exercise screening is essential to ensure exercise professionals meet their duty of care.

These best practice guidelines are for 50+ participants who:

- are asymptomatic (i.e. determined by the pre-exercise completion and interpretation of one of the two recommended 50+ pre-exercise Screening Tools namely: Revised PARQ (PARQ-R) or the AHA/ACSM Health/Fitness Facility Pre-participation Screening Questionnaire)
- have little or no recent and frequent experience of the particular exercise modality

Relaxation of these guidelines for highly trained, recently and frequently, physically active asymptomatic individuals in a particular exercise modality is at the client's own risk. However, the instructor needs to be mindful that regardless of the older adult's fitness levels and outward appearance, the ageing process is underway

- 13.1 40 is the approximate age at which the ageing process begins and 50 is the age at which the progressive losses in the musculoskeletal/cardiovascular/neuromuscular systems means that adaptation of exercise needs to be considered
- 13.2 Highly trained individuals in the 50+ age range are a very small and elite group accounting for approximately 1% of the 50+ population
- 13.3 Ageing is not a disease. It is a natural, universal, complex and highly individual process characterised by progressive losses and declines in the function of most physiological and psychological systems and impacts on fitness and safety during exercise. Eventually these losses lead to increased frailty and inability to respond to stress and disease
- 13.4 Functional status at any age depends not only on our age but also on our rate of ageing, health, gender, lifestyle (including our physical activity levels), behaviour and socio-economic influences
- 13.5 Potentially serious disease is increasingly prevalent with increasing age
- 13.6 Activity levels remain low or decrease with increasing age
- 13.7 The losses in each of the body systems (NB from the age of 40) result in a corresponding loss of 1-2% loss per year in physical capacity in:
- muscular strength (fewer, smaller and weaker fibres)
 - power (fewer fast twitch, smaller, weaker and slower)
 - bone density (thinner, more brittle bone and less ability to withstand fracture)
 - aerobic endurance (fewer capillaries, less elastic vessels and reduced intake, uptake and utilisation of oxygen)
 - balance and co-ordination (less sensory input and less postural stability, co-coordinated and less ability to prevent a trip turning into a fall)

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- flexibility, agility and later mobility and transfer skills (stiffer joints, reduced range and ease of movement and less ability to perform activities of daily living (ADLs) such as getting up and down from floor, chairs safely etc.)

In addition, there are:

Sensory declines including:

- reduced motor learning (slower motor learning)
- reduced visual and aural acuity (sight and hearing difficulties)

Cognitive declines including:

- Poorer short term memory

13.8 To be safe (to reduce/minimise the risk of adverse, age-related cardiovascular and articular system events) the following guidelines should be followed for adults age 50+:

- current International guidance (ACSM/AHA) recommends that all people over the age of 50 should complete a recommended pre-exercise health screening questionnaire (PARQ-R or AHA/ACSM) to establish whether they are asymptomatic and ready to participate or whether they should seek further medical assessment prior to participating in an exercise programme
- spend longer warming up and warm up more gradually than younger clients (i.e. to ensure a total of 15 minutes) and begin with moderate shoulder circles before increasing the shoulder range of movement (ROM) and progressing to arm circles etc.) Clients should be advised to do this by taking responsibility for themselves, such as by walking to the session or by coming early and warming up before the session
- build-in a longer, more gradually tapered cool down after the aerobic training. Clients should be advised to do this by taking responsibility for themselves, for example, by keeping going for a few minutes after the rest of the class have stopped and/or are changing to the next activity, such as to prevent/minimise the potential for diverse cardiovascular events
- keep the intensity of all training components to a challenging but health related level, that is, without pain or strain and within their individual 'personal best training zone' by using the talk-test and educating clients on the use of the RPE scale as a means of monitoring and regulating exercise intensity, as required. (NB it should be challenging)

In addition, where appropriate, instructors should encourage 50+ clients to:

- ensure correct technique as it is even more important for injury prevention with this client group
- take more time during transitions, such as floor to standing etc.
- simplify exercise; when correct technique cannot be maintained and risk is increased, such as when any weight bearing steps involving laterally crossing one leg over the other (as in grapevine) are included in a group session, the instructor should use their

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professional judgement (including the client's current physical activity history) before giving suitable alternatives to the older person. An example of this could be adapting the grapevine by bringing the feet together, with turns of more than 90 degrees, breaking it down into stages to prevent dizziness until fitness improves

- learn new exercises with the easiest position and/or the lightest resistance and progress slowly initially
- avoid extreme spinal flexion, such as full or half curl-ups from supine and make abdominal training more challenging and safer for the vertebrae by keeping the neck long and if lifting off the floor, supported by the arm

14. Disabled people

14.1 Many disabled people find they experience barriers to accessing sufficient physical exercise due to psychological, physical or social reasons

14.2 It is widely recognised that regular and planned physical activity in a safe and supportive environment may not only help disabled clients in the same range of ways as for non-disabled clients, but it may also reduce the risk of gaining additional disabling conditions, improve the ability to perform activities of daily living that might previously have been difficult, and maintain or even improve independence

14.3 The Disability Discrimination Act (1995)

It is unlawful to refuse to serve a disabled person, provide a lower standard of service, or offer a less favourable service to a disabled person. For the purpose of the DDA a person has a disability if he/she has a physical or mental impairment which has a substantial and long-term adverse effect on their ability to carry out normal day-to-day activities. Service providers must make "reasonable adjustments" to their facilities and services so that they are accessible to disabled people. Adjustments to buildings and services must be made in expectation of attendance by disabled people; it is not reasonable for disabled people to be asked to wait until adjustments have been made. This may include providing extra help when required, but does not include automatically providing an additional service that is not required.

Exemption from the DDA is justified for the following reasons:

- if by meeting the needs of the disabled person the health and safety of any person, including the disabled person, is endangered
- if by serving the needs of the disabled person the service provider is unable to serve others (not including a delay or inconvenience to others)
- if the disabled person is unable to enter into a legally enforceable agreement, or give informed consent
- if providing a service to disabled people on the same terms as to other people means that it would not be possible to offer the service at all, or if a higher charge would have to be made to others

14.4 The Inclusive Fitness Initiative (IFI)

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

15. Young people

15.1 This guidance relates to the provision of safe exercise instruction to young people in a gym and studio environment (aged 14 to 17). Gym and studio environments are typically designed with an adult in mind; therefore, certain elements and exercises may not be suitable until an individual reaches physical maturity. It is essential that Gym Instructors who work with adolescents on a more than occasional basis understand fully the physiological and psychological implications of working with adolescents, to enable them to work safely and effectively within these environments

15.2 Fitness experts, organisations and medical researchers across the world have now concluded that a supervised muscular strength and endurance programme is beneficial to a child's overall growth and development. A young person's fitness routine should include activities that are aerobic or endurance based to work the cardiovascular and cardio respiratory systems, driven by the processes of both anaerobic and aerobic metabolisms (*Preventing Childhood Obesity report – from the British Medical Association 2005*)

15.3 Adolescence is characterised by dramatic physical, cognitive, social and emotional changes. These changes, along with the adolescent's growing independence, search for identity, concern with appearance, need for peer acceptance and active lifestyle, can significantly affect their mental and physical activity behaviours

15.4 The impact of exercise participation on the adolescent both now and in the future will greatly depend on how psychological and physiological changes are managed by the individual and others. If there is any doubt over the suitability of the environment, equipment and training for adolescents then instructors should contact a fully qualified children's physical activity instructor

15.5 Physiological safety considerations:

- a gym environment is typically designed with an adult in mind; therefore, certain elements may not be suitable until an individual reaches physical maturity. For example: if an adolescent is unable to reach a lat pull down bar then they must be advised to use another piece of equipment
- the same situation could also occur in a studio environment; for example, if an adolescent is unable to meet the required adjustments on a spin bike it may not be suitable for them to attend the class
- emphasise the importance of variety within a session. It is extremely important to avoid excessive training. These include too much of one form of exercise, participating in the wrong class for their body type and using too heavy weight in weight training
- inappropriate size matching in pairs should be avoided
- too much high impact moves on the spot should be avoided
- the appropriate equipment for the activity (correct size, weight etc.) should always be provided

15.6 Psychological safety considerations

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- it is important to remember that psychological symptoms/difficulties often go hand in hand with growing up. It is extremely important that a qualified children's physical activity instructor is consulted if any situations causing concern arise
- instructors should be able to effectively communicate with both young people and parents to ensure an intelligent and safe session is followed. Simple language that is jargon free and not overly technical needs to be used
- implement gym etiquette and rules from the onset (young people need clear guidelines of expected behaviour)
- it is important to identify common ground to build rapport and trust with adolescents but remain within the guidelines of safeguarding children
- instructors should be aware of the lack of mental ability of some young people to cope with the psychological and physiological changes they are undergoing, especially if they are considerably bigger or smaller than the rest of their peer group. This may lead to low self-esteem or other psychological problems
- instructors should be aware that psychological changes in adolescents could lead to bouts of teenage depression, social issues (such as violence), smoking and drugs, eating disorders and even over-training

15.7 Guidelines for cardiovascular training in adolescents:

- interval training should ideally form the main focus when designing cardiovascular sessions for adolescents. Interval training has been proven as the most successful type of cardiovascular training for adolescents for both physiological benefits and psychological benefits. It provides variety which boosts enthusiasm, motivation and confidence to complete short exercise tasks but also in relation to daily life
- during exercise young people should use the Rate of Perceived Exertion (RPE) scale (refer to the Borg RPE scale) the preferred method used by most experts. RPE requires the young person to pay particular attention to how they feel regarding how tired they feel, how much effort it is taking and how much physical stress they are under
- for safety reasons, young people aged 14 plus using a heart rate chart solely depends on the mental and physical maturity of the adolescent. The preferred recommended method is to start to educate the participant in the use of heart rate charts alongside the use of RPE until full physical maturity has been reached
- a youth specific PAR-Q and needs analysis will have to be devised to accommodate the adolescents who sign up to use the gym (this should be done by a qualified children's physical activity instructor). The terminology used in a youth specific PAR-Q needs to be adolescent friendly to ensure they understand the questions asked. The PAR-Q and gym etiquette will need to be signed for by their parent or guardian, if they are under the age of 16, to allow access into the gym prior to their first session

15.8 Guidelines for strength training in adolescents:

- if an instructor does not hold a children's physical activity qualification, then they should not instruct adolescents to lift weights. With proper training and supervision from qualified children's physical activity instructors, adolescents can safely lift weights. Adolescents should not attempt to lift maximal amounts of weight until they are physically mature (on average, age 16 for males and 2 years after the menarche for females)

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- heavy weights can be potentially dangerous and damaging to the developing skeletal and joint structures. It is not recommended that resistance exercise be performed to the point of momentary muscular fatigue
- it is important not to impose adult training regimes on young people and recognise the developmental age of the adolescent; not just their chronological age
- instructors should be aware that all models of fitness equipment are designed and manufactured with a particular 'end-user' in mind. The bodies of young people are unique and adult equipment is not the most suitable for the most functional range of movement in a young adolescent. If the facility has adult equipment, then reasonable adjustments and adaptations to that exercise need to be made in order for the adolescent to participate. NB. equipment specifically designed for children and young people is available
- it is far more beneficial to the young adolescent to use gym equipment that has been designed for the size and proportion of adolescents' anthropometric measurements
- progression in resistance, repetitions and sets should only be programmed when the adolescents are ready both physically and mentally. Care should also be taken with a progressive programme when using the traditional pin loaded adult equipment, since weight increments on adult machines far exceed the 0.5 – 2kg increase recommended for adolescents
- free-weight exercises including dumbbells, barbells and cables require a significant amount of knowledge and experience with regards to postural alignment and engaging a neutral spine; therefore, these exercises must be guided under and provided by a qualified children's physical activity instructor to encourage and develop solid basic skills
- ultimately the most effective form of resistance training could cause the most harm if not supervised correctly by an experienced children's physical activity instructor. Therefore, where possible, youth equipment that is suitably designed and manufactured for adolescents should be used

15.9 In 2004 the British Association of Sport and Exercise Sciences (BASES) offered the following prescription for muscular training with children and young people:

- Frequency: 2-3 times a week to develop strength
Rest between sessions: 48 hours recovery for heavier training sessions
- Intensity: Repetitions and resistance:
Lighter resistance (15-20 repetitions),
Moderate resistance (10-15 repetitions)
Heavier resistance (6-10 repetitions)
- Time: Sets:
Begin with single sets and progress to 3-4 sets.
Rest (between sets): Will vary depending on training goals. Circuit resistance training should be encouraged to maximise cardiovascular benefits
- Type: Promote muscle balance and joint stability by using a whole body approach and working all major muscles.
Avoid too much eccentric muscle work

15.10 Guidelines for flexibility training in adolescents:

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- caution should be taken when teaching any stretch exercise especially when adolescents are in a growth spurt. These are really vulnerable times and there is an increased injury risk as the soft tissue around the joints is already stretched as muscle growth does not keep up with bone growth rates
- flexibility classes, for example yoga, need to be taught with caution especially with adolescents who are in their growth spurt. Adapted exercises may need to be applied if the adolescent complains of any discomfort or pain during certain exercises
- some adolescents will not have gained sufficient motor skills to develop their flexibility with good technique and therefore risk injury by not understanding stretching to the point of 'mild tension'. Terminology and understanding needs to be adapted to ensure adolescents understand the given task

15.11 The Safeguarding of Children and Vulnerable Adults

- with adolescents, training within a gym environment the instructor is in "loco parentis" in this situation and it is their responsibility to ensure the individuals are using the correct and suitable equipment according to their stature and mental capacity. In legal terms this is known as Duty of Care. If during a liability claim procedure it was found that an accident occurred on a piece of equipment that was unsuitable for the end-user, then the instructor and his/her employer would be held jointly responsible and therefore be deemed negligent

16. How to safeguard children and vulnerable adults

The definition of 'children' is any person under the age of 18.

The definition of 'vulnerable adult' is any person over the age of 18 who is, or may be in need of community care services by reason of mental, or other, disability, age or illness and who is, or may be, unable to take care of themselves, or unable to protect themselves against harm or exploitation.

16.1 Safeguarding the welfare of children and vulnerable adults

The term 'safeguarding' means a wide approach to meeting the needs of all children and vulnerable adults (including those who may be at risk from abuse).

All those directly or indirectly involved with children's and vulnerable adults' leisure activities have a responsibility to:

- review their own practice in situations to ensure that they are complying with recognised codes of conduct
- recognise the signs and symptoms and indicators of abuse and the impact this has on children and vulnerable adults
- respond in an appropriate way and take appropriate action if concerns are raised

16.2 The responsibilities and limitations of a fitness instructor

It is important to demonstrate safeguarding behaviour at all times; this includes:

- acting as a role model

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- adhering to the policies and procedures
- adhering to the code of practice
- always wearing uniform and/or name badge if one is provided
- understanding and acting upon their responsibilities
- recognising the need to protect the rights of participation, for fun, enjoyment and achievement for all
- reporting any suspected abuse to the safeguarding and protection officer or senior manager
- responding to cases of abuse in a responsible manner
- working in an open environment

16.3 The types of abuse which an instructor may encounter

Abuse can take on many forms, but it can be broadly separated into five categories:

- physical
- emotional
- sexual
- bullying
- neglect

16.4 The possible signs of abuse

16.4.1 Physical abuse

The indicators of physical abuse are:

- fear of parent or carer being contacted
- aggressive or angry outbursts
- fear of going home
- flinching
- depression
- keeping arms and legs covered
- withdrawn behaviour
- unexplained bruising or injuries
- bruises which reflect hand marks
- cigarette burns
- bite marks
- broken bones
- scalds

16.4.2 Emotional abuse

The indicators of emotional abuse are:

- neurotic behaviour
- inability to take part in activity
- fear of making mistakes
- sudden speech disorders

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- self-harm
- fear of parents or carers being contacted
- depression
- withdrawn behaviour

16.4.3 Sexual abuse

The indicators of sexual abuse are:

- sudden changes in behaviour
- becoming aggressive/withdrawn
- apparent fear of one person
- self-harm/suicidal
- in children; advanced sexual knowledge/behaving beyond their age
- sexually explicit behaviour or language
- pain/itching/bruising in the genital area
- sexually transmitted diseases
- stomach pains
- discomfort when walking/sitting
- pregnancy

16.4.4 Bullying

The indicators of bullying are:

- withdrawn behaviour
- insecurity
- seems 'over' sensitive
- also see; indicators of physical and/or emotional abuse

16.4.5 Neglect

The indicators of neglect are:

- in children; truancy and lateness
- regularly alone and unsupervised
- constant hunger
- unkempt state
- weight loss or obesity
- inappropriate dress

16.5 A fitness organisation's policies and procedures in relation to safeguarding

16.5.1 Key principles of a policy are:

- instructors must demonstrate proper personal behaviour and conduct at all times
- instructors must keep a high level of competence through a commitment to ongoing training that ensures safe and correct practice
- paid Instructors and volunteers must hold a current Criminals Records Bureau Check (CRB)

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- always maintain confidentiality

16.5.2 The key principles of procedures to follow are:

Refer any suspicions to the welfare protection officer who is based within the facility or organisation or a senior manager, or in an emergency, call 999.

If a child or vulnerable adult chooses you as their trusted adult the procedures to follow are:

- stay calm, reassure, listen and let the person talk
- do not promise to keep secrets
- do not interrogate or ask leading questions
- do not approach the alleged abuser, or the parents/carer of the person
- record in writing the details what has been said, heard or seen

16.6 The procedure to follow to protect oneself from accusations of abuse are:

- work in an open environment, avoiding spending time alone with children and/or vulnerable adults
- never take photographs of children and young people without the permission of the parents, carers and the facility operators
- always consider your behaviour towards children and vulnerable adults
- always take action if you have a concern about the behaviour of an adult or child towards another child or vulnerable adult
- promote the welfare of your clients, even if this means letting another professional take over
- never engage in intimacy with vulnerable people including immediately after instructing a session has ended

16.7 The statutory agencies responsible are:

- child welfare agencies
- child welfare officers
- social services
- police
- Childline

16.8 Contacting statutory agencies

It is not up to the instructor to judge whether the person is being abused, but it is their responsibility that information gets to the statutory authorities.

An instructor's first contact should be the appointed person or the child protection officer in the centre, or a line manager whose responsibility it will be to contact the statutory agencies. If this is not possible, the instructor needs to contact the local welfare office, or social services, or if they require further guidance they should contact the NSPCC helpline. If it is an emergency, then they should dial 999.

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Exercise and Fitness Core Knowledge Requirements

The following NOS are underpinned by the below Core Knowledge requirements:

In addition to the generic Core Knowledge Requirements, on Pages 3 to 21, the following section

SKAEF1	Health, safety and welfare promotion in active leisure and recreation
SKAEF2	Assist participants to develop and maintain the motivation to adhere to exercise and physical activity
SKAEF3	Plan and prepare gym-based exercise
SKAEF4	Instruct and supervise gym-based exercise
SKAEF5	Plan and prepare group exercise
SKAEF6	Instruct group exercise
SKAEF7	Plan and prepare group exercise, movement and dance
SKAEF8	Instruct group exercise, movement and dance
SKAEF9	Plan and prepare water-based exercise
SKAEF10	Instruct water-based exercise
SKAEF11	Plan health related exercise and physical activity for children
SKAEF12	Instruct children in health related exercise and physical activity

contains the specific Core Knowledge requirements for each relevant NOS.

You must also check the Knowledge Statements provided in each NOS; as the information provided in this document is in addition to that already stated in each, individual Standard.

You will also find a Chart, between Pages 23 to 25, that identifies the relevant Core Knowledge statement against the corresponding NOS, where it is repeated across the NOS suite.

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Core Knowledge Statements, repeated across relevant NOS										
	SKAEF3	SKAEF4	SKAEF5	SKAEF6	SKAEF7	SKAEF8	SKAEF9	SKAEF10	SKAEF11	SKAEF12
the application of the principles and variables of fitness to the components of fitness	*	*	*	*	*	*	*	*		
the effect of speed of movement on posture, alignment and intensity	*	*	*	*	*	*	*	*		
the effect of levers, gravity and resistance on exercise	*	*	*	*	*	*	*	*		
the life-course of the musculoskeletal system, including bone, and its implications for working with young participants, ante and postnatal women, disabled participants and older participants, such as tendon, ligament and bone mass density changes and their effect on posture and postural stability for all the above	*	*	*	*	*	*	*			
contra-indications and key safety guidelines for working with older participants	*	*	*	*	*	*	*			
contra-indications and key safety guidelines for working with ante and postnatal participants	*	*	*	*	*	*	*			
how to give guidance to encourage special population participants to follow the key safety guidelines and to discourage them from anything deemed to be potentially hazardous/contra-indicated to enable them to take part in sessions	*	*	*	*	*	*	*			
the importance of careful and thorough planning and preparation for sessions	*		*		*		*			
how to plan a range of logical delivery methods			*		*					

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	SKAEF3	SKAEF4	SKAEF5	SKAEF6	SKAEF7	SKAEF8	SKAEF9	SKAEF10	SKAEF11	SKAEF12
the needs and potential of the participants including reasons for and barriers to participation in the appropriate session	*	*	*	*	*	*	*	*	*	*
exercises that are safe and appropriate for participants, including alternatives to potentially harmful exercises; safe and effective alignment of exercise positions	*	*	*	*	*		*	*	*	*
the purpose and value of warm-up and cool-down		*		*		*		*		*
why participants need to understand the purpose and value of warm-up and cool-down		*		*		*		*		*
safe and effective warm-up and cool-down activities specific to the session		*		*		*		*		*
a range of alternative exercises for adaptation including progressions and regressions as appropriate		*		*		*		*		*
the types of special requirements that participants may have and how to adapt your plans, yourself and the equipment and facilities to meet these needs and give reasons for temporary deferral of exercise				*		*		*		
the purpose of exercises, how to break exercise/movements down to their component parts		*		*		*		*		*
how to develop participant co-ordination by building exercises/movements up gradually		*		*		*		*		*
effective methods of building combinations of movements				*		*				
the aims of the programme that you are delivering				*		*		*		*

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	SKAEF3	SKAEF4	SKAEF5	SKAEF6	SKAEF7	SKAEF8	SKAEF9	SKAEF10	SKAEF11	SKAEF12
the suitability of speed and type of music for the participants and section of the class			*	*	*	*	*	*	*	*
legalities covering the use of music			*	*	*	*	*	*	*	*
how to work to the structure and phrase of the music			*	*	*	*		*		
how music can enhance a session							*		*	*
the importance/methods of voice projection; effective use of volume and pitch of voice, with and without a microphone		*		*		*		*		*
effective cueing			*	*	*	*	*			
how choreography needs to be balanced to avoid stress on joints			*		*					
the information that you must give to other people who are involved		*		*		*				*
reporting procedures for health and safety		*		*		*		*		
how to identify any new risks during a session and take action to control these in line with national guidelines		*		*		*		*		

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The chart on Pages 23 to 25 should be referenced in addition to the specific Core Knowledge Requirements, listed below:

SKAEF1 Health, safety and welfare promotion in active leisure and recreation

- the values or codes of practice relevant to the work you are carrying out
- the requirements for health, safety and welfare that are relevant to your work, for example: your organisation's health and safety policies and procedures, principles and best practice for safeguarding and protecting children, the Health and Safety at Work Act, requirements for activities in the scope of National Governing Bodies, requirements for activities in the scope of the Activity Centre (Young Person's Safety) Act, Manual Handling regulations, Control of Substances Hazardous to Health regulations
- manufacturers' guidelines and instructions for the use of facilities and equipment
- why health, safety and welfare are important in a sport and activity environment
- the persons responsible for health and safety in your workplace
- your organisation's security procedures

SKAEF2 Assist participants to develop and maintain the motivation to adhere to exercise and physical activity

- the Exercise and Fitness Code of Ethical Practice; ensuring equal opportunities are reflected during the exercise session and diversity is respected
- the difference between advising on exercise participation and lifestyle physical activity
- the values or codes of practice and their importance
- the role of the fitness professional in the industry
- the importance of reflection and continuing professional development in helping you to develop participant fitness and motivation
- the structure and roles within the fitness industry
- industry organisations and their relevance to the fitness professional
- the importance of registration systems and continuing professional development requirements
- employment opportunities in different sectors of the industry

SKAEF3 Plan and prepare gym-based exercise

- how to motivate participants to take part in exercise
- how to plan to use a range of cardiovascular and resistance machines, free weights - barbells, dumbbells, collars, benches, protective floor - mats
- the specific equipment available to implement the session successfully

SKAEF4 Instruct and supervise gym-based exercise

- the importance of fitness advice and how to offer it in gym based physical activity

SKAEF6 Instruct group exercise

- how to develop participant co-ordination by building exercises/movements up gradually, including layering techniques and holding patterns

SKAEF10 Instruct water-based exercise

- effective methods of building combinations of movements; instructor safety concerns, such as heat stress, joint stress and vocal cord injury
- appropriate attire for the participants and instructor
- the information that you must give to other people who are involved in the session including lane discipline/etiquette and direction
- the importance of health and safety in the facility and of paying close attention to possible hazards, such as slippery surfaces, changes in water depth, pool temperature, entries and exits of the pool
- the safe entries and exits to a pool
- pacing and speed of exercises in an aquatic environment
- the risks of using electrical equipment on the poolside and how to minimise these risks
- spacing of the class; shallow water to deep water
- the types of new hazards that may occur during a session and how to identify and deal with these

SKAEF11 Plan health related exercise and physical activity for children, and

SKAEF12 Instruct children in health related exercise and physical activity

- national guidelines for safeguarding children
- the types of special needs that children may have and how to adapt your plans, yourself and the equipment and facilities to meet these needs
- knowledge of common conditions in children that will affect an exercise session, for example childhood obesity, dyspraxia, growth related injuries, asthma
- reasons for temporary deferral of exercise
- the principles of behaviour management when working with children in the age range 5-15

Personal Training, Physical Activity and Health Core Knowledge Requirements

The following Personal Training and Physical Activity Core Knowledge Requirements underpin the below NOS:

SKAEF13	Assist participants to maintain long term adherence to exercise and physical activity
SKAEF14	Evaluate exercise and physical activity programmes
SKAEF15	Design, manage and adapt a personal training programme with participants
SKAEF16	Deliver exercise and physical activity as part of a personal training programme
SKAEF17	Apply the principles of nutrition to support participant goals as part of an exercise and physical activity programme
SKAEF19	Design, manage and adapt an exercise and physical activity programme for referred participants
SKAEF20	Instruct exercise and physical activities for referred participants
SKAEF21	Design, manage and adapt a mat Pilates programme
SKAEF22	Instruct mat Pilates sessions

The following NOS are underpinned by the below Core Knowledge requirements:

Personal Training, Physical Activity and Health Core Knowledge Requirements

1. Health benefits of physical activity
2. Healthy eating
3. The musculoskeletal system in relation to exercise
4. Postural and core (spinal) stability
5. The nervous system in relation to exercise
6. The endocrine system in relation to exercise
7. The principles and variables of fitness training and how to apply them to a progressive/regressive exercise programme
8. Energy systems in relation to exercise
9. The heart and circulatory system in relation to exercise and health
10. Duty of Care (law of tort in England, or law of delict in Scotland) and professional role boundaries in relation to special populations
11. Antenatal and postnatal women
12. Older people
13. Disabled people
14. Young people
15. How to safeguard children and vulnerable adults

1. Health benefits of physical activity

1.1 How physical activity impacts on the causes of certain diseases, including Coronary Heart Disease (CHD), some cancers, Type 2 Diabetes, Hypertension, Obesity and Osteoporosis

2. Healthy eating

2.1 Dietary role of the key nutrients:

- macronutrients, such as carbohydrate, fat and protein
- micronutrients, such as water soluble vitamins: C and B, fat soluble vitamins A, D, K and E, and minerals, such as calcium, copper, iron, magnesium, phosphorus, potassium, sodium, selenium and zinc

2.2 The importance of hydration

2.3 Common dietary sources of the key nutrients

2.4 The energy balance equation

2.5 The health risks of poor nutrition

2.6 The circumstances in which a client should be recommended to visit their GP about the possibility of referral to another professional

3. The musculoskeletal system in relation to exercise

3.1 The axial and appendicular skeleton building on Level 2

3.2 The muscular system/muscles building on Level 2, for example

- muscle attachment sites (origin and insertion)
- rotator cuff
 - teres minor
 - supraspinatus
 - subscapularis
 - infraspinatus
- shoulder girdle
 - levator scapulae
 - pectoralis minor
 - serratus anterior
 - trapezius
 - rhomboids major/minor

- teres major
 - spinal extensors
 - erector spinae: iliocostalis, longissimus, spinalis
 - multifidus
 - quadratus lumborum
 - hip flexors (iliopsoas)
 - iliacus
 - psoas major
 - adductors
 - magnus
 - brevis
 - longus
 - pectinius
 - gracilis
 - sartorius
 - abductors
 - gluteus medius
 - gluteus minimus
 - piriformis
 - tensor fascia latae
 - abdominals
 - internal and external obliques
 - transversus abdominus
 - intercostals
 - diaphragm
- 3.3 Structure of muscle fibres, including myofibrils, sarcomere, actin, myosin and troponin
- 3.4 Sliding filament theory
- 3.5 Effects of exercise on muscle fibre type
- 3.6 The anatomical axis and planes (frontal, sagittal, transverse) with regard to joint actions and different exercises
- 3.7 The application of joint actions brought about by specific muscle group contractions to programme design/different exercises
- 3.8 Joints/joint structure with regard to range of motion/movement and injury risk (to include the synovial joints: condyloid, ellipsoid and saddle)

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3.9 Joint movement potential and joint actions building on level 2, for example horizontal adduction, horizontal abduction, internal and external rotation, eversion, inversion, elevation, depression, retraction and protraction

3.10 Structure of the pelvic girdle and associated muscles and ligaments

4. Postural and core (spinal) stability

4.1 Muscles associated with stabilisation (local) and mobilisation (global)

4.2 The ligaments and muscles of the spine

4.3 Procedures/methods used to identify postural deviations

4.4 Systems contributing to stabilisation and potential reasons for dysfunction of these systems

4.5 Muscle role changes/imbbalances associated with incorrect stabilisation

4.6 The relationship between centre of gravity excursions and adiposity on posture deviation

4.7 The range of medical conditions associated with dysfunctional stabilisation, such as common spinal disorders), the impact of core stabilisation exercise and the potential for injury/aggravation of problems

4.8 Reasons and procedures for referring on to an appropriate professional

4.9 Principles and techniques of flexibility training including Static (passive and active), Dynamic and Proprioceptive Neuromuscular Facilitation

5. The nervous system in relation to exercise

5.1 Specific role of the central nervous system (CNS) and Peripheral Nervous System (PNS)

5.2 Nervous control and transmission of a nervous impulse, to include the role of the brain and spinal cord, sensory neurons, receptors, synapse, motor neurons, axon terminal, acetylcholine, neuromuscular junction and effector organs/muscles

5.3 Structure and function of a neuron or nerve cell

5.4 The process of motor unit recruitment and the significance of a motor unit's size and number of muscle fibres

5.5 Function of muscle proprioceptors and the stretch reflex (muscle spindles and golgi tendon organs)

5.6 Reciprocal inhibition and its relevance to exercise

5.7 The neuromuscular adaptations associated with exercise/training

5.8 The benefits of improved neuromuscular coordination/efficiency to exercise performance

6 The endocrine system in relation to exercise

6.1 The functions of the endocrine system

6.2 The major glands in the endocrine system

6.3 The function of hormones including:

- growth hormone
- thyroid hormones
- corticosteroids
- catecholamines
- insulin
- glucagon

7. The principles and variables of fitness training and how to apply them to a progressive/regressive exercise programme

7.1 The physiological implications of:

- specificity
- progressive overload
- reversibility
- adaptability
- individuality
- recovery time

7.2 How to recognise when and how to progress and regress a training programme to meet the needs of the client/session

7.3 How to include periodisation of training in goal setting, to include macrocycle, mesocycle and microcycle

8. Energy systems in relation to exercise

8.1 The contribution of energy according to the duration, type and intensity of exercise/activity being performed

8.2 The by-products of the three energy systems (Phosphocreatine (PCr)/Creatine Phosphate (CP), Lactic acid/anaerobic system and Aerobic system) and their significance in muscle fatigue

8.3 The effect of endurance training/advanced training methods on the use of fuel for exercise

9. The heart and circulatory system in relation to exercise and health

- 9.1 How blood moves through the four chambers of the heart and the purpose of the valves
- 9.2 The coronary circulation
- 9.3 The effect of disease processes on the structure and function of blood vessels
- 9.4 The short and long term effects of exercise on blood pressure, including the valsalva effect
- 9.5 The cardiovascular benefits and risks of endurance/aerobic training
- 9.6 Blood pressure classifications and associated health risks

10. Duty of Care (law of tort in England, or law of delict in Scotland) and professional role boundaries in relation to special populations

Please see Section 11 on Page 9

11. Antenatal and postnatal women

Please see Section 12 on Page 10

12. Older people

Please see Section 13 on Page 12

13. Disabled people

Please see Section 14 on Page 14

14. Young people

Please see Section 15 on Page 15

15. How to safeguard children and vulnerable adults

Please see Section 16 on Page 18

SkillsActive Exercise and Fitness Core Knowledge Requirements March 2016

In addition to the generic Core Knowledge Requirements, on Pages 28 to 33, the following section contains the specific Core Knowledge for each relevant NOS below.

You must also check the Knowledge Statements provided in each NOS; as the information provided in this document is in addition to that already stated in each, individual Standard.

SKAEF13	Assist participants to maintain long term adherence to exercise and physical activity
SKAEF14	Evaluate exercise and physical activity programmes
SKAEF15	Design, manage and adapt a personal training programme with participants
SKAEF16	Deliver exercise and physical activity as part of a personal training programme
SKAEF17	Apply the principles of nutrition to support participant goals as part of an exercise and physical activity programme
SKAEF19	Design, manage and adapt an exercise and physical activity programme for referred participants
SKAEF20	Instruct exercise and physical activities for referred participants
SKAEF21	Design, manage and adapt a mat Pilates programme
SKAEF22	Instruct mat Pilates sessions

SKAEF13 Assist participants to maintain long term adherence to exercise and physical activity

- the professional code of ethical conduct ensuring equal opportunities are reflected during the exercise session and diversity is respected
- the difference between advising on exercise participation and lifestyle physical activity

SKAEF21 Design, manage and adapt a mat Pilates programme, and SKAEF22 Instruct mat Pilates sessions

- the history of Joseph Pilates
- the original principles of Joseph Pilates
- the fundamentals of Pilates
- the repertoire of the 34 original Pilates exercises
- the life-course of the musculoskeletal system (including bone) and its implications for working with young people, ante and postnatal women, disabled people and older people (such as, tendon, ligament and bone mass density changes and their effect on posture and postural stability for all the above)
- contra-indications and key safety guidelines for working with older participants
- contra-indications and key safety guidelines for working with ante and postnatal participants
- contra-indications and key safety guidelines for working with disabled participants
- contra-indications and key safety guidelines for working with young participants
- how to give guidance to encourage the identified special population participants to follow the key safety guidelines and to discourage them from anything deemed to be potentially hazardous/contra-indicated to enable them to take part in sessions

SkillsActive Exercise and Fitness Core Knowledge Requirements March 2016

In addition to the previous generic Core Knowledge Requirements, on Pages 28 to 33, the following section contains the specific Core Knowledge requirements for each relevant NOS.

You must also check the Knowledge Statements provided in each NOS; as the information provided in this document is in addition to that already stated in each, individual Standard.

SKAEF23	Design and manage supervised exercise referral programmes for medium-high risk participants with specific medical conditions
SKAEF24	Deliver, review and adapt supervised exercise referral programmes for medium-high risk participants
SKAEF25	Adapt a physical activity programme to meet requirements of participants with specific needs
SKAEF26	Design, agree and adapt a physical activity programme for participants with cardiac disease
SKAEF27	Plan, prepare, deliver and review a strength and conditioning programme
SKAEF28	Design and manage an exercise rehabilitation programme with patients requiring accelerated rehabilitation exercises after illness and injury
SKAEF29	Deliver an exercise rehabilitation activity programme with patients requiring accelerated rehabilitation exercises after illness and injury

You will also find a Chart, on Page 36, that identifies generic Core Knowledge statements against the corresponding NOS, where they are repeated across the NOS suite.

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Generic Knowledge Statements, repeated across relevant NOS				
	SKAEF23	SKAEF24	SKAEF25	SKAEF26
government policy and published national guidelines for the specified condition	*		*	*
awareness of national agencies, organisations and literature relating to the specified condition's management and physical activity recommendations	*		*	*
current relevant structures of the national health service, the names and functions of different relevant medical organisations and service providers	*			*
how physical activity may influence the other risk factors, associated with the specified condition	*		*	*
anatomy and physiology of the neurological, musculoskeletal, cardiovascular, pulmonary and endocrine systems	*		*	*
range of medication/co-morbidities and their exercise considerations	*			
acute responses and chronic adaptations to aerobic endurance and muscle strength, balance and strength training and the implications for individual cardiovascular, pulmonary, articular, neuromuscular, cerebrovascular or metabolic diseases	*	*	*	*
contra-indications to exercise which need to be taken into account for the participant with a history of the specified condition	*		*	*
how to manage the dietary and fluid intake needs in and around the exercise session		*	*	*
advantages and disadvantages of group versus individual exercise programmes for those with the specified condition, when appropriate	*			*
the role of health promotion, lifestyle therapy and the efficacy of exercise as a long-term treatment strategy	*	*		*
the side effects and implications of polypharmacy on exercise programming	*			*
the motivational processes, models and techniques involved in behavioural change for the referred participant to encourage long term beneficial lifestyle changes	*	*		*
how to manage medical complications and emergencies until appropriate medical help is available, for the specified condition		*		*

**SKAEF23 Design and manage supervised exercise referral programmes for medium-high risk participants with specific medical conditions, and
SKAEF24 Deliver, review and adapt supervised exercise referral programmes for medium-high risk participants**

- a) Falls prevention
- b) Stroke
- c) Mental health
- d) Non-specific lower back pain
- e) Obesity/diabetes
- f) Chronic respiratory disease
- g) Cancer rehabilitation
- h) Long term neurological conditions
- i) Accelerated rehabilitation (military only)

a) Falls prevention

- prevalence and consequences of falls and falls related injury
- risk factors for falls and fractures
- causes, presentation, assessment of treatment/intervention of the following:
 - general medical examination to exclude unrecognised illness which may explain fall, such as a stroke, myocardial infarction, anaemia, thyroid disease etc.
 - cognition
 - postural blood pressure assessment
 - cardiovascular examination, electrocardiogram (ECG) and other relevant tests
 - neurological examination
 - gait and balance assessment
 - locomotors system examination
 - visual assessment
- investigations for patients who fall
 - mini-mental state questionnaire
 - confidence in balance questionnaire
 - blood tests
 - resting and standing blood pressure
 - get up and go test (timed or untimed); 180° turn, functional reach
 - muscle weakness; asymmetry; joint problems in lower limbs and feet
 - Snellen vision chart; visual acuity, for example, depth perception
 - specialised investigations for falls (for example ECG and where appropriate, echocardiography and holter monitoring and for falls associated with syncope, tilt table testing and carotid sinus massage etc.)
- interventions for falls prevention and management:
 - multi-factorial versus single interventions
 - targeted

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- individual versus population approaches components of falls management within the clinical setting (phases 1-3)
- stratifying and managing an individual's falls and fracture risk, risk during the exercise session and the risk as a result of future disease progression using the appropriate tools validated in a range of settings (such as, community/nursing home)

b) Stroke

- prevalence and consequences of stroke
- risk factors for stroke
- how physical activity may influence these and other risk factors
- causes, presentation, diagnosis and treatment of the following:
 - ischaemic and haemorrhagic stroke
 - motor symptoms (such as, altered muscle tone, hemiparesis, balance, co-ordination, dyspraxia)
 - sensory symptoms (such as, neuropathic pain, fatigue, unilateral neglect, loss of/altered sensation)
 - speech and language and comprehension problems (such as, expressive dysphasia, receptive dysphasia)
- investigations for risk of secondary complications after stroke
 - monitoring hypertension
 - swallowing problems (dysphagia)
 - visual problems (homonymous hemianopia, visual intention)
 - mood (lability, clinical depression)
 - hemiplegic shoulder pain
- investigations for causes of stroke (suspected/occurred)
 - blood tests (glucose, cholesterol, haemoglobin, renal, erythrocyte sedimentation rate)
 - brain scan, such as computerised tomography (CT) or occasionally magnetic resonance imaging (MRI)
 - electrocardiogram (ECG)
 - cerebral blood flow
 - carotid doppler
 - echocardiography
- interventions for management of stroke:
 - medical
 - surgical
 - rehabilitation – stroke units
 - multi-factorial versus single interventions
 - individual versus population approaches
- components of stroke management within the clinical setting (phases 1-3)
- exercise considerations for individuals with other stroke-associated symptoms such as, motor, sensory, impairment of speech, language and understanding, vision, swallowing, mood
- mental health and mental health promotion in patients after stroke

c) Mental health

- Mental Health Disorder classification systems and other relevant theories
- definition and assessment of mental health
- awareness of the anti-psychiatry movement, the Diagnostic and Statistical Manual of Mental Disorders (DSM) classification system and concern about the overuse of medication
- determinants of mental health and risk factors for mental health conditions
- importance of identifying triggers or typical behaviour patterns in individuals to create better/safer exercise environments
- prevalence and consequences of mental health conditions
- how mental health conditions affect different groups (for example, young adults, older adults, black and minority ethnic communities) and what the implications are for effective programming
- causes, presentation, assessment of treatment/intervention of the following:
 - anxiety disorders
 - generalised anxiety disorder
 - obsessive-compulsive disorder (OCD)
 - panic disorder
 - post-traumatic stress disorder (PTSD)
 - social phobia (or social anxiety disorder)
 - depression
 - psychotic disorders
 - bipolar disorder
 - schizophrenia
 - eating disorders
 - anorexia nervosa
 - bulimia nervosa
 - binge-eating disorder
 - substance-related disorders
 - alcohol
 - cannabis
 - stimulants
 - opioids
- plausible mechanisms for the process of mental health changes through physical activity:
 - biochemical
 - physiological
 - psychological
- interventions for mental health conditions management:
 - multi-factorial versus single interventions
 - facility-based versus lifestyle interventions
- understanding of both psychosocial and biophysical processes in individuals with a mental health condition

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- importance of optimism, positive thinking and encouragement for individuals with a mental health condition
- promotion of self-determined behaviour and use of strategies to support patients' needs for autonomy, competence and relatedness
- motivational processes to encourage adoption and maintenance of healthy lifestyle choices (use of a planned, coherent set of established behaviour change techniques, such as, motivational interviewing, prompting self-talk)
- awareness of lifestyle counselling strategies and techniques, for example, cognitive-behavioural strategies, person-centred approaches
- role of nutrition and weight management support in mental health promotion (group-based or individual support)
- group and individual exercise programming skills for individuals with a mental health condition, following recommended guidelines
- advantages and disadvantages of group versus individual exercise programmes for those with mental health conditions

d) Non-specific lower back pain

- epidemiology, causes, consequences and classification of non-specific lower back pain
- risk factors for non-specific lower back pain onset and chronicity
- relevant psycho-social aspects that could contribute to non-specific lower back pain, for example, fear avoidance behaviour, catastrophising and expectations
- assessment of modifiable risk factors:
 - medical, for example, medications
 - functional, for example, gait, balance and movement
- occupational health, such as, workplace ergonomics, understanding of interaction between exercise and co-interventions for non-specific lower back pain management, such as:
 - pain management course
 - cognitive behavioural therapy
 - complementary therapies
- evaluate and monitor an individual's status associated with non-specific lower back pain using tools validated in a variety of settings, such as, function, pain and psycho-social
- contra-indications to exercise and red flags to intervention which need to be taken into account for the individual with non-specific lower back pain
- psychosocial considerations (yellow flags) which need to be taken into account for the individual with non-specific lower back pain
- mental health and mental health promotion in a population with non-specific lower back pain

e) Obesity/diabetes

- the benefits of physical activity in the absence of weight loss

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- the causes of obesity including individual psychology, biology (family history), societal and cultural influences, individual activity and the activity environment (energy expenditure), food production, and food consumption (energy intake, quality/quantity of food)
- the components of energy expenditure including resting metabolic rate (RMR), the thermic effect of food or dietary-induced thermogenesis (TEF or DIT) and the energy cost of movement or physical activity (Active Metabolic Rate - AMR)
- the comparative variability of the components of energy expenditure
- what is meant by “obesogenic” environments
- the current national and global incidence and prevalence of obesity
- accepted definitions of overweight and obesity and methods of assessing excess body fat/health risk related to weight, for example, body mass index (BMI), skinfold measurements, somatotyping, waist circumference, waist to hip ratio and bioelectrical impedance
- validity and reliability of the different methods of assessing excess body fat/health risk related to weight for obese populations
- the clinical complications that frequently accompany obesity, including:
 - cardiovascular disease
 - type 2 diabetes and insulin resistance syndrome
 - hypertension
 - sleep apnoea
 - non-alcoholic fatty liver disease
 - gallstones
 - osteoarthritis
 - certain cancers (endometrial, breast, colon, prostate and gallbladder)
 - female reproductive complications and polycystic ovarian syndrome
 - mental health conditions
- common predictors of associated clinical complications
- the suggested waist circumference cut-off points that identify increased disease risk for men and women of different racial backgrounds, for example, Caucasians and Asians
- the physiological effects of insulin
- how insulin affects glucose uptake by skeletal muscle
- how GLUT 4 mediated glucose uptake is affected by skeletal muscle contraction, independently of insulin
- how the sensitivity of skeletal muscle, liver and adipose tissue to insulin can vary from individual to individual
- the role of obesity in the development of insulin sensitivity and resistance, impaired glucose tolerance and type 2 diabetes
- the role of high-intensity exercise, aerobic and resistance training in reducing obesity and improving insulin sensitivity
- the current national and global incidence and prevalence of type 1 and type 2 diabetes
- accepted definitions and pathophysiology of type 1 and type 2 diabetes
- accepted treatments for type 1 and type 2 diabetes, including different insulins, oral medication (biguanides, sulphonylureas, acarbose, glinides, glitazones and gliptins) and lifestyle therapy
- drugs currently licensed for the treatment of obesity in the UK

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- appropriate dietary advice for patients with obesity and/or diabetes and how to recognise when the individual requires more specialised dietary advice and intervention
- popular diets, fads, unorthodox weight loss control practices and the dangers/limitations of these
- disordered eating associated with obesity
- blood sugar readings for Hypoglycaemia, Normoglycaemia, Hyperglycaemia, impaired glucose tolerance (IGT)/pre-diabetes, diabetes, HbA1c, Ketones, Hyperosmolar Hyperglycaemic Nonketotic Syndrome (HHNS)
- the physiological responses to exercise of patients with type 1 and type 2 diabetes
- specific guidelines for avoiding certain complications of exercise in patients with diabetes, such as, wearing proper footwear, monitoring blood glucose to avoid hypoglycaemia and ensuring adequate hydration
- potential adverse effects of exercise in patients with diabetes, including the following:
 - cardiovascular
 - cardiac dysfunction and arrhythmias due to ischaemic heart disease
 - excessive increments in blood pressure
 - post-exercise orthostatic hypotension
 - microvascular
 - retinal haemorrhage
 - increased proteinuria
 - acceleration of microvascular lesions
 - metabolic
 - worsening of hyperglycaemia and ketosis
 - hypoglycaemia in patients on insulin or oral hypoglycaemic agents
 - musculoskeletal and traumatic
 - foot ulcers (especially in the presence of neuropathy)
 - orthopaedic injury related to neuropathy
 - accelerated degenerative joint disease
 - eye injuries and retinal haemorrhage
- surgical techniques in the treatment of severe obesity and for weight reduction

f) Chronic respiratory disease

- the information that must be reported on the referral form to include:
 - main diagnosis and significant co-morbidities
 - oxygen requirements
 - smoking history
 - medication
 - lung function (FEV₁ % predicted and FEV₁/FVC (%))
 - exercise tolerance (distance achieved, heart rate at rest and post-test/s, breathlessness score pre and post-test/s, reason for termination of test and oxygen saturation)
 - pre and post exercise test (e.g. incremental shuttle walk test (ISWT), 6 minute walk test or endurance shuttle walking test) (indication as to whether undertaken with or without oxygen)

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- exercise completed during pulmonary rehabilitation (frequency, intensity, type and duration)
- other information (e.g. BODE Index score, if used)
- the significance of measurements of lung function and oxygen saturation and their implications for practice
- the respiratory system and the components of respiration
- the physiology and pathology of Chronic Obstructive Pulmonary Disease with consideration for other conditions such as asthma, bronchiectasis and interstitial lung disease
- causes, presentation, diagnosis and treatment of Chronic Obstructive Pulmonary Disease with consideration for other conditions such as asthma, bronchiectasis, interstitial lung disease
- the impact of chronic respiratory disease on functional performance and emotional well-being
- how the pathophysiology of respiratory disease contributes to the altered response to exercise in individuals with respiratory disease
- the range of respiratory medications and their exercise considerations
- oxygen therapy and potential requirements during exercise
- acute responses and chronic adaptations to aerobic and resistance training and implications for the individual with chronic respiratory disease
- evidence-based beneficial effects of physical activity on chronic respiratory disease
- principles of individual exercise prescription (aerobic and resistance)
- evidence-based methods for monitoring intensity, such as breathlessness (use of the breathlessness scale and perceived exertion (RPE scale))
- causes and management of breathlessness (such as breathing techniques)
- exercise considerations for the patient/client with other medical conditions/co-morbidities for example:
 - heart failure
 - diabetes (Type 1 and Type 2)
 - hypertension
 - obesity/low weight
 - peripheral vascular disease
 - osteoarthritis/rheumatoid arthritis/osteoporosis
 - depression and anxiety
- how to determine and progress physical activity programmes using results from the physical exercise assessments, medical information, national guidelines, consultation and participants' aims
- how to recognise and understand the impact of an exacerbation of the chronic respiratory disease and adapt the exercise programme accordingly

g) Cancer rehabilitation

- how to establish a system of risk assessment of the participants' abilities
- how to plan and prepare objectives, activities and delivery methods tailored to participants' goals and condition
- the importance of having an ongoing system of monitoring and assessment in order to ensure activity goals are met and/or adapt them according to participants' evolving needs and abilities

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- how to give attention to any common co-morbidities
- the physiology and pathology of cancer together with the environmental/risk factors
- cancer treatments and the management pathways particularly surgery, radiotherapy, hormone therapy, chemotherapy and biological therapies and how these can influence the safety and ability to exercise.
- how to assess, interpret and record baseline parameters within the categories of cardio-respiratory endurance, muscular strength and endurance, flexibility, range of motion, balance, body composition based on their physical and psychological parameters related to their cancer.
- how to consider other associated medical conditions such as diabetes, anxiety, depression, hypertension, arthritis, osteoporosis, cardiac disease which may be associated with cancer treatments
- the important general lifestyle factors after cancer and the ability to signpost clients to suitable written materials regarding weight control, adequate protein intake relevant to the level of exercise, healthy and unhealthy diets, supplements, smoking, sun exposure, carcinogens and environmental pollutants

h) Long term neurological conditions (LTNC)

- background and evidence base to neurological exercise prescription
- common risk factors and co-morbidities in neurological medicine
- prevalence, causes, presentation, diagnosis, treatment, course and prognosis of the following:
 - multiple sclerosis
 - Parkinson's disease
 - cerebral palsy
 - neuromuscular conditions
 - motor neurone disease
 - acquired brain injury
 - spinal cord injury
- investigations for neurological disease including:
 - neurological examination
 - physiological investigations
 - CT /MRI imaging
- co-morbidity considerations such as:
 - heart disease
 - hyperlipidaemia
 - hypertension
 - diabetes
 - depression and anxiety
 - arthritis
- the range of neurological medications and their exercise considerations
- acute responses and chronic adaptations to endurance and strength training and implications for the individual with neurological disease

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- postural deficiencies in individuals with LTNC and ways to address them through awareness strategies and postural stability exercises
- monitoring intensity methods, for example, heart rate and perceived exertion
- exercise considerations for the participant with:
 - multiple sclerosis, for example, temperature regulation
 - Parkinson's disease, for example, timing of exercise and medication
 - cerebral palsy, for example, management of contractures
 - neuromuscular conditions, for example, care in content of strengthening programme
 - motor neurone disease, for example, consideration of disease progression
 - acquired brain injury, for example, behavioural issues
 - spinal cord injury, for example, sensory and autonomic considerations
- mental health and mental health promotion in a neurological population

i) Accelerated rehabilitation (military only)

- the Core Standards for Joint Service Remedial Instructors outlining what modalities can be utilised to treat musculoskeletal injuries
- understand the importance of linking the constituent parts of the Defence Medical Rehabilitation Plan
- process of muscle, tendon, ligament and bone healing
- contra-indications to exercise for injuries that would include neurological, upper limb, amputees, and combat injuries
- causes, presentation, diagnosis and treatment of the following:
 - upper limb injuries
 - spinal injuries
 - lower limb injuries
 - medical conditions/diseases that affect joints bones and soft tissue
 - polytrauma
- be an integral part of the multi-Disciplinary Team that can refer for further investigations in review clinics. These include:
 - X rays
 - MRIs
 - bone scans
 - ultrasound scans
- the range of musculoskeletal conditions and their exercise considerations
- components of inpatient and outpatient musculoskeletal rehabilitation; The Defence Medical Rehabilitation Plan
- risk management in alignment with recognised guidelines and conditions
- acute responses and chronic adaptations to accelerated rehabilitation that includes endurance, flexibility, core stability, proprioception, balance and strength training for individuals with musculoskeletal injury
- ensuring appropriate levels of exertion are maintained utilising contraindications, heart rate monitors and perceived levels of exertion

- exercise considerations for the participant with, for example:
 - complex polytrauma
 - amputee
 - hypertension
 - obesity
 - combat injury
 - osteoarthritis/rheumatoid arthritis/osteoporosis
- holistic health advice for those with a musculoskeletal injury
- how to use and adapt a system for monitoring and recording the participants' progress and updating their physical activity programme

SKAEF25 Adapt a physical activity programme to meet requirements of participants with specific needs

Older adults

- anatomy and physiology including:
 - the coronary circulation
 - the effect of disease processes on the structure and function of blood vessels
 - the short and long term effects of exercise on blood pressure, including the valsalva effect
 - blood pressure classifications and associated health risks
 - joints/joint structure with regard to range of motion/movement and injury risk
 - delayed onset of muscle soreness (DOMS) and its likely causes
 - joint movement potential and joint actions
 - the endocrine system and its relationship to exercise
 - the nervous system and its relationship to exercise
 - neuromuscular adaptations to exercise resulting in improved performance (endurance/aerobic, strength/anaerobic and motor skills training adaptations)
- overview of ageing and physical activity
- demographic aspects (for example, gender, culture and ethnicity)
- definitions – theories of ageing, chronological, biological, functional, successful, pathological
- the benefits of physical activity throughout the lifespan for disease prevention, health promotion, preservation of function and quality of life
- current research on physical activity, exercise inactivity and ageing
- responsibility and liability
- the limits of your own competence
- age associated physiological and biomechanical changes and their implications for the older adult's ability to perform physical activity with optimal benefits and minimum risk (such as, a trip, fall, injury or a cardiac event) including:
- skeletal system changes associated with ageing:
 - decreased bone mineral content and increased fracture risk
 - long-term stress on joints
 - decreased availability of synovial fluid/calcification of cartilage
 - reduced joint stability and range of movement

- thinned intervertebral discs
- associated postural and postural stability problems
- muscular system changes associated with ageing:
 - reduced motor function (reduced motor unit size and loss of fine control)
 - decreased size and number of muscle fibres
 - fewer fast twitch fibres
 - reduced concentration of protein
 - reduced size and number of mitochondria
 - reduced capillarity
 - increased connective tissue
 - reduced elasticity in ligaments and tendons
 - reduced strength and power
- respiratory system changes associated with ageing:
 - decreased elasticity of the lungs
 - reduced flexibility in the thoracic cage
 - reduced vital capacity
 - poor posture leading to reduced lung capacity
- cardiovascular system changes associated with ageing:
 - decreased cardiac muscle and heart volume
 - decreased maximal heart rate
 - reduced efficiency of the circulatory system
 - increased blood pressure
 - reduced capillary network
 - reduced amount of oxygen in the blood/delivered to cells
 - reduced oxygen exchange in muscle
 - reduced tolerance to fatigue and acidity
 - reduced maximal oxygen uptake
 - slower recovery rate
- nervous system changes associated with ageing:
 - decreased number of nerves
 - decreased speed of transmission
 - decreased speed of central processing
 - decreased mass and strength in eye muscles
 - decreased elasticity in eye
 - decreased hydration of eye
 - increased eye infections
 - decreased vestibular and proprioception
 - reduced motor learning and control
- psychological and socio-cultural aspects of physical activity and ageing
- the particular health and functional benefits of habitual physical activity and exercise for old age (prevention of falls, osteoporosis joint stiffness, minimises muscle loss, isolation maintenance of independence and role in peer mentoring etc.)
- the relationship between habitual physical activity and psychosocial well-being

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- the added importance of pre-exercise screening older adults prior to participation and the legal and ethical role and responsibilities pre-exercise screening places on the instructor
- the specific types of physical, psychological and social goals older participants may have
- the available methods and sources of data for researching conditions presented by participants
- how to identify when to refer older adults to other professionals including an awareness of when disabled participants should be overseen by an exercise referral or Level 4 specialist instructor
- the medical conditions common in old age that impact on safety during physical activity and exercise including:
 - vascular disease
 - ischaemic heart disease
 - peripheral vascular disease
 - cerebrovascular disease (stroke)
 - hypertension
 - arrhythmias
 - heart failure
 - respiratory disease
 - asthma
 - chronic obstructive pulmonary disease
 - brain disease
 - Parkinsonism and Parkinson's disease
 - depression
 - dementia
 - musculoskeletal disorders
 - osteoarthritis
 - rheumatoid arthritis
 - endocrine and metabolic disorders
 - diabetes (type 2)
 - osteoporosis
 - sensory system abnormalities and nervous system integration (cataracts, glaucoma, senile macular degeneration, Meniere's disease)
- programme design and management for healthy older adults
- the variables (frequency, intensity, time, type and principles of training, progression/regression, functional relevance, challenge) of exercise applied to older adults in both individual and group settings
- the guidelines to consider when analysing and adapting movement and selecting the warm-up, strength/power, dynamic balance, flexibility and aerobic, training components of a programme for older participants
- systematic approaches to motivational, environmental and other factors that may assist
- the integration of supervised step by step functional (life-related) movement patterns and activities into all sessions, such as, correct lifting technique; getting up and down from the floor in and out of chairs etc.

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- methods for client reassessment and programme evaluation
- further considerations for programme design for older adults with medical conditions carrying a low risk of exercise-related events
- the types of physical (functional) limitations associated with ageing that may lead to injury and will need specific adaptation for exercise
- how to use pre-participation assessments to risk stratify, such as asymptomatic or low risk etc. and manage the risks associated with any conditions and limitations during physical activity
- the importance of proper nutrition, hydration and fluid replacement, particularly when participating in physical activity
- development of safe, effective, enjoyable and elder-friendly exercise and physical activity environments, like the use of equipment, music, transport, where applicable
- development of planning and group organisational and motivational skills, like lesson plans, pre session rest and individual preparation time and post session tea and socialise/recovery time
- development of effective motivational communication strategies relating to individual and group dynamics in a range of settings associated with the delivery of exercise for older participants, such as sheltered housing, residential homes, community centres, leisure and recreation facilities and health and fitness clubs
- translation of technical terminology into client friendly language and of intimidating equipment into accessible modalities, for example, resistance bands rather than dumbbells in the first instance in care settings
- incorporating leadership/games skills into personal training and group physical activity sessions to enhance professional skill mix and effectiveness with a wider range of older participants as well as increase participant enjoyment and satisfaction
- development of social support strategies to enable long-term participation, such as buddy system, home based exercise options, peer mentor support training, or telephone support
- development of effective age-friendly marketing strategies, images, messages and events calendar
- signs that indicate that exercise should be discontinued immediately and/or medical consultation sought
- identification of a safer and older adult friendly exercise environment (for example, accessibility/transport, floor surfaces, footwear, lighting, access to toilet facilities and drinking water, temperature control and safe, comfortable refreshment facilities)

Disabled participants

- legal and ethical responsibilities
- legislation relating to disability
- metrics which define reasonable practice
- inclusive and segregated programmes
- standard operating procedures for safe use of facilities by disabled participants, their carers and personal assistants, and assistance animals

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- psychological, socio-cultural and economic aspects of disability
- models of disability
- responsibility and liability
- the limits of your own competence
- methods of client-centred functional assessment and reassessment
- how to identify when to refer disabled participants to other professionals including an awareness of when disabled participants should be overseen by an exercise referral or Level 4 specialist instructor
- the types of impairments which disabled participants may have and the implications of these on participation in a physical activity programme, including:
 - early stage development of physically disabling and neurological conditions
 - spinal cord injury
 - limb amputation
 - Down's syndrome
 - visual impairment
 - hearing impairment
 - learning disability (mild-moderate)
- the implications that having a disabling condition may have on:
 - cardiovascular capacity
 - muscular strength
 - muscular endurance
 - flexibility and mobility
 - co-ordination/balance/motor skills
 - functional capacity
- anatomy and physiology including:
 - the effect of disease processes on the structure and function of blood vessels
 - blood pressure classifications and associated health risks
 - the nervous system and its relationship to exercise and certain disabilities
 - the anatomical axis and planes with regard to joint actions and different exercises
 - joints/joint structure with regard to range of motion/movement and injury risk
- potential effects of abdominal adiposity and poor posture on movement efficiency
- potential problems that can occur as a result of postural deviations
- use of equipment by participants with functional limitations
- appropriately designed/standardised equipment
- small equipment, such as dumbbells, bands, tubes, balls, discs etc.
- guidelines to consider when selecting appropriate warm up and cool down, aerobic, strength/endurance, flexibility and motor skill components
- the significance of healthy eating for disabled participants
- programme design and management for disabled participants including:
 - the variables (frequency, intensity, time, type and principles of training, progression/regression, functional relevance, challenge) of exercise applied to disabled participants in both individual and group settings

- the guidelines to consider when analysing and adapting movement and selecting the warm-up, strength/power, dynamic balance, aerobic and flexibility training components of a programme for disabled participants
- systematic approaches to motivational, environmental and other factors that may assist disabled participants to adhere to physical activity
- the integration of supervised step by step functional (life-related) movement patterns and activities into all sessions, for example, correct lifting technique; getting up and down from the floor, in and out of chairs, and other activities for daily living etc.
- methods for client reassessment and programme evaluation

Antenatal and postnatal participants

- the benefits of physical activity to antenatal and postnatal clients including: reduction of common pregnancy complaints, like leg cramps, oedema, carpal tunnel syndrome, high/low blood pressure, constipation, haemorrhoids, varicose veins and gestational diabetes, improved posture and body awareness, better functional movement and pelvic floor muscle function, possible reduction in low back pain, weight control, maintenance of cardiovascular and strength fitness levels, improved maternal well-being, like better sleep patterns, less anxiety and depression, improved ability to cope with stress), possible reduction of length of labour and birth complications and easier resumption of activity post birth
- how to give teaching points that relate to the baby when relevant
- the importance of resuming postnatal activity on an individual, gradual and progressive basis according to evidence-based guidelines
- motivational and other factors that may assist antenatal and postnatal participants to take up and adhere to physical activity
- sources of information and advice on working with antenatal and postnatal participants
- the physiological and biomechanical changes that occur during pregnancy to the:
 - cardiovascular system
 - respiratory system
 - musculoskeletal system – including the spine, the structure and anatomy of the pelvis and pelvic floor, back and abdominal muscle anatomy and general posture
 - metabolic system
 - endocrine system
- how the physiological and biomechanical changes persist post birth how to check for abdominal muscle separation and the safest and most effective way to rehabilitate the abdominal wall post birth
- key implications of the effects of pregnancy on exercise programming (effect on motor skills, implications of exercising in the supine position after 16 weeks or when the baby shows, the need to preferentially re-educate the pelvic floor and transversus abdominis post birth, weakening/widening of rectus abdominis, the importance of safe functional transitions between exercises)
- the importance of practical skills tailored to the needs of antenatal and postnatal participants (including the importance of functional activities, observation, monitoring and cueing skills to ensure safe exercise intensity, toilet and hydration breaks, technique correction (reinforcement of posture, joint alignment), speed of instruction, safe transitions, pelvic floor awareness, pros and cons of different positions to take into account supine and postural hypotensive syndromes,

pelvic girdle pain, carpal tunnel syndrome, rib pain, gastric reflux and low back pain, the standing position for functionality, balance and optimal pelvic floor muscle function, considerations for the exercise environment (including temperature, trip hazards, ventilation, group size, choice/safe use of appropriate equipment)

- common antenatal problems relevant to exercise participation and how to respond to them (risks and symptoms of pelvic girdle pain including the hypermobile woman, knee, back and shoulder pain, fatigue and interrupted sleep patterns, effects on co-ordination, balance, concentration and memory)
- contra-indications to exercise in pregnancy:
 - absolute contra-indications:
 - haemodynamically significant heart disease
 - restrictive lung disease
 - incompetent cervix/cerclage
 - multiple gestation at risk for premature labour
 - persistent second or third trimester bleeding
 - placenta praevia after 26 weeks gestation
 - premature labour during the current pregnancy
 - ruptured membranes
 - pregnancy induced hypertension
 - relative contra-indications:
 - severe anaemia
 - unevaluated maternal cardiac arrhythmia
 - chronic bronchitis
 - poorly controlled type 1 diabetes
 - extreme morbid obesity
 - extreme underweight (body mass index <12)
 - history of extremely sedentary lifestyle
 - intrauterine growth restriction in current pregnancy
 - poorly controlled hypertension/pre-eclampsia
 - orthopaedic limitations
 - poorly controlled seizure disorder
 - poorly controlled thyroid disease
 - heavy smoker
 - warning signs to terminate exercise while pregnant
 - vaginal bleeding
 - dyspnoea before exertion
 - dizziness
 - headache
 - chest pain
 - muscle weakness
 - calf pain or swelling (need to rule out thrombophlebitis)
 - preterm labour
 - decreased foetal movement
 - amniotic fluid leakage
- complications/considerations affecting the resumption of exercise post birth:
 - involution of the uterus
 - placental site healing and lochia (bleeding)
 - secondary postpartum haemorrhage

- air embolism
- thrombosis
- infection (breast/uterine/urinary tract/caesarean wound site)
- pelvic floor trauma/sensation loss/dysfunction/prolapse
- Caesarean section
- abdominal muscle separation
- back or coccyx pain
- pelvic girdle pain
- pelvic torsion or instability
- knee pain
- carpal tunnel syndrome
- anaemia
- establishment of breastfeeding
- postnatal anxiety/depression
- separation anxiety (from baby)
- extreme fatigue
- the added importance of pre-activity screening including relevant information relating to previous pregnancies and births for antenatal and postnatal clients and the legal and ethical responsibilities screening places on the instructor
- the circumstances under which it would be good professional practice to obtain written healthcare provider consent
- relevance, incidence, timing and benefits of the postnatal check
- evidence-based recommended guidelines for the frequency, intensity, type and duration of physical activity for previously active and previously inactive participants
- types of physical activity that should be avoided during pregnancy and recovery from pregnancy and the reasons for avoiding these
- general guidelines on appropriate stretching for antenatal and postnatal participants
- the importance of pelvic floor exercises and how to teach these
- why antenatal participants should avoid hot and humid conditions when exercising
- the importance of regular nutrition, hydration and the avoidance of fatigue and dramatic or sudden weight change for antenatal and postnatal participants
- appropriate clothing, footwear (dropped arches, oedema and over-active hamstrings and calf muscles contribute to changes in feet leading to increased size and the need for greater support during exercise) and breast support for antenatal and postnatal participants
- why it is inappropriate to use babies as a resistance or weight during exercise
- the need to risk assess exercise/physical activity where babies are present
- the importance of checking insurance arrangements where babies are present during exercise/physical activity

SKAEF26 Design, agree and adapt a physical activity programme for participants with cardiac disease

- ethical considerations involved in ongoing maintenance of exercise behaviour (community-based cardiac rehabilitation), including respecting inter-professional boundaries and patient confidentiality
- methods of information collection and interpretation, appropriate storage of confidential records and management processes encountered in running ongoing maintenance of exercise behaviour (Phase IV cardiac rehabilitation)

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- process of atherosclerosis
- causes, presentation, diagnosis and treatment of the following:
 - angina
 - Acute Coronary Syndrome-Angina/Myocardial Infarction (STEMI/NSTEMI)
 - heart failure
 - valvular heart disease
 - arrhythmias
 - cardiomyopathy
- investigations for cardiac disease
 - resting and exercise electrocardiogram
 - echocardiogram
 - angiogram
 - nuclear imaging
- interventions for cardiac disease, for example:
 - revascularisation – percutaneous coronary intervention (PCI) and coronary artery bypass grafting (CABG)
 - implantable devices
 - valve surgery
 - transplantation
- the range of cardiac medications and their exercise considerations
- components of inpatient and outpatient cardiac rehabilitation
- monitoring intensity methods, such as heart rate and perceived exertion
- exercise considerations for the patient/client with, for example:
 - complex cardiac patient, such as associated heart failure, implantable cardioverter defibrillators (ICDs) and permanent pacemakers (PPMs)
 - diabetes (type 1 and type 2)
 - hypertension
 - obesity
 - peripheral vascular disease
 - pulmonary disease
 - osteoarthritis/rheumatoid arthritis/osteoporosis
- mental health and mental health promotion in a cardiac population

SKAEF27 Plan, prepare, deliver and review a strength and conditioning programme

- fundamental aspects of sport science
 - physiology
 - biomechanics
 - psychology
 - injury epidemiology
- needs analysis and target setting
 - the different types of sport classification, the positional demands or event specifics and the associated physical quality requirements

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- how the rules of the sport affect the demands placed on the athlete
- how to research, analyse and determine the unique attributes and demands of any sport or performance activity
- how to identify measurable physical qualities for the performance activity
- how physical/physiological requirements relate to specific performance factors
- the methodology associated with gathering information
- how to identify measurable physical qualities for the athlete
- how to create performance targets that are specific, measurable, achievable, realistic and time bound, and why this is important
- the methods of presenting agreed performance targets to the athlete and support team
- which tools can be used to evaluate progression towards a target and why they need to be aligned with the previous evaluation status of the athlete
- how to revise performance targets in line with regular review processes
- the frequency of evaluating and reviewing performance necessary to support achievement of targets
- how to present performance targets in a clear format suitable for the athlete, technical coach and support team
- how to employ different methods of communication tailored for different audiences
- programme design
 - why it is important to plan a structured and sequential strength and conditioning programme to support progression of performance
 - why it is important for the athlete and support team to understand and agree the programme
 - the structure of the competitive cycle and performance goals set
 - common strategies for planning and systems of training
 - the implications of the performance calendar on the planning of training
 - the implications of the athlete's training and injury history on the planning of training
 - the implications of the athlete's current status on the planning of training
 - the implications of logistical factors such as time, facility and equipment availability
 - the role of evidence in planning programme structure, and making choices on training activity selection
 - the interaction between training activity, intensity, volume and the need for recovery
 - strategies to monitor and evaluate training load retrospectively based on programme outcomes
 - biomechanics and motor control aspects relating to transfer of training effects and therefore the process of selecting training activities
 - skill acquisition relating to development and progression of movement competency and transfer of training effects
 - psychology relating to engagement and motivation
 - injury preventative effects and risk from activities selected in the programme
 - how to structure a training plan in proximity to key agreed performance dates such as to maximise performance, commonly referred to as peaking

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- how to present a programme in an understandable and useable format for the athlete and support team
- how to make decisions about programme efficacy based on ongoing data collection
- how to effectively modify the programme based on perceived programme efficacy or changes in circumstance such as injury or changes to performance calendar
- training effects, responses and adaptation
 - fundamental aspects of adaptation such as specificity, overload, progression, recovery and reversibility
 - physiological aspects of adaptation to imposed training stress including the time necessary for substantive adaptation change
 - timeframes required for desired adaptations related to performance targets
 - how to structure timeframes of performance targets with respect to adaptation processes; the process of accumulating adaptation responses
 - the effects of contrasting stimuli for adaptation imposed in close proximity, often described as an interference effect
 - anticipated acute responses to completion of training activities
 - adaptation change achievable in different aspects of the athlete's structure and function, including but not limited to;
 - muscular hypertrophy (fibre type specificity, pennation changes)
 - changes in muscle recruitment (magnitude, order and distribution)
 - changes in blood volume and constituency
 - changes in structure of blood supply network
 - changes in mass, quality and function of connective tissues
 - the nature and magnitude of stress imposed by different training activities, volumes and intensities of training
 - the mechanisms of fatigue and implications for delivery of training stress and demand for recovery
 - evidence and accepted best practice regarding strategies and interventions to optimise recovery and adaptation following training
- evidence informed practice
 - the role of evidence in underpinning the coaching process
 - how to find and interpret evidence relating to training practice
 - how to collect and interpret accurate and appropriate information/data
 - how to access and interpret different forms of peer reviewed evidence
 - the relative merits of different forms of evidence
 - the information needed to be collected and included in an athlete's profile and/or that of athletes within a team
 - the strengths and weaknesses of the various methods of collecting information for different types of athletes, to include but not limited to aspects of validity and reliability; importance of control during data collection; relative merits of testing, monitoring and predictive screening
 - appropriate formats for recording information

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- how to organise information in a way which will help you to interpret and analyse it
- how to analyse and interpret collected information so that you can identify athlete performance targets
- how to analyse data to clearly demonstrate strengths and weaknesses based on testing results
- how to respond to information available from assessment of an athlete's status
- what constitutes meaningful change in performance on tests or in monitoring data
- the legal and ethical implications of collecting information about athletes including consent, storage and distribution
- effective communication and collaboration
 - how to communicate effectively with the athlete, technical coach and support team
 - how to communicate effectively to come to agreement on the interpretation of available evidence
 - the importance of and how to communicate with athletes and/or teams as well as coaches and other support practitioners to elicit an effective and productive environment
 - how to communicate effectively to foster agreement and engagement with the programme
 - how to collaborate, and who with, to ensure appropriate information is provided from outside the strength and conditioning skill domain including but not limited to:
 - injury information and related screening from a physiotherapist
 - health information
 - why it is important to work together with the athlete, coaches and the wider support team to agree performance targets and activities
 - the importance of sharing and agreeing roles and responsibilities of the athlete and wider support team
 - establish a rapport and agree and identify the roles and responsibilities with the athlete and support team
- session delivery
 - the aims, content and rationale of the of the training plan from which a session is drawn, including the knowledge base utilised to design the programme
 - why the manner of delivery is important to outcomes of the strength and conditioning programme
 - the importance of and how to give effective explanations, demonstrations or instructions
 - the importance of and how to evaluate understanding from the athlete
 - how to foster development of a motivated athlete engaged in the strength and conditioning programme
 - accepted principles of coaching
 - how to modify behaviour to support achievement of aims of the training unit
 - how to manage delivery of training unit to minimise risk of injury
 - strategies for evaluating athlete status and readiness to train
 - how to manage and maintain engagement of individuals and groups taking into account group dynamics, individual motivations and training partner/group selection

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- potential benefits offered by a warm-up
- warm-up activities and structure to best capitalise on potential benefits
- models of competent movement for training activities used in strength and conditioning
- modifications to movement models based on aims/objectives of the training unit or limitations of the athlete
- how to observe and analyse existing competence of the athlete
- skill acquisition principles and current evidence to support best practice in design and management of session activities with a view to skill development and learning. This includes but is not limited to;
 - organisation of practices
 - modification of constraints upon, and aims of, practices
 - delivery of feedback
- how to effectively observe, give feedback and evaluate progress when working with athletes and athletes within groups
- how to progress and regress exercises according to the needs of an athlete or athletes within a group
- best practice guidelines and evidence relating to session management variables such as activity/exercise selection and order, movement tempo, intensity, volume, work distribution/division and recovery periods
- strategies for monitoring outcomes from training unit which might include but not be limited to; volume-load; rating of perceived exertion; heart rate; time
- how to effectively record session outcomes and modifications
- the potential benefits of session-end cool-down activities and prescription to best capitalise on potential benefits
- first aid attained through a recognised first-aid education provider
- how to evaluate and manage risk