



My@Campus

Learner Guide

SPOA3 Specific Populations and Older Adults



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Unit Introduction

Welcome to the **SPOA3 Specific populations** course cluster of units. A cluster of units is a group of units that are clustered together to achieve a set of learning outcomes.

The name given to this cluster of units is SPOA3. Below is a list of the units contained within this cluster of units:

- **SISFFIT002** Recognise and apply exercise considerations for specific populations
- **SISFFIT014** Instruct exercise to older clients

Before you begin please read through the following frequently asked questions.

What is the full name of the course award I am working for?

Successful completion of this course can count towards several qualifications. Check your registration details for the qualification you are working towards.

How much work is involved?

Whichever qualification you are working towards will have a number of units of competency you are required to complete.

We recommend that, to successfully meet the requirements of each cluster of units for this course, you plan to complete one cluster of units of study per month. You will receive your personalised study plan two weeks after your enrolment date. This study plan is a structured plan which allocates a manageable study timeframe, with the allocation of additional months at the end of your study period.

This will enable you to read through the materials, undertaking a range of activities which focus on this cluster of Units. Then you will be ready for the final assessments at the end of this Cluster of units.

If I get stuck or need help, what is available?

The Technical Panel is available to support you during business hours, from Monday to Friday (excluding public holidays). You may book a phone coaching session with a Technical Advisor by emailing your questions to fitness.support@aipt.edu.au. One of the Technical Advisors will respond to you within two business days. In the meantime, whilst you are waiting for a response, we recommend that you continue working through your cluster of units learning activities.

Aim: What is this cluster of units about, and what will be expected of me?

SISFFIT002:

This unit describes the performance outcomes, skills and knowledge required to recognise exercise considerations common to specific population groups. It requires the ability to understand anatomical and physiological considerations and apply that understanding to client exercise participation aimed at improving health-related components of fitness.

This unit applies to fitness instructors working within the industry endorsed scope of practice when providing advice regarding fitness services and referral requirements for clients from the following specific population groups:

- Children
- Women
- Older adults
- Clients with a disability
- Culturally and linguistically diverse (CALD) groups.

This unit does not apply to provision of exercise to higher risk specific population clients, or inappropriate exercise prescription for moderate risk clients.

This unit applies to fitness instructors who typically work independently with some level of autonomy in a controlled environment. Work is performed according to relevant legislation including working with children and/or vulnerable people checks, and organisational policies and procedures.

No occupational licensing, certification or specific legislative requirements apply to this unit at the time of publication.

SISFFIT014:

This unit describes the performance outcomes, skills and knowledge required to plan, instruct and evaluate exercise for male clients aged forty five and over, and female clients aged fifty five and over. It requires the ability to provide instruction of exercise programs aimed at improving health and fitness for older clients, with consideration of aspects of healthy ageing. It also covers promotion of incidental physical activity to clients to minimise the risk of developing sedentary lifestyle behaviours. It involves using industry endorsed risk stratification procedures when determining the provision of suitable advice and referral requirements.

This unit applies to fitness instructors who work in a variety of fitness locations such as fitness, leisure and community centres. These individuals typically work independently with some level of autonomy in a controlled environment.

Work is performed according to relevant legislation and organisational policies and procedures.

No occupational licensing, certification or specific legislative requirements apply to this unit at the time of publication.

Learning objectives: What should I be able to do, when I have successfully achieved this cluster of units?

We are working with you to support you in developing your competence in the following areas:

SISFFIT002 :

- i. Identify client fitness requirements.
- ii. Develop program plans.
- iii. Conduct exercise sessions.
- iv. Evaluate program.

SISFFIT014:

- i. Identify client fitness requirements.
- ii. Develop program plans.
- iii. Instruct exercise session.
- iv. Evaluate program.

What kind of work will I have to undertake and complete?

This is an online learning course, which is different from learning in the traditional classroom. You can work at your own pace, refer to your own past experiences and seek support, when needed. Each time you read and complete a set of information, save that work and return to it, if you wish to revise or review, at any time. Work through one module at a time. It will take time to adapt to online learning, so be fair to yourself, and allow yourself time to get used to this new and exciting way of developing your skills and knowledge!

How many modules are in this cluster of units?

There are **seven** modules to be completed within this cluster of units. They are:

1. Introduction, client requirements and health professionals
2. Exercise considerations in children and adolescents
3. Exercise considerations for women
4. Exercise considerations for clients with disabilities and neurological disorders
5. Exercise considerations for culturally and linguistically diverse groups
6. Exercise considerations for the older person and instructing exercise programs in the older population
7. Prescribing exercise for elderly with medical conditions

How are the modules presented?

Each module will provide you with an introduction and overview of information.

When do I get assessed?

You will submit your assessments at the end of this cluster of units. You can of course ask for help before or during your studies if you wish. Please feel free to read through the assessments at any time.

How will I be scored/ assessed?

The Assessor is looking for a demonstration of your competence in this cluster of units. There are four assessment items for each cluster of units. Each of the four assessment items must be assessed as 'Satisfactory'. If any assessment item is assessed as 'Not Yet Satisfactory', this means that the item does not meet the cluster of units standards/requirements. You will then be required to review and resubmit the assessment item/s. The Assessor will provide comments for you for the purpose of assisting in revising and reviewing your submission to meet cluster of units standards and criteria. Professional AIPT assistance is also available for you, on request.

The final assessment outcome of the cluster of units will recognise you to be 'Competent' in each of the individual units that make up this cluster of units. This can only be confirmed when all four assessment items are assessed as "Satisfactory". You will not be deemed "Competent", until all four assessment items are separately assessed as "Satisfactory". This is the basis on which all vocational (work-based) training is assessed. Please note that neither scores nor grades are issued to candidates within the competency-based assessment process.

Additional learning aids (subject to availability)

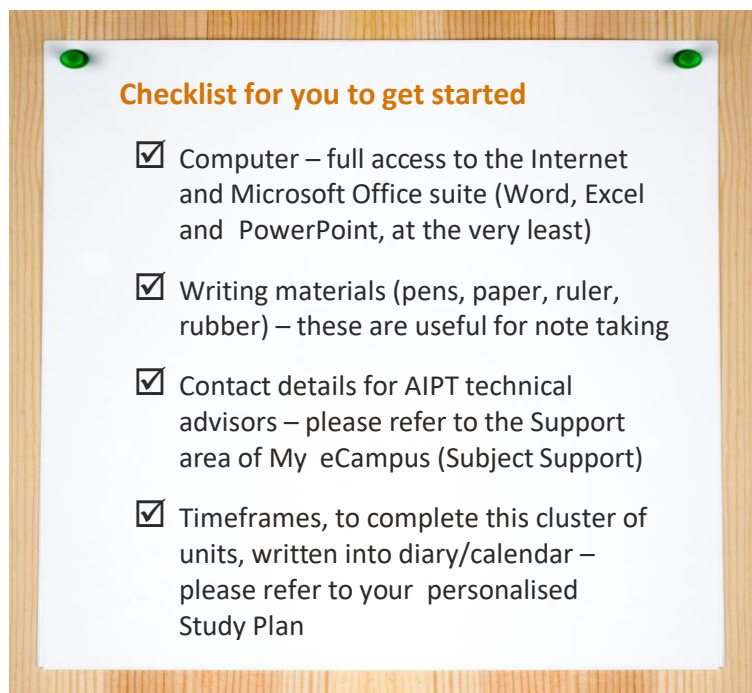
- eLibrary of templates and resources available for you to use
- Video clips to enhance your e-learning (subject to availability)
- Webinars can be organised (subject to availability and numbers)
- Online chat forums are encouraged (subject to availability).

AIPT is committed to, and continuously reviews, the design and development of their contemporary eLearning tools and resources to support you, in your studies. However, resources will be subject to availability.

Recommendation to make the best use of your time

We recommend that you attempt to complete at least one cluster of units per month. A minimum of 12 hours per month should be set aside in a quiet area where there are minimum interruptions for you. This time is YOUR investment in YOUR learning and, in YOUR success.

Great! I think we are ready to get started. Please work through and complete the following checklist, to ensure you have the tools needed to get started.



To be successful within this cluster of units, we need you to demonstrate your competence. What does that mean for you?

To be competent is to: Demonstrate your skills, knowledge and attributes for completing a task/job to national standards.



Tip:

Read through and identify any area/s in which you may wish to undertake personal research prior to commencing your studies.

Remember that AIPT has Technical Advisers who are available to work with you after you have commenced your studies. When contacting them (preferably by email), list the key questions or queries you have. By doing so, you will enable them to assist you in the best possible way. Telephone appointments are also available by booking through Student Services! Their email address is fitness.support@aipt.edu.au.

So, let's look at the 'competencies' that are to be demonstrated, within this cluster of units.

SISFFIT002:

Performance Evidence

Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the job role, and:

- Use industry endorsed pre-exercise screening tools and risk stratification processes to identify the risk level of at least ten clients across the following specific population groups:
 - Children and adolescents
 - Women
 - Older adults
 - Clients with a disability
 - Culturally and linguistically diverse (CALD) groups
- Prepare referral letters to relevant medical or appropriate allied health professionals with supporting pre-exercise health screening documentation for a client from each specific population group
- Plan, document, implement and evaluate suitable exercise programs within scope of practice for specific population clients:
 - Five clients that don't require guidance or instruction provided by medical or allied health professionals
 - Five clients in response to guidance or instruction provided by medical or allied health professionals
- Conduct sessions that incorporate:
 - Appropriate selection and monitoring of a range of gym-based cardiovascular and resistance equipment, according to industry guidelines
 - Demonstration, explanation, and instruction of exercises
 - Injury prevention strategies specific to client needs and program
 - Suitable order and sequence of activities
 - Session components that target the needs and goals of the individual
 - Suitable duration, intensity, volume
 - Ongoing clear and constructive feedback to clients and, where required, medical or allied health professionals
 - Use of evidence based exercise adherence strategies specific to the population groups
- Modify programs for clients, addressing at least three of the following:
 - Technical requirements
 - Changing needs due to fitness adaptations
 - Changing goals
 - Client needs, objectives, likes and dislikes
 - Technical difficulty adjustments of exercises
 - Medical or allied health professional feedback
- Conduct periodic ongoing evaluation of outcomes from fitness programs in accordance with the established program goals and industry best practice.

Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit:

- Legislative and regulatory requirements regarding specific population exercise participation:
 - Child protection
 - Privacy
 - Anti-discrimination
 - Work health and safety/occupational health and safety
 - Duty of care
- Organisational policies and procedures in regards to specific population exercise participation:
 - Industry endorsed risk management protocols, exercise implications and referral requirements
 - Overcrowding
 - Ventilation and/or climate control
 - Hygiene
 - Emergency
 - Standards of personal presentation
 - Participant's clothing and footwear
 - Use, care and maintenance of equipment
- Industry endorsed client pre-exercise screening processes
- Industry endorsed risk stratification procedures, exercise implications and referral requirements for:
 - Low-risk clients
 - Moderate risk clients
 - Higher risk clients
 - When there are extreme or multiple risk factors present and professional judgement to decide whether further medical advice is required identification of clients at high or higher risk of an adverse event occurring during exercise
 - Physical activity and exercise intensity and frequency guidelines
- Precautions to exercise relevant to the specific population in accordance with industry guidelines where applicable
- Benefits versus risk of participation
- Situations where cessation of exercise program is required, this may include but is not limited to:
 - Chest pain at rest or during activity
 - Severe breathlessness/feeling faint/dizziness/loss of balance
 - Unusual fatigue or shortness of breath
 - Asthma aggravation/attack
 - Significant muscle, bone or joint pain (beyond what is normally expected during exercise)
 - A situation whereby the fitness professional makes a judgement that continuing the session is beyond their professional capabilities and scope of practice, and could potentially compromise client health and safety
- Signs and symptoms of poor exercise tolerance or unstable condition

Knowledge Evidence	• Role of medical or allied health professionals for referral processes: - Accredited exercise physiologist - Accredited practising dietician - Chiropractor - Continence nurse advisor - General practitioner - Occupational therapist - Osteopath - Physiotherapist - Podiatrist - Psychologist - Remedial massage therapist - Sports doctor - Sports physician • Typical anatomical and physiological considerations for the following specific population groups: - Children - Women - Older adults - Clients with a disability - CALD groups • Appropriate management for signs and symptoms of intolerance or an unstable condition: - Cease or modify exercise - Refer to a medical or allied health professional - Call an ambulance if required • Potential or actual effect of the condition on exercise behaviour • Exercise adherence strategies.
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SISFFIT014:

Performance Evidence	Evidence of the ability to complete tasks outlined in elements and performance criteria of this unit in the context of the job role. This must include period(s) totalling at least five hours comprising at least five different client contact sessions and: • Use industry endorsed pre-exercise screening tools and risk stratification processes to identify the risk level of at least ten older clients • Prepare referral letters to relevant medical or appropriate allied health professionals with supporting pre-exercise health screening documentation for at least two older clients • Plan, document, implement and evaluate suitable exercise programs within scope of practice for older clients: - Three clients that don't require guidance or instruction provided by medical or allied health professionals - Two clients in response to guidance or instruction provided by medical or allied health professionals
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Performance Evidence	- Conduct sessions that incorporate: - Appropriate selection and monitoring of a range of equipment appropriate for the client's functional ability, according to industry guidelines - Demonstration, explanation, and instruction of exercises - Injury prevention strategies specific to client needs and to minimise the risk of falls - Suitable order and sequence of activities - Session components that target the needs and goals of the individual - Suitable duration, intensity, volume - Ongoing clear and constructive feedback to clients and, where required, medical or allied health professionals - Use of evidence based exercise adherence strategies - Minimise the risk of falls - Variations and structure suitable to the needs of the older client - Provision of hydration and rest opportunities as required - Explanation of the role of exercise and incidental physical activity in prevention of chronic diseases and functional decline that may or may not be associated with ageing and reducing the risk of falls - Modify programs for clients, addressing at least three of the following: - Technical requirements - Changing needs due to fitness adaptations - Changing goals - Client needs, objectives, likes and dislikes - Technical difficulty adjustments of exercises - Medical or allied health professional feedback - Conduct periodic ongoing evaluation of outcomes from fitness programs in accordance with the established program goals and industry best practice.
Knowledge Evidence	Demonstrated knowledge required to complete the tasks outlined in elements and performance criteria of this unit: - Legislative and regulatory requirements regarding specific population exercise participation: - Privacy - Anti-discrimination - Work health and safety/occupational health and safety - Duty of care - Organisational policies and procedures in regards to specific population exercise participation: - Industry endorsed risk management protocols, exercise implications and referral requirements - Overcrowding - Ventilation and/or climate control - Hygiene - Emergency - Standards of personal presentation - Participant's clothing and footwear - Use, care and maintenance of equipment - Precautions to exercise relevant to the older adults in accordance with industry guidelines where applicable - Signs and symptoms of exercise intolerance and appropriate management strategies

- Awareness of major types of injuries or conditions that may present in older clients that may require referral to a relevant medical or appropriate allied health professional:
 - Sprains
 - Musculoskeletal
 - Cardiovascular
 - Respiratory
 - Other
- Importance of strength and balance training in falls prevention
- Exercise considerations in regards to the following components of ageing process, injuries and conditions:
 - Physiological
 - Biomechanical
 - Psychological
 - Behavioural change and social needs
 - Lifestyle and cultural
 - General population characteristics
- Awareness of the following injury risks or considerations that may be related to older clients:
 - Inadequate skill and physical preparation
 - Overtraining
 - Biomechanics and exercise technique
 - Physical and mental preparation
 - Poor core and postural awareness
 - Fatigue and recovery
 - History of falls
 - Incontinence
- Common barrier to exercise participation:
 - Perceived versus actual barriers
 - Initial low fitness level
 - Time and access to facilities
 - Self-consciousness in client
- Methods to overcome barriers to exercise adherence:
 - Goal setting
 - Feedback
 - Healthy habits
- Health-related components of fitness:
 - Body composition
 - Flexibility
 - Muscle strength
 - Muscle endurance
 - Cardiovascular endurance

Knowledge Evidence	• Benefits of exercise related to older populations: - Increased muscle mass - Maintenance of bone health - Joint health - Minimising fat levels to prevent disease - Improved ability to function in everyday tasks and reduced risk of functional decline that is often associated with ageing - Prevention of chronic disease related to sedentary lifestyles and ageing - Reduced risk of falls • Concepts of healthy ageing • Risks of leading a sedentary ageing lifestyle: - Falls - Low bone density - Cardiovascular deficiency.
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Standards established to assess you

As you will learn over the course of this cluster of units, to assess any performance requires that a minimal standard or standards (or benchmark) be achieved. This is written into a Performance Criterion.

A Performance Criterion will clearly state WHAT is to be demonstrated for assessment to be successful. The performance criteria for this cluster of units are set by the Australian Qualifications Framework (AQF).

Performance criteria

SISFFIT002:

1. Identify client fitness requirements.	1.1 Consider and confirm client needs, expectations and preferences using suitable questioning techniques. 1.2 Review and advise client of outcomes of pre-exercise health screening procedures. 1.3 Refer client to medical or allied health professionals as required. 1.4 Identify potential barriers to participation. 1.5 Develop and document client profile for re-evaluation purposes.
2. Develop program plans.	2.1 Determine type of training, training methods and equipment required to achieve client goals. 2.2 Incorporate guidance/advice from medical or allied health professionals into the provision of fitness advice/or planning of instruction. 2.3 Develop and document program plans that incorporate key instructional information to target components of fitness, including guidance from medical or allied health professionals if required. 2.4 Explain benefits of exercise and anticipated structural and physiological adaptations as they relate to client goals and needs. 2.5 Develop customised training sessions that include a variety of exercises and equipment to meet client needs.

	2.6 Discuss and confirm client understanding of potential signs and symptoms of intolerance, precautions or contraindications to exercise and recommended precautions.
3. Conduct exercise sessions.	3.1 Allocate sufficient space, assemble resources and check equipment for safety and maintenance requirements. 3.2 Provide clear exercise instructions and confirm client understanding. 3.3 Demonstrate exercises, techniques and equipment to client. 3.4 Monitor participation and performance to identify signs of exercise intolerance and modify as required. 3.5 Monitor client intensity, techniques, posture and safety, and modify program as required. 3.6 Seek ongoing guidance from, or refer client to, medical or allied health professionals, as appropriate. 3.7 Select and use communication techniques that encourage and support clients. 3.8 Modify session as required considering basic mechanics, safety and fitness outcomes. 3.9 Respond to clients experiencing difficulties and answer questions as required. 3.10 Complete session documentation and progress notes.
4. Evaluate program.	4.1 Monitor and evaluate exercise program at appropriate intervals. 4.2 Provide written and verbal feedback to medical or allied health professionals, as required. 4.3 Request and respond to feedback from clients. 4.4 Review own performance and identify areas needing improvement. 4.5 Identify aspects needing further emphasis or attention in future sessions. 4.6 Evaluate program or activities and discuss modifications to program. 4.7 Document and update records of evaluation and modification of programs.

SISFFIT014:

1. Identify client fitness requirements.	1.1 Consider and confirm client needs, expectations and preferences using suitable questioning techniques. 1.2 Review and advise client of outcomes of pre-exercise health screening procedures. 1.3 Refer client to medical or allied health professionals as required. 1.4 Select and use appropriate baseline functional capacity or fitness assessments, as required. 1.5 Identify common barriers to exercise participation by older clients. 1.6 Recognise and explain benefits of exercise for older populations and the role of exercise in reducing risks associated with ageing. 1.7 Receive guidance from medical or allied health professionals for exercise participation, as required. 1.8 Develop and document client profile for re-evaluation purposes.
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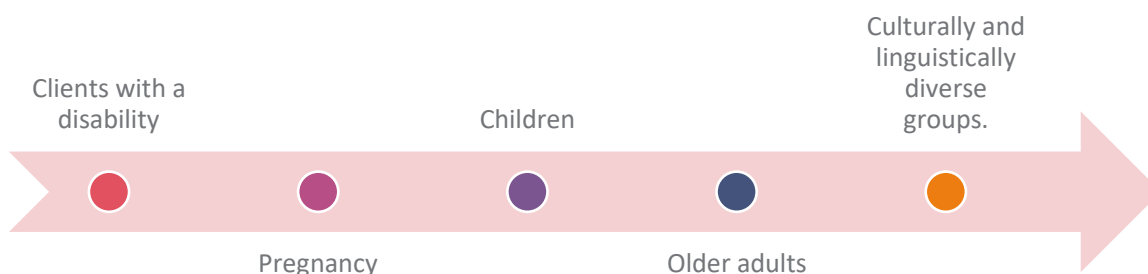
2. Develop program plans.	2.1 Identify settings and program considerations that support safe and sustainable exercise participation for older clients. 2.2 Determine type of training, training methods and equipment required to achieve client goals. 2.3 Develop and document program plans that incorporate instructional information and guidance from medical or allied health professionals if required. 2.4 Explain benefits of exercise and anticipated structural and physiological adaptations as they relate to client goals and needs. 2.5 Develop customised training sessions that include a variety of exercises and equipment to meet client needs. 2.6 Discuss and confirm client understanding of potential signs and symptoms of intolerance contraindications to exercise and recommended precautions.
3. Instruct exercise session.	3.1 Allocate sufficient space, assemble resources and check equipment for safety and maintenance requirements. 3.2 Provide clear exercise instructions and confirm client understanding. 3.3 Demonstrate exercises, techniques and equipment to client. 3.4 Explain any precautions for exercise relevant to client age, ability and risk status. 3.5 Monitor participation and performance to identify signs of exercise intolerance and modify as required. 3.6 Monitor client intensity, techniques, posture and safety, and modify program as required. 3.7 Seek ongoing guidance from, or refer client to, medical or allied health professionals, as appropriate. 3.8 Select and use communication techniques that encourage and support clients. 3.9 Modify session as required considering basic mechanics, safety and fitness outcomes. 3.10 Respond to clients experiencing difficulties and answer questions as required. 3.11 Complete session documentation and progress notes.
4. Evaluate program.	4.1 Monitor and evaluate exercise program at appropriate intervals. 4.2 Provide written and verbal feedback to medical or allied health professionals, as required. 4.3 Request and respond to feedback from clients. 4.4 Review own performance and identify areas needing improvement. 4.5 Identify aspects needing further emphasis or attention in future sessions. 4.6 Evaluate program or activities and discuss modifications to program. 4.7 Document and update records of evaluation and modification of programs.

Module one: Introduction, client requirements and health professionals

SECTION 1 – INTRODUCTION TO THE UNIT

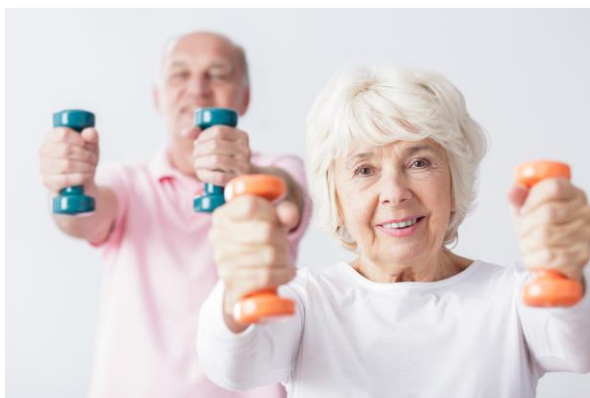
This subject is going to provide the learner with key information about the appropriate exercise programs for specific populations within the community. The subject will examine a number of different medical conditions that will impact men, women, children and the elderly and the recommended exercise regime.

It will also examine a number of specific populations including:



The final module in this program will examine the key aspects around instructing exercise to older clients. This module will detail a range of important aspects relevant to training the older client to help them achieve their outcomes they desire for their physical health; in effect this module will cover the following:

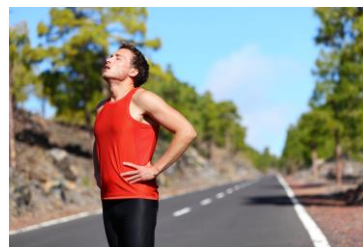
- Typical anatomical and physiological considerations
- Benefits of exercise for older adults
- Importance of strength training and balance training for falls prevention
- Precautions to exercise testing for older adults
- Common barriers to exercise participation
- Exercise considerations during the aging process
- Monitoring older clients
- Promoting physical activities in older clients
- Conditions that affect older clients.



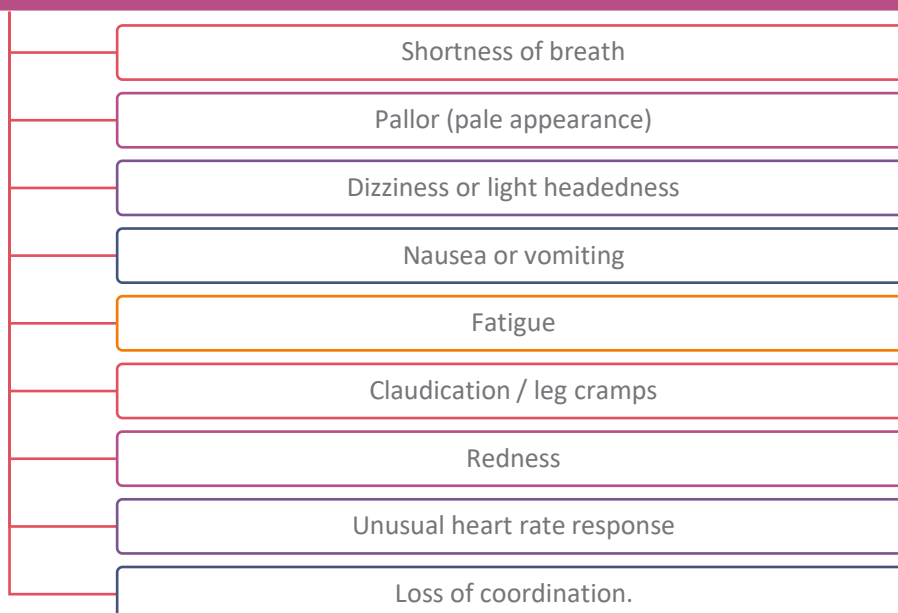
SECTION 2 – EXERCISE DELIVERY PROGRAM

The delivery of an exercise program needs to take into consideration the guidelines specific to the individual's condition, under the supervision of an appropriate medical or Allied Health professional.

It is the responsibility of a personal trainer to constantly monitor their clients and be aware of any adverse signs or symptoms they may display. These could indicate a possible heart problem, respiratory problem, or metabolic issue and can lead to serious complications.



If your client displays any of the signs and symptoms below, it is crucial that you stop the session **immediately**.



Program modification

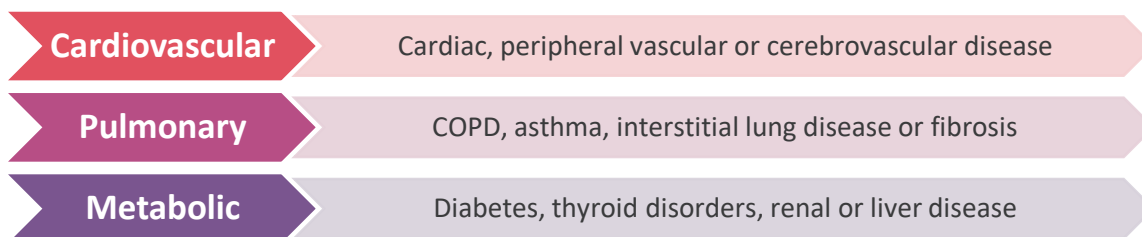
Modifications that may be needed for exercise programs for a client who is classified as specific population is detailed in the following table.

Exercise Program	Modifications
Gentle exercise or group exercise sessions	• Shorter duration • Longer rest durations • Lower intensity • Low or no impact • Rest stations around the room
Stretching session	• Standing options • Light options and progressions
Resistance training	• Supported exercises • Longer rest periods • Seated options

Exercise Program	Modifications
	• Decreased intensity • Supervision
Aerobic or endurance training	• Shorter duration • Seated options • Temperature regulated • Supervision
Aqua therapy or classes	• Shallow water • Railing around pool edge • Ramps for access • Temperature regulated • Flotation devices

ACSM risk stratification

To assign a client into a risk category, a process of risk stratification is required. A client is classified into low, moderate or high risk. It is based on the presence or absence of known disease, signs and symptoms or cardiovascular disease risk factors.



Major signs and symptoms suggestive of cardiovascular, pulmonary or metabolic disease include:

- Pain or discomfort in the chest, neck, jaw, arms or other areas that may result from ischemia
- Shortness of breath at rest or with mild exertion
- Dizziness or syncope
- Orthopnoea or paroxysmal nocturnal dyspnoea
- Ankle oedema
- Palpitations or tachycardia
- Intermittent claudication
- Known heart murmur
- Unusual fatigue or shortness of breath with usual activities

Cardiovascular risk factors include:

- Age
- Family history
- Current cigarette smoking
- Sedentary lifestyle
- Obesity
- Hypertension
- Dyslipidaemia
- Pre-diabetes



Web

For additional information on risk stratification, read the chapter available here:

[Chapter 2: Preparticipation Health Screening and Risk Stratification:](#)

Pay particular attention to Figure 2.3 on page 24 and Figure 2.4 on page 32.

Figure 2.3 assists with risk assessment, Figure 2.4 informs decisions related to risk stratification (GTX stands for Graded Exercise Test- known in Australia as an exercise electrocardiogram, exercise ECG, or cardiac stress test.)

Definition of Terms

Ischemia: Is defined as an inadequate blood supply to an organ or part of the body.

Syncope: Is defined as a loss of consciousness caused by a temporary lack of oxygen to the brain.

Dyspnoea: Is defined a difficulty and uncomfortable ability to breathe

Oedema: Is defined as fluid retention

Tachycardia: Is defined as an abnormally rapid heart rate

Heart murmur: Is defined as an abnormal sound made by the heart when blood flow occurs in the wrong direction.



Individuals classified as high risk must gain medical clearance prior to fitness testing, programming or exercise participation. It is recommended that those classified as moderate risk do so also.

More in-depth outcomes of risk stratification include:

Referral to a medical or Allied Health professional for further medical evaluation and clearance (high risk)

Referral for clinical testing (high risk)

Medical or Allied Health professional present for submax testing (high risk)

As a fitness instructor, you are bound by the limitations of your knowledge and experience to deliver best practice within duty of care when performing a fitness test and prescribing a fitness program or exercise for a client. This is why it is important that those individuals identified as moderate and high risk gain a medical clearance. It is also important that suitably qualified medical and Allied Health professionals (noted above) are involved in the complex exercise induction and reprogramming processes for the client. This ensures a safe and effective program.

There are some programs currently available for specific population groups or clients. These include:

Heart Moves:	• http://www.health.gov.au/internet/publications/publishing.nsf/Content/healthy-comm-lgag-att_c-toc~healthy-comm-lgag-att_c-heartmoves
Lungs in Action:	• http://lungsinaction.com.au
Stronger for Longer:	• http://www.illswa.org.au
Active Ageing:	• http://www.activeageingaustralia.com.au
BEAT IT:	• http://www.australiandiabetescouncil.com/events/beat-it
Lift for Life:	• http://www.liftforlife.com.au

Referrals

A referral is when someone is recommended to another individual. In the case of fitness instructors, it occurs when a client presents with signs and symptoms outside the scope and expertise that the fitness instructor possesses. A referral to a medical or Allied Health professional would be sought. Individuals classified as high, and possibly moderate risk, will need to have medical clearance granted prior to participation in fitness testing, programming and exercise.



Clients who present with contraindications to exercise also need to be referred to medical and Allied Health professionals. It may be that the risk of participation outweighs perceived benefits, or the contraindications may be absolute or relative. Absolute is when exercise is to be ceased. Relative means that exercise may continue in the absence of triggers or symptoms with clearance.

In Australia a common source used to obtain information regarding pre-exercise screening and referral protocol is Fitness Australia. Fitness Australia is not for profit industry association that provides industry advice and standards for fitness professionals. Exercise professionals can download a variety of free resources from the Fitness Australia website on pre-exercise screening and the referral process from accessing the following link: <https://fitness.org.au/articles/policies-guidelines/exercise-referral-kit/4/19/20>

Exercise may also be ceased and a referral may be necessary for the following reasons:

- Client experiences adverse signs and symptoms
- Onset of angina or like symptoms
- Drop in blood pressure >10mmHG from baseline
- Excessive rise in blood pressure >250 Systolic Blood Pressure or >115 Diastolic Blood Pressure
- Shortness of breath, wheezing, leg cramps or claudication (limping- a condition in which cramping pain in the leg is induced by exercise, typically caused by obstruction of the arteries)
- Signs of poor perfusion – light-headedness, confusion, ataxia, pallor, cyanosis, nausea, cold/clammy skin
- Failure of heart rate to rise with increased intensity
- Noticeable change in heart rhythm
- Physical or verbal manifestations of severe fatigue
- Client requests to stop
- Client experiences an emergency situation



Medical and Allied Health Professionals and their roles:

- **General practitioner** – point of call for most clearances, tests, diagnosis and referrals
- **Sports medicine physician or doctor** – diagnosis and treatment of sports specific performances, injuries and illnesses
- **Physiotherapists** – diagnosis and treatment of biomechanical issues
- **Accredited exercise physiologist** – exercise prescription for chronic and complex conditions
- **Accredited exercise scientists** – exercise testing and prescription for sports specific performance
- **Accredited dietitians** – diagnosis of food allergies/intolerances, assistance with food choices and diet
- **Psychologists** – assistance with mental performance and dealing with issues
- **Occupational therapist** – identification of aides needed in the house and work environment
- **Remedial massage therapist** – treatment of soft-tissue tightness
- **Chiropractor** – treatment of spinal issues
- **Osteopath** – holistic treatment of musculoskeletal issues
- **Continence nurse advisor** – assistance with continence issues such as exercise, prevention and treatment
- **Aboriginal health worker** – specialises in assisting aboriginals with their health needs
- **Diabetes educator** – specialist in treatment of diabetes



Referral organisational policies and procedures



- OHS
- Record management
- Privacy and client confidentiality
- Equal opportunity
- Freedom of information
- Referral requirements
- Risk management plan
- Medical clearance
- Collection and use of client information

Each of these components are described below in more detail.

Referral process

Referring

A referral may be granted to any of the above mentioned medical or Allied Health professionals when:

- Risk stratification is moderate or high
- Client requests one
- Ongoing contact is not contributing to the individual's recovery
- Current healthcare provider can't offer services required
- Working relationship is affected by non-positive provider/client relationship
- Unable to devote or provide the required times

Once it has been decided that a referral will be granted, the client's consent is needed and the reasons must be explained and understood. A referral may be hard copy or electronic and must be with the client's permission. It must contain information such as the client's assessment and purpose of referral and it must be signed and dated. Once the referral has been delivered (electronically, fax, post, or hand), a follow-up phone call is best practice. All paperwork must be kept on your client's record/file.



Below is the referral process flowchart from Fitness Australia

Essential components of successful referrals	
1. Screen and assess	Identify client health risks and determine your client needs
2. Evaluate	Know your scope of practice and evaluate whether you require guidance from a health professional to meet your client needs
3. Decide	Decide what expertise you require to develop and manage your client's exercise program
4. Prepare	Compile relevant, accurate and concise information for the referral
5. Consent	Involve your client in the process and gain informed consent to share their health information
6. Connect	Plan ahead and ensure your referral actions are appropriate ,professional and effective
EXERCISE PROGRAM	Delivered under health professional guidance
7. Commit	Commit to ongoing dialogue and feedback to achieve a positive health outcome for your client

Receiving referral

Referrals are secured through networking and word of mouth. Points of advice to assist you in gaining referrals include:

- Competence, skill, expertise
- Ethical, legal and reliable business operations
- Courteous and responsible manner
- Excellent communication skills
- Punctual and reliable
- Value for the client
- Operate within scope of practice
- Testimonies
- Become a specialist
- Ask for referrals
- Business networking
- Participate in volunteer work



When you receive a referral, it is important to respond as quickly as possible, be it verbal, written or electronic. Seek clarification on any items you are unsure about and always work within your limits of expertise. The client referred must then be contacted for an appointment. All paperwork must be recorded and kept on the client's case file. Communication with the medical and Allied Health professional should be frequent with progress reports.

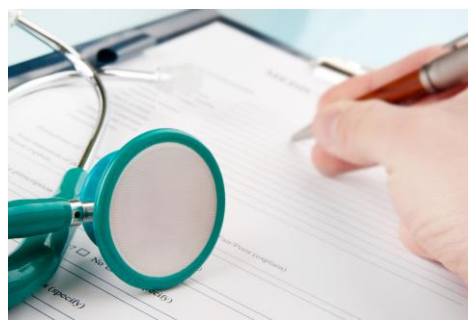
The case file

- Maintains professional, accountable and effective business operation
- Provides continuity between workers
- Prevents client frustration
- Provides accurate records
- Includes background information



SECTION 3 – SCREENING AND MEDICAL CLEARANCES

Clients who are classified as specific populations are usually identified during the screening process. Clients who present with certain medical conditions, injuries or medication use are classified as being a specific population due to their specific requirements. For these people, a medical clearance is vital prior to fitness testing, programming or exercising.



Once clearance is granted, modification to testing, programming and exercise may be required in accordance with the recommendations from the allied or medical health professional. The health professional may provide specific recommendations in the form of a pre-determined program, intensity ranges, or a list of approved exercise and/or contraindicated exercises. Guidance may also be less specific and may just state general recommendations such as the recommended intensity for the client. The Personal Trainer is entitled to contact the health professional for further guidance before implementing the training recommendations if necessary.

Exercise intensity guidelines

There are multiple sources that an exercise professional or a medical or allied health professional may use to prescribe exercise guidelines for older adults and specific populations. Exercise guidelines will vary due to individual differences within the same specific populations group. Due to the complex nature of exercise prescription for clients with specific risk factors it is imperative that the fitness instructor or personal trainer programs within the parameters determined from the relevant allied or medical health professional from whom medical clearance was sought. Medical clearance from allied or medical professionals will vary but at minimum will provide medical clearance for the individual to participate in exercise and will identify any exercises or activities that may be harmful to the client. Medical clearance may also contain the following:

- Guidance on the specific exercises to be performed
- Advice on what exercises or activities should be avoided
- Guidance on the frequency, type, and intensity of exercise to be performed.

Where specific advice is not given the fitness professional may wish to contact the allied of medical professional for further clarification if needed.

The exercise intensity guidelines below can be used as a guide when programming for low or moderate risk specific populations clients.

Exercise Intensity Guidelines for fitness professionals

Intensity category		Heart rate measure/ % 1RM	Perceived rate of exertion (scale 1-10)	Descriptive measures
Light (generally prescribed for specific populations)	Aerobic exercise	40 to <55% HRmax	Very light t light RPE 1-2	An aerobic activity that does not cause a noticeable change in breathing rate An intensity that can be sustained for at least 60 minutes
	Resistance exercise	40 to <55% 1RM	Very light t light RPE 1-2	Exercise that can be comfortably performed for 15 repetitions for 1 to 2 sets and is not performed until failure. Recovery time is not specified as this will be varied depending on the client's exercise tolerance
Moderate (generally prescribed for specific populations)	Aerobic exercise	55 to <70% HRmax	Moderate to somewhat hard RPE 3-4	An aerobic activity that is able to be conducted whilst maintaining a conversation uninterrupted An intensity that my last between 30 and 60 minutes
	Resistance exercise	55 to <70% 1 RM	Moderate to somewhat hard RPE 3-4	Exercise that is moderately difficult and is performed for 10 to 20 for 1 to 3 sets and is not performed until failure. Recovery time is not specified as this will be varied depending on the client's exercise tolerance
Vigorous (NOT generally prescribed for specific populations)	Aerobic Exercise	70 to <90% HRmax	Hard RPE 5-6	An aerobic activity in which a conversation generally cannot be maintained uninterrupted An intensity that may last up to 30 minutes
	Resistance exercise	70 to <90% 1RM	Hard RPE 5-6	Exercise is hard and is performed for up to 5-8 repetitions for 3 to 5 sets and is performed until failure Recovery time is not specified as this will be varied depending on the client's exercise tolerance

Intensity category		Heart rate measure/ % 1RM	Perceived rate of exertion (scale 1-10)	Descriptive measures
High (NOT generally prescribed for specific populations)	Aerobic Exercise	≤90% HRmax	Very Hard RPE 7+	An aerobic activity in which it is difficult to talk at all An intensity that generally cannot be sustained for longer than about 10 minutes
	Resistance exercise	≤90% 1RM	Very Hard RPE 7+	Exercise is very hard and is performed for 1-4 repetitions for 3-6 sets and is performed until failure Recovery time is not specified as this will be varied depending on the client's exercise tolerance

Exercise Intensity Guidelines adapted from page 2 ESSA adult pre-screening system

https://www.essa.org.au/Public/ABOUT_ESSA/Adult_Pre-Screening_Tool.aspx



Attachment 1, 2

Please open and consider

- **Attachment 1 – Clearance Letter Example.**
- **Attachment 2 – Reference Letter Example.**

These documents are a helpful resource when determining how to structure letters you may require for a client.

Attachment(s) for this unit can be found in the *Learning Resources* section of this unit in My eCampus.



Web

For additional information on pre-exercise screening download the following PDF:
[Sports Medicine Australia pre-screening system 2005](#)

SECTION 4 – LEGAL AND ETHICAL REQUIREMENTS

There are a range of legal and regulatory terms that are relevant to the fitness industry. The table below defines each of these terms.

Legislative and regulatory requirement	Description
Privacy	The expression 'personal information' is defined in the Privacy Acts as information or an opinion (including information or an opinion forming part of a database), whether true or not, and whether recorded in a material form or not, about an individual whose identity is apparent, or can reasonably be ascertained, from the information or opinion.
Anti-discrimination	Exercise professionals shall not discriminate in their professional practice, on the basis of ethnicity, culture, impairment, language, age, gender, sexual preference, religion, political beliefs or status in society.
Work health and safety	Are a set of guidelines that the fitness professional need to abide by to run a business in the fitness industry.
Duty of care	All fitness professionals have a 'duty of care' to their clients when providing instruction or advice, to ensure that reasonable steps are taken so that harm that could reasonably be expected to occur is avoided.
Business licenses	Exercise professionals registered with Fitness Australia provide a variety of exercise services for a range of clientele across many varied settings. Competency to practice is represented through the registration category held and associated continuing education completed.
Consumer protection	The Fitness Industry Code of Practice has been developed to guide consumers in their dealings with fitness businesses.

Organisation policies and procedures

There are a number of organizational policy and procedures that you need to be aware of as a personal trainer. Each of the terms have been described in the table below.

Legislative and regulatory requirement	Description
Confidentiality	Beyond the necessary sharing of information with professional colleagues, exercise professionals are to safeguard confidential information relating to clients in accordance with privacy laws
Recording client information	The exercise professional shall keep records and reports clearly and concisely for the information of clients, professional colleagues, legal purposes, and to record fitness services.
Hygiene	Hygiene can refer to personal hygiene; which needs to appropriate when instructing a class or teaching 1:1. Hygiene can also refer to a gym based setting in which all machinery and facilities need to adhere to the work health and safety guidelines.
Emergency	Fitness business and professionals have a legal obligation to plan for and provide appropriate emergency care when these situations occur.
Standards of personal presentation	The personal trainer needs to be dressed professionally to undertake the training session.

Legislative and regulatory requirement	Description
Participants clothing and footwear	Participants must wear proper clothing and closed shoes to participate in physical activity.
Use, care and maintenance of equipment	Maintaining the place of work and working environment under your control in a safe condition. Ensuring the safe use, handling, storage and transport of equipment & substances. Providing and maintaining “systems of work” (eg. policies and procedures) to ensure workplace safety.

It is important when working with children to undertake a pre-exercise screen and assessment test to inform the child’s capacity to participate in exercise. This will help identify health risks associated with commencing exercise and will also aid in optimising the exercise program.

There is a range of pre-exercise screening considerations that require guidance from a child’s medical practitioner or allied health professionals.

These include the following:





- Diagnosed medical condition, including:
 - Diabetes
 - Heart disease
 - Stroke
 - High blood pressure
 - Cystic fibrosis
 - Asthma
 - Cerebral palsy
 - Breathing or lung problems
- Experience abnormal episodes, including seizures, fainting, and heat stroke
- Diagnosed psychological/behavioural disorders related to exercise
- Muscle, bone, and joint problems that could worsen as a result of exercise
- Neuromuscular issues including brain or spinal injuries
- Sensory issues including vision, hearing, speech, or balance
- History of allergies that may worsen as a result of exercise
- Prescription of medications and unknown side effects

The screening process must be undertaken in conjunction with the child's parent or guardian. It is also important to have informed written consent for the child's participation in the exercise service.

There are several requirements that need to be met by informed consent, including that the parents:

- Know the health of the child as correct as possible
- Will inform the personal trainer of any changes to the child's health
- Understand the service that is being provided and give permission for the child to participate in the exercise program
- Provide both personal and emergency contact details

To ensure the safety and wellbeing of clients and also keep in line with duty of care responsibilities, a fitness professional must constantly monitor and observe their clients. If any undesirable signs or symptoms become apparent, the session should be stopped immediately. Should this happen and the client has a known condition about which they have seen an AHP, an initial or follow-up referral may be needed.

A training session should immediately be stopped if clients show any of the following symptoms:

- Onset of angina-like symptoms
 - Chest pain or discomfort
 - Pain in your arms, neck, jaw, shoulder or back accompanying chest pain
 - Nausea
 - Fatigue
 - Shortness of breath
 - Sweating
 - Dizziness
- Abnormal systolic blood pressure
- Excessive blood pressure
- Drop in blood pressure >10mmHG from baseline
- Failure of heart rate to increase
- Heart palpitations or severe anxiety
- Signs of poor perfusion e.g. light-headedness, confusion, ataxia, pallor, cyanosis, nausea, cold/clammy skin
- Claudication (pain in calves that is not usual muscular pain)
- Dizziness or fainting
- Asthma
- Rapid weight change
- Frequent or persistent headache
- Significant muscle, bone or joint pain
- Physical or verbal signs of fatigue or extreme exhaustion
- Experiences an emergency situation
- Requests to stop
- Onset of injury or aggravation of pre-existing injury
- Adverse signs and symptoms



Module two: Exercise Considerations in Children and Adolescents

SECTION 1 – INTRODUCTION TO MODULE

In this module, we will examine physical growth and development and the response to physical exercise in this population (including aerobic exercise, anaerobic neuromuscular function and psychological-social function). The exercise considerations for preparing and delivering exercise in this population will be detailed. Next, two common conditions that impact on this population and the considerations for exercise will be discussed:



Physical growth and development

It is important to understand that there are many factors that contribute to growth and development in children, these include:

- Environmental influences (social, cultural, economic, geographic and nutritional factors)
- Biological factors (including genetics and hormonal factors).

Abnormal genetics in biological mechanisms can affect metabolic function and body composition as well as neurological function and cardiorespiratory function. The environment in which a child lives can be responsible for an illness or a disability. In addition, the environment affects the way in which those conditions are handled by the child, for example a poor environment may worsen the condition and a good environment may improve the condition.



Children and adolescent responses to physical activity

Aerobic Exercise Response: The response to aerobic exercise is commonly measured in a laboratory environment using a treadmill or cycle ergometer. Maximal oxygen consumption (VO₂max) is considered the most reliable indicator of aerobic fitness. In children peak oxygen consumption (VO₂max) is perhaps the best indicator for aerobic fitness.

Source: Durstine, J.L., Moore, G.E., Painter, P.L. and Roberts, S.O., 2009, pg. 39

The maximal heart rate of children is generally higher than adults; furthermore, they have higher submaximal heart rates than adults. Baseline pulmonary parameters are different between adults and children, with resting respiratory rate decreasing progressively during childhood

Source: Durstine, J.L., et al., 2009, pg. 39

Children have immature thermoregulatory systems and tend to sweat less than adults, thus have a reduced ability to undertaking cooling processes.

Source: Durstine, J.L., et al., 2009, pg. 39

Blood pressure responses to exercise in children and adolescents follow the same general principles as adults. In an adult systolic blood pressure may increase by 6-8 mmHg and young children the increase will be from 2 to 3 mmHg; whilst in adolescents the increase is between 4-6 mmHg.

Source: Durstine, J.L., et al., 2009, pg. 39

Anaerobic Exercise: Anaerobic capacity of children and adolescents are lower than adults. Anaerobic power increases throughout childhood and adolescents.

Source: Durstine, J.L., et al., 2009, pg. 40



Neuromuscular function: Muscular strength increases during childhood – which occurs as a result of normal growth and development. Males demonstrate significant increases in muscle size and strength as a result of maturation-driven changes.

Source: Durstine, J.L., et al., 2009, pg. 40

Psychological-social function: Engaging in regular physical activity in children has been shown to have a positive effect on the child's psychological development, and improve a range of aspects, including:

- Self-concept
- Self-efficacy
- Self esteem
- Improves symptoms of depression
- Reduces stress
- Other measures of psychological well-being.

Source: Durstine, J.L., et al., 2009, pg. 40



SECTION 2 – EXERCISE CONSIDERATION IN CHILDREN AND ADOLESCENTS

There are a number of important considerations for designing training programs for children. The following section will examine the foundation skills to build a safe and effective training session. There are five (5) important aspects to exercise training in children, each of which have been listed and described as follows:

1. Designing a training program to prevent growth plate injuries.



Training programs need to be developed to prevent growth plate injuries: Exercise programs need to take into account the fact that children bones do not fully fuse until the late teens or early twenties. Children's growth plates are composed of growing tissue as opposed to solid bone; which increases the children's risk of injury. Weight-bearing exercise where children carry their own body weight (such as push ups and running) have a positive impact on bone development. It is important to avoid

prescribing repetitious, high-impact activities. While jumping activities are good for bone development, constant repetition of these activities will place strain on their growth plates.

As a personal trainer you can promote healthy bone growth and reduce the risk of injury in this population. This can be achieved by varying training intensities by programming low, moderate and vigorous intensity exercise. Additionally, training sessions have a variety of activities that use different muscles and body parts, for example children can do skipping and jumping exercises and then switch the session to focus on exercises of the upper body.

2. Designing a weight training program that is suitable for children

The use of weight training is commonly debated as a method to developing muscle strength.

Source: Very Well, 2016.

The Australian Sports Commission does support the use of weight training for children as long as they meet the following criteria:

- A qualified trainer designs and/or instructs the sessions
- The child is aged eight years or over
- Only low weights are used, e.g. 1 to 3kg dumbbells
- Proper technique is taught and continually monitored
- Repetitions are between 8 to 15, with two sets
- Non-explosive weight techniques are employed, i.e. avoid deadlifts and clean and jerk lifts until the child is much older and more experienced with weight training
- The exercises are kept simple (lunges, squats, shoulder presses) so that basic techniques can be learnt and performed safely.



Source: Australian Institute of Sport, 2003

As a personal trainer, it is important to note that other exercises other than weight training can be used to improve their strength. For example, a range of other exercise activities can be used in children:



Warm up activities for ten minutes of general fitness are best used before strength and conditioning sections to prevent injuries (Very Well, 2016). It is important to remember that as a muscle group is strengthened the opposing group is also strengthened. For example, if the child performs core abdominal exercises it is important that they strengthen their lower back muscles

Source: Very Well, 2016

3. Design a training program that focuses on children's reduced aerobic and anaerobic capacity.

It is well reported that children have a significant lower aerobic and anaerobic training capacity than adults. Therefore, children are more suited to intermittent training.

Source: Zwiren, L.D., 1989.



As a personal trainer, it is important to plan the clients exercise plan to include a mixture of aerobic and anaerobic activities. As a rule of thumb a child around the age of ten (10) years old can manage about 1/3 of the training load of an adult. The duration of training should be initially set at 30 minutes with an aim to increasing to 45 minutes as they become older.

4. Know when to refer an injured child to medical personal.

There are a number of situations where children need to be referred to medical personal, including:

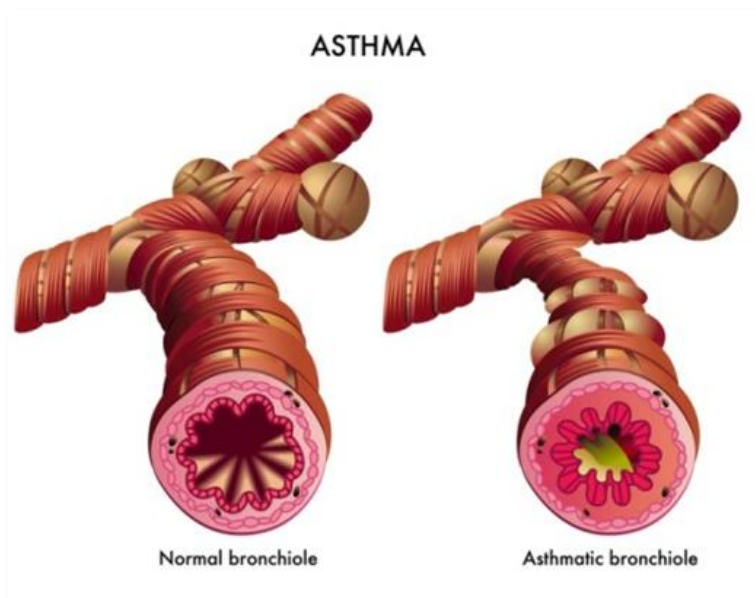
- Says they are experiencing severe pain
- May have a joint injury, such as a dislocation or the joint is very unstable
- Loss of movement (for example an inability to walk due to a twisted ankle)
- An underlying infection.

It is important to remember that medical decisions reside with the child's caregiver. If there are concerns, then suggestions should be made to the caregiver to refer the child to medical professional and then follow up.

5. Protect yourself.

It is of critical importance that you ensure you have written consent from the caregiver of the child before commencing an exercise program; together with a full health history form completed and signed.

SECTION 3 – ASTHMA



Asthma is an inflammatory disorder of the airways where airways are extremely sensitive which leads to recurrent episodes of wheezing, breathlessness, chest tightness and coughing particularly at night or in the early morning.

The National Asthma Council Australia (2016) describes asthma as a disease of the airways — the small tubes which carry air in and out of the lungs. The muscles in the

airways tighten and the lining of the airways swell and produce sticky mucus. Symptoms include coughing, tight feeling in the chest, wheezing, and shortness of breath.

There are many factors that can worsen asthma symptoms or trigger an attack and these things should be avoided where possible.

Triggers include:

Asthma Triggers


Mold


Pets


Chemical Odours


Dust


Grass and Weeds


Smoke

- Allergens
 - **Indoor** – mites, pets, cockroaches, fungi, mold
 - **Outdoor** – pollen, mold, yeast, fungi
- Occupational substances – plastic resin, wood dust, metals, latex
- Tobacco smoke – active and passive
- Outdoor and indoor air pollutants
- Air humidity and temperature
- Certain medications
- Aerobic exercise
- Diet
- Viral infections

In addition to avoiding triggers where possible, it is also vital that any asthmatic follows their medication prescription schedule and always has their inhaler near them when exercising. If the client shows any signs of a potential asthma attack you must stop exercise immediately and ensure they seek medication if required. If the symptoms remain an issue, referral to their general practitioner is recommended.

Effects on the exercise response

Aerobic exercise can sometimes be a trigger for asthma and is commonly referred to as exercise induced asthma (EIA). There is evidence in the medical literature that indicates that exercise may in fact help control the frequency and severity of asthma attacks. Most of the studies undertaken in this population show that an average of 20-30 minutes of exercise two to three times per week will improve a range of pulmonary functions, including:

- Maximal ventilation
- Oxygen consumption
- Work capacity
- Heart rate.

Source: Durstine, J.L., 2009, pg. 143

As a personal trainer it is important to note that EIA is most likely to occur 5-15 minutes following exertion; which can last up to 30 minutes following the cessation of exercise. Symptoms of an attack include:

- Wheezing
- Coughing
- Shortness of breath
- Chest discomfort
- A combination of these symptoms

Source: Durstine, J.L., 2009, pg. 144



Management and medications

The use of short-acting beta2-agonist (for example Albuterol) taken 10-15 minutes before exercise has been shown to reduce the risk of EIA.

Source: Durstine, J.L., 2009, pg. 144

Longer acting beta2 agonists (including salmeterol and formoterol) increase the extent of protection. It is important to note that the prescription of salmeterol is only prescribed if other medications have not been successful in controlling the symptoms.

Source: Bryant, B., 2011, pg. 562-563

Recommendations and consideration for exercise programming



Regular exercise should be a part of any asthma sufferer's routine. Most people with asthma experience asthma symptoms if they exercise in dry or cold air. When at rest, you breathe through your nose and the air is warmed, moistened, and filtered as it enters your body. When you exercise, you need more oxygen and so you breathe faster through your mouth. The airways react to this cold, dry air and the muscles

around them tighten. Although some asthmatics may be apprehensive to exercising, there are many benefits to be gained. These include fewer asthma attacks, improved cardiorespiratory function, improved aerobic fitness, and a possible decrease in medication doses.

An important factor to remember in this population is that they may have intermittent exacerbations and remission that influences their ability to exercise. Realistic outcomes for exercise programs in this population may include improving one or all of the following:

- Fitness as judged by one or all of the physiological criteria
- Exercise tolerance
- Musculoskeletal conditioning.

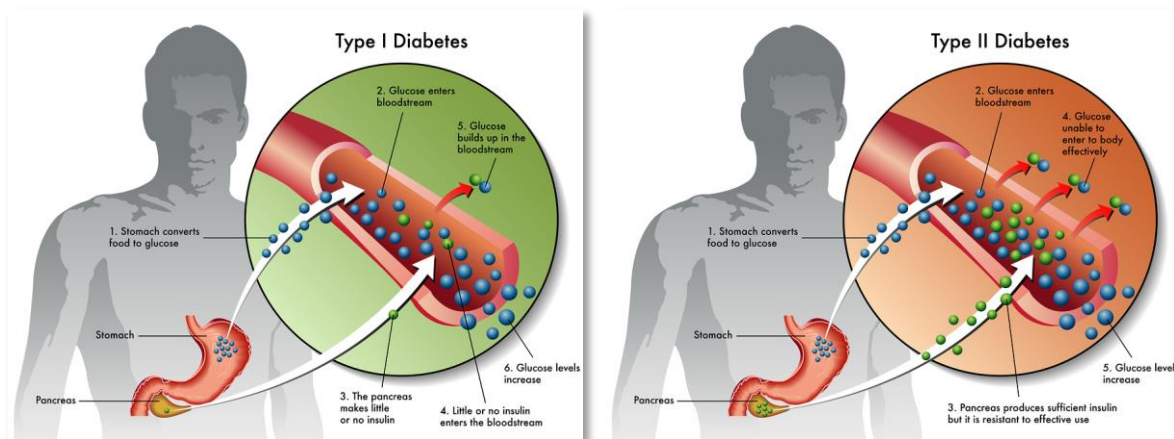
Source: Durstine, J.L., 2009, pg. 146

An example is shown below of program recommendations for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done under the guidance of the appropriate medical or allied health professional

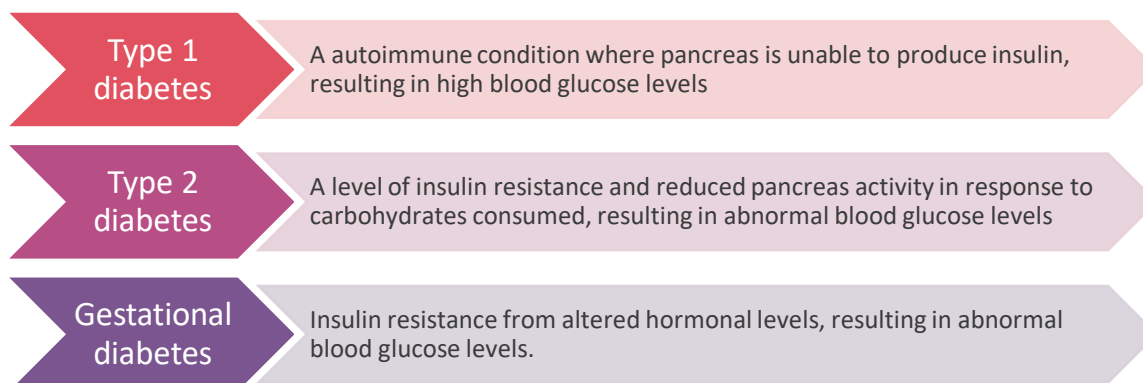
Modes	Goals	Intensity/frequency/duration	Time to goal
Aerobic			
Large muscle activities (walking, cycling, swimming)	• Increase VO2 peak • Increase lactate threshold and ventilator threshold • Become less sensitive to dyspnea • Develop more efficient breathing patterns • Facilitate improvements in activities of daily living (ADL)	• RPE 11-13/20 • Monitor dyspnea • 1-2 session, 3-5 days per week • 30 min sessions (shorter sessions may be required depending on the nature of the client's asthma) • Emphasise progression as opposed to intensity in the program	2-3 months
Strength			
Free weights Isokinetic/isotonic machines	• Increase maximal number of reps • Increase isokinetic torque/work • Increase lean body mass	• Low resistance, high reps • 2-3 days/week	2-4 months
Flexibility			
Stretching	• Increase ROM	• 3 session/week	Ongoing
Neuromuscular			
Walking Balance exercise Breathing exercise	• Improve gait, balance • Improve breathing efficiency	• Daily	Ongoing

SECTION 4 – DIABETES

Diabetes mellitus is a condition where there is an imbalance between carbohydrate consumption, insulin production for carbohydrate metabolism and carbohydrate energy utilisation.



There are three different types of diabetes:



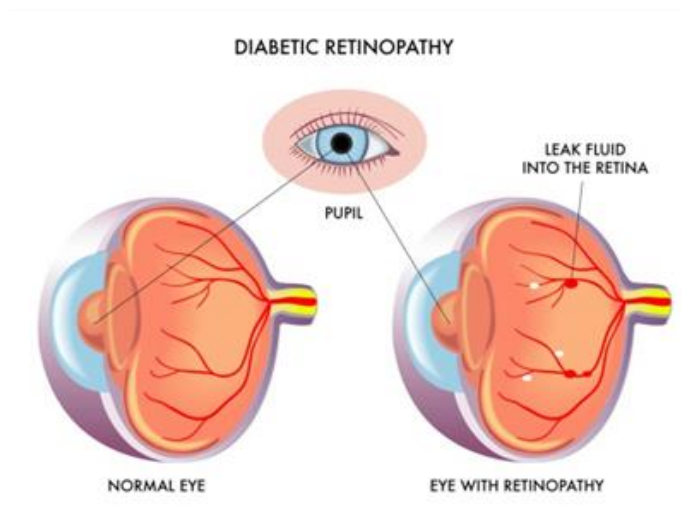
Source: Olokoba, A.B., 2012

Complications

Diabetes can lead to complications, including damage to large and small blood vessels, which can lead to heart attack, stroke, and problems with the kidneys, eyes, feet and nerves. However, the risk of most diabetes-related complications can be reduced.

Source: Forbes, J.M., 2013

Smoking, poor diet, alcohol, and obesity can increase the risk of complications. Many of these complications can take many years to develop – regardless the presence of diabetes in the childhood populations means great risk of developing these complications.



Retinopathy

Retinopathy refers to problems with the eyes that can lead to blindness due to damage to the small vessels in the eyes.

Peripheral neuropathy

Peripheral neuropathy is defined as problems with nerve messages that desensitize parts of the body, especially the lower limbs and feet. It causes sensory defects and loss of tendon reflexes so feet become numb and clients have a high risk of

developing foot injuries as they cannot feel when they are injured. Loss of sensation in the feet also causes balance difficulties.

Autonomic neuropathy

Autonomic neuropathy can cause problems with important nerve functions such as heart rate response. In addition this disorder can damage a range of different nerves that control the following physiological mechanisms:

1. Blood pressure
2. Sweating
3. Bowel and bladder emptying
4. Digestion.



Peripheral vascular disease

Peripheral vascular disease causes problems with the blood supply to blood vessels outside the heart and brain. This often affects the limbs and can result in amputations due to lack of oxygen causing tissue death.

Hypertension

Hypertension causes a demand on the heart, requiring it to work extra hard during exercise (Hypertension and the exercise considerations are described in module 5).



Web

For additional information on diabetes.

[Better Health Channel - Diabetes](#)

[Diabetes Australia – Understanding diabetes](#)

Effects of exercise training

Exercise is an essential component to a treatment plan when providing care for a client with diabetes. There are many beneficial effects to exercise that have been reported in the medical literature, these have been summarised as follows:

- **Improvements in blood glucose control.** Exercise improvements in blood sugar control are pertinent to type-2 diabetes in conjunction with medication and dietary strategies. This effect will not be observed in type-1 diabetes, but exercise should be encouraged for its other benefits including the overall improvement of cardiovascular health.
- **Improvement in insulin sensitivity.** This is beneficial in type-1 diabetes as it lowers the dose of insulin required to cause its blood glucose effect. If a patient is diagnosed and taking insulin – the effects of exercise will also be beneficial here as well.
- **Reducing body fat.** This is tremendously beneficial since reducing body fat reduces the amount of insulin or hypoglycaemic agents required.
- **Cardiovascular benefits.** Exercise is well known to exhibit positive cardiovascular benefits and reduce the risk of cardiovascular disease.



Source: Durstine, J.L., 2009, pg. 184

Recommendations and considerations for exercise programming

The prescription of exercise is individual for children, adolescents and adults with diabetes. There are a number of considerations for this population that include the following:

- Medication schedule
- Presence and severity of diabetic complications
- Client goals
- Expectation from exercise program.

It's important to note that physical activity for those without significant complications or limitations (as to be expected with children) should include appropriate endurance and resistance exercise.



Source: Durstine, J.L., 2009, pg. 187

An example of a program for diabetes is shown in the following table. There are a number of contraindications to exercise in this population, these include:

- Active retinal haemorrhage is present, or the client has received retinal therapy (i.e. laser surgery)
- Infection is present and the client is running a fever
- Blood glucose is above 13.9 mmol/L
- Blood glucose is less than 3.9 mmol/L

There are also a number of precautions that need to be taken into account for this population, including the following:

- A source of carbohydrates needs to be available if blood glucose drop as a result of exercise, and so that stores can be restored
- Adequate fluids before, during and after exercise
- Carrying medical identification in case of an emergency.



An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and should be done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Modes	Goals	Intensity/frequency/duration	Time to goal
Aerobic			
Large muscle activities	• Increase aerobic capacity • Increase time to exhaustion • Increase work capacity	• 50-80% peak HR • 50-80% VO_{2peak} • Monitor RPE • 4-7 sessions per week • 20-60min per session	4-6 months
Strength			
Free weights Weight machine Elastic tubing or bands	• Increase maximal number of reps • Improve performance	• High resistance, low reps for most clients • High resistance is ok for most patients with well controlled diabetes	4-6 months
Anaerobic			
High-intensity intervals	• Only for athletes in good diabetic control (refer to exercise considerations for children above)	• Same as for nondiabetic athletes	Ongoing
Flexibility			
Stretching/yoga	• Maintain/increase ROM • Improve gait	• 2-3 sessions per week	4-6 months
Neuromuscular			
Yoga	• Improve balance and co-ordination	• Individualised to each client	Ongoing
 Web Some general guidelines for cardiovascular exercise prescription for healthy adults. • Fitness Australia Exercise Guidelines			

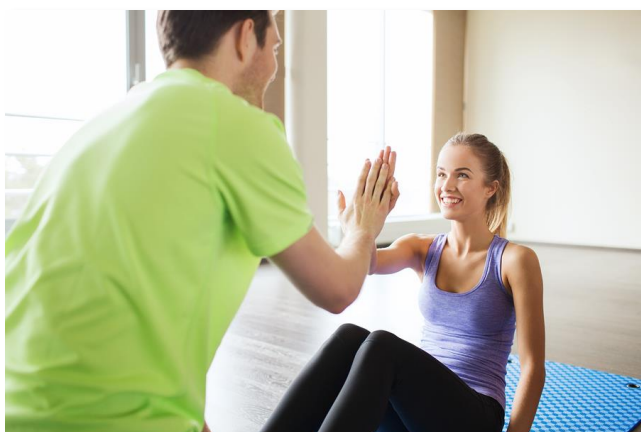
Module three: Exercise considerations for women

SECTION1 – INTRODUCTION TO MODULE

This module will start with a general discussion of the anatomical and physiological considerations in women that impact on exercise capacity and programming. Next, the module will examine the exercise considerations (including: effects of exercise training, management and medication, recommendations for exercise programming) for a number of common situations and or conditions in woman, including:



SECTION 2 – INTRODUCTION TO EXERCISE CONSIDERATIONS IN WOMEN



Aside from the gender difference like pregnancy and age-related condition (for example osteoporosis and menopausal changes, described below) there are a number of anatomical and physiological difference between men and women that need to be taken into account when designing exercise programs. Knee anatomical difference between males and females has long been understood – with programs taking into account good knee integrity

for female clients. Physiological difference between genders are generally not taken into account, but current evidence considerations in design and training is warranted when designing programs in this population. The following section describes the anatomical and physiological considerations for women, including:

- Females normally have wider pelvis for childbearing purposes. This combined with shorter limb-lengths increases the Q-angle at the knee. This angle is the measurement of the angle between the long axis of the femur bone and the long axis of the tibia. On average this angle deviation is approximately 17-18degrees in women compared to 12-13degrees in men. This very nature of this deviation creates a potential weak link during basic exercise (including walking) and in advanced movements (including jump-landing).
- Women have smaller bones, ligaments and muscles which implies less surface area for attachment and support. This creates additional injury risks as ligaments (including the anterior cruciate and posterior cruciate) undergo shearing movement – particularly during rotational-type movement between the femur and tibia.

- The upper extremity of men supports more muscle mass, which in turn provides advantages to the muscles acting at the shoulders. Women only exhibit 52% of the strength in the upper extremity; in contrast men exhibiting 66% of the strength of the upper body.

Source: Human Anatomy Fundamentals: Advanced Body Proportions, 2016

Given that females now incorporate compound lifts and more ballistic-type movements into their exercise routine; there is a need to address knee and shoulder stability if these types of exercise are to be implemented into their program.

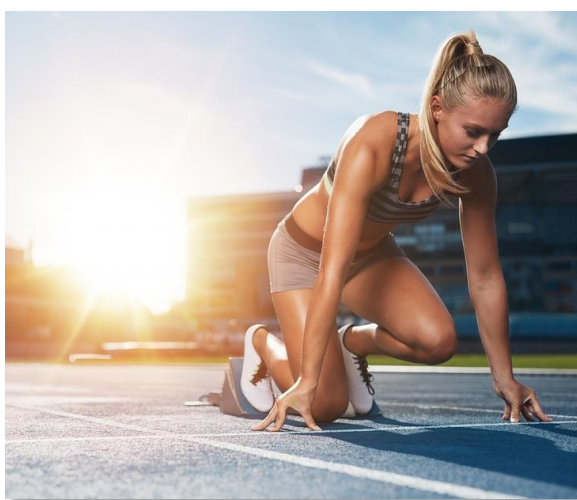


Bioenergetics:

There are significant bioenergetics differences between genders. Women have lower quantities of type II fibres, which are the fibres responsible for anaerobic energy production. This anatomical distinction means that women are better suited to utilize fat during exercise. Other differences between genders include the following:

- Females use less glucose compared to men during endurance type exercise
- Females have lower glycogen stores than men; the hormone estrogen reduces carbohydrate loading capacity and may impact training outcomes for endurance and ultra-endurance events.
- Oestrogen reduces gluconeogenesis, which is the manufacture of glucose from non-carbohydrate sources (examples include lactate and amino acids)
- Reduced blood volume – meaning that there is reduced concentrations of lactate buffer in the blood needed to tolerate the spill over from exercising muscles.

Source: Biomechanics, n.d.



Thus from an anatomical and physiological point of view these factors diminish the overall efficacy of the anaerobic pathways in women. Whilst there are currently no guidelines with respect to exercise for women, low to moderate duration exercise and continuous steady state exercise are recommended.

The following section examines pregnancy, menopause, continence and osteoporosis together with the exercise considerations during these circumstances.

SECTION 3 – PREGNANCY AND CONTINENCE

With gender comes a difference in needs, expectations, fears, history and conditions. Many may feel apprehensive towards commencing a fitness program and this needs to be considered. Menstruation, pregnancy and menopause affect only females.

Factors to consider with menstruation include weight gain, pain, iron intake, rest and exercise choice.

During pregnancy, the female reproductive system undergoes many changes. These affect the cardiovascular, respiratory, musculoskeletal, endocrine, gastrointestinal and nervous systems. They include:

- Blood volume increases and blood flow increases 40-50%
- Red blood cells only increase 18-25%, causing dilatational anaemia around week 32 due to decreased haemoglobin levels
- Increased heart rate and oxygen uptake during weight bearing activities coinciding with increased weight
- Stroke volume increases at eight weeks gestation and is at its maximum during the second trimester
- Increased respiration especially during late pregnancy
- Increased cardiac output up to 50% in late pregnancy
- Weight increase of 10-12kg
- Centre of gravity changes due to stomach enlarging, creating lumbar lordosis
- Diastasis or separation of left and right side of the rectus abdominus as stomach enlarges
- Increased abdominal and pelvic floor muscles pressure
- Pressure on bladder increases, causing frequent urination and possible incontinence
- Abdominal region stretches to allow the uterus to occupy, pressing on the thorax and causing a wider thorax
- Increased diaphragm pressure makes breathing difficult
- Increased insulin is released and may create hypoglycaemia, especially in late pregnancy
- As the placenta enlarges, it secretes increasing human placental lactogen, stimulating breast maturation for lactation and causing glucose sparing
- Increased parathyroid hormone creates positive calcium levels
- Fat accumulation decreases in second half of the pregnancy when cortisol, growth hormone and insulin concentrations increase and foetal energy requirements rise dramatically
- Relaxin is a hormone in preparation for childbirth,



- Relaxin is a hormone produced by the ovary and the placenta with important effects in the female reproductive system and during pregnancy. It is released progressively in preparation for childbirth and peaks between 18 and 22 weeks and continues to increase up until labour. It relaxes the ligaments in the pelvis and softens and widens the cervix.
- Relaxin also increases waddling gait
- Relaxin decreases post-delivery but may be present for up to six months post-birth
- Nausea and vomiting may occur due to an increase in hormones. This may decrease kilojoule intake and nutritional status of the foetus and the mother
- Nervous system changes include moodiness, anxiety, amnesia, decreased cognitive ability, forgetfulness

Source: Totor, G.J., 2013, pg. 1089-1123

Pre-eclampsia is a condition that may develop during the second half of pregnancy and is characterised by hypertension, proteinuria and severe fluid retention.

Source: Totor, G.J., 2013, pg. 1113

It appears to be related to insulin resistance including gestational diabetes, polycystic ovarian syndrome and obesity. It can involve all maternal organs and can lead to convulsions, kidney failure, liver failure, clotting problems or death.

Source: Totor, G.J., 2013, pg. 1113

If blood flow to the placenta becomes sluggish the baby is starved of oxygen and nutrients. This may cause death, premature labour or separation of the placenta from the uterine wall, resulting in a medical emergency. If progression occurs to eclampsia, seizures linked to high blood pressure may occur.

Risk factors include:

- First pregnancy
- Pre-existing hypertension
- Pre-existing vascular diseases
- Family history
- Diabetes
- Multiple foetuses.

Signs and symptoms of pre-eclampsia include:

- Dizziness
- Headache
- Visual disturbances
- Abdominal pain just below the ribs
- Nausea and vomiting.

Source: Totor, G.J., 2013, pg. 1113



Exercise programming needs to consider the stage of pregnancy, exercise history and experience of the mother, the mother's goal, comfort of the mother and medical concerns. The mother must be in an environment where temperature can be regulated. If the mother's temperature rises above the foetus (foetus is 0.5 degrees Celsius higher than mother), the temperature gradient reverses and the foetus becomes overheated and may result in death.

Hot, humid environments should be avoided. Air-conditioning and fans are recommended. Adequate hydration is necessary.

Exercise duration should be short and intensity should be monitored by rate of perceived exertion, as heart rate is not a good indicator. Exercise selection should be non-weight bearing and comfortable. It should include pelvic floor, balance and core exercises. The regression objective of a trained mother is to achieve muscular endurance and light cardiovascular activities within the mother's comfort levels. The mother will know when she needs less. Being pregnant is not the time to commence an exercise program; the goals are based on the foetus and a sound pregnancy and birth.

Benefits of exercise during pregnancy include:

- Decreased risk of excessive weight gain
- Prevention of stretch marks
- Prevention of varicose veins
- Faster delivery
- Faster recovery from childbirth
- Improved psychosocial wellbeing
- Prevention of leg cramps
- Improved posture
- Prevention and relief of high blood pressure
- Prevention of diabetes
- Reports of fewer discomforts
- Increased fitness

Exercise should cease if the mother experiences:

- Back pain
- Pubic region pain
- Shortness of breath
- Palpitations
- Faintness
- Vaginal bleeding
- Vaginal fluid loss
- Difficulty walking
- Uterine contractions
- Absence of foetal movement
- Tachycardia

Post-natal exercise can commence when medical clearance is granted. This may be around or after six weeks. Considerations include the birth method, relaxin levels, sleep deprivation, complications, weak pelvic floor and abdominal muscles and nutrition if breastfeeding.

Exercise should focus on short duration, low intensity cardiovascular, muscular endurance, core and pelvic floor exercises.



SECTION 4 – MENOPAUSE

There are a range of anatomical and physiological considerations that need to be taken into account for women in menopause years, these include the following:

- Musculoskeletal changes – including reduced elasticity and atrophy of muscle; reduction in bone density and more porous bones that are susceptible to fracture.
- Body shape – A decline in the hormone oestrogen is associated with increased body and abdominal fat.
- Psychological
- Connective tissue
- Urogenital – is a term that refers to the urinary system and reproductive system. Women going through menopause experience urinary frequency, cystitis and incontinence.
- Increased risk of associated conditions – Women going through menopause are at increased risk of metabolic disease and cardiovascular disease.



Exercise considerations during menopause

The exercise considerations for women with menopause are generic and include the following:



- During an exercise program women are encouraged to continue exercising with modifications to suit any specific symptom.
- Women going through menopause can participate in a range of individual and general group fitness programs
- Participation in a variety of exercise.

Source: Allen, S.H., 2005

Effects on exercise training

Exercise is fundamentally important for women at every stage of life. It can be argued that exercise is beneficial in women going through menopause. There are a number of effects/benefits of exercise, including:

- Improve/maintain cardiovascular fitness
- Improve and preserve lean muscle mass
- Promote weight loss and metabolism
- Preserve or improve bone mass density
- Improve reaction time and balance
- Promote psychological health (i.e. self-confidence, self-image and self-esteem).

Source: Australian Fitness Network, 2009

Recommendations and consideration for exercise programs

Cardiovascular Training: It is recommended that approximately 30 minutes of weight bearing activity be undertaken 3 to 4 times per week. This type of exercise is beneficial for assisting bone density. It is important to let pre-exercise screening fitness and physical ability determine the style and intensity of the activities in the exercise program. If there is a history of musculoskeletal or pelvic floor or incontinence issues the program should be modified to low impact.

Source: Australian Fitness Network, 2009



Strength Conditioning: Strength training is essential in menopausal women to prevent the risk of osteoporosis (explained below) and build bone strength and density. It is important to start with low load and high repetition; load can be increased as appropriate. Heavy loads should be avoided as they will increase the stress on already vulnerable pelvic floor muscles. If there are any musculoskeletal complaints, then the program needs to be modified so they can commence training/resistance classes.

Source: Australian Fitness Network, 2009

Pelvic Floor: In each training session for women going through menopause it is important to include at least three (3) sets of pelvic floor exercises. These exercises of the pelvic floor need to be practiced in a range of positions, including:

Sitting

Standing

Kneeling

Lying

Example of pelvic floor exercises can include a simple set of five (5) to ten (10) quick lifts while sitting and the next might be a slow lift and hold for five to ten breaths. Considerations for undertaking these exercises include unwanted recruitment of muscles such as the gluteals.

Posture: During menopause the increased risk of osteoporosis and musculoskeletal changes make posture an important consideration into the training program. It is important to use postural cues and plenty of posterior muscle strengthening in the programs (muscles of particular importance such as rhomboids, posterior shoulder, latissimus dorsi and extensor training).

Flexibility: Is an important aspect to include into an exercise program as it maintains muscle length and range of motion.

Source: Australian Fitness Network, 2009

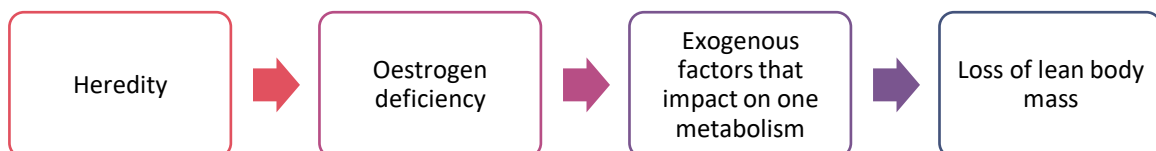
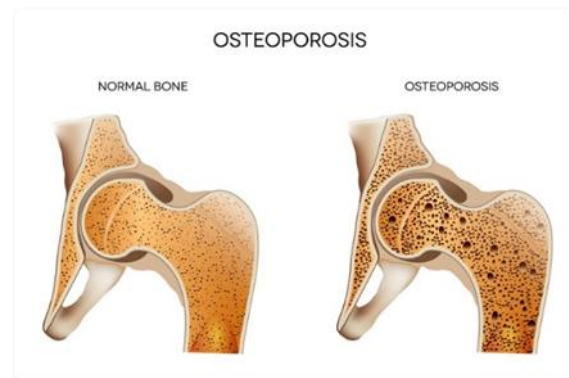
SECTION 5 – OSTEOPOROSIS

Introduction to Osteoporosis

Osteoporosis is a condition in which bones become weak and can break from minor falls, or in some instances can break from simple actions, such as sneezing.

Source: Titora, G.J., 2013, pg. 188

Women over the age of 50 are 50% more likely of experiencing an osteoporotic fracture. Women tend to lose bone earlier in life than men, and is accelerated after menopause because of the effect of oestrogen withdrawal. Oestrogen deficiency at menopause alters bone resorption exceeds the rate of bone formation. The most commonly cited risk factors for osteoporosis, include the following:



Web

For additional information on osteoporosis visit the following website:

[Better Health Channel - Osteoporosis](#)

Effects on exercise training



People with osteoporosis are more likely to be deconditioned than average and it is recommended that low intensity training to start with. Orthopaedic limitations may slow progress and may require additional support during walking. There is no evidence to suggest that people with osteoporosis respond differently to cardiovascular and skeletal muscle adaptations to that of people without osteoporosis. Regular aerobic, weight-bearing, and resistance exercise training has been shown to have a positive effect on bone mass density (BMD).

Source: Durstine, J.L., 2009, pg. 272

There is evidence showing that walking is effective for hip BMD.

Management and medication



The National Osteoporosis Foundation suggests a five (5) step process to help optimise bone health and help prevent osteoporosis, including:

1. • Ensure recommended intake of calcium and vitamin D
2. • Engage in regular weight-bearing and muscle-strength exercise training
3. • Avoid tobacco use and excess alcohol intake
4. • Become educated about bone health
5. • Have a regular bone density examination and take medication as recommended.

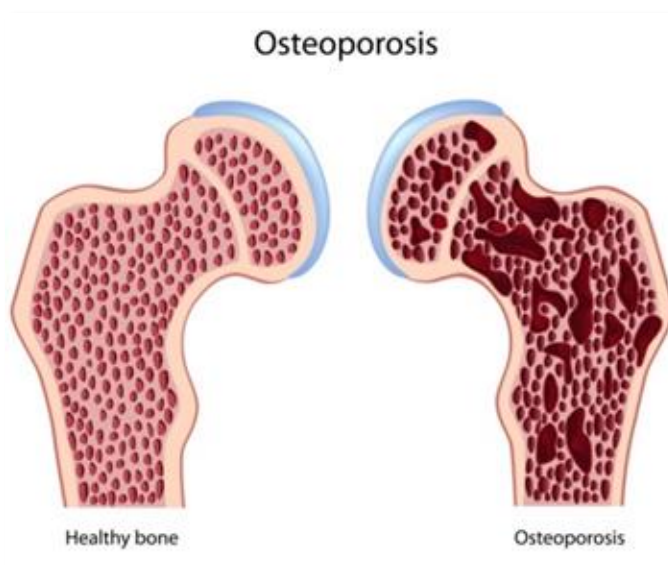
Source: National Osteoporosis Foundation, 2016



Recommendation for exercise programming

There are a number of aims of incorporating an exercise program for women and men at risk of osteoporosis; or currently suffering from osteoporosis, and include the following:

- Reduction of bone loss
- Conservation of remaining bone tissue
- Improved physical fitness
- Improved muscle strength
- Better sense of balance and coordination
- Reduced risk of bone fractures caused by falls
- Reduced pain.



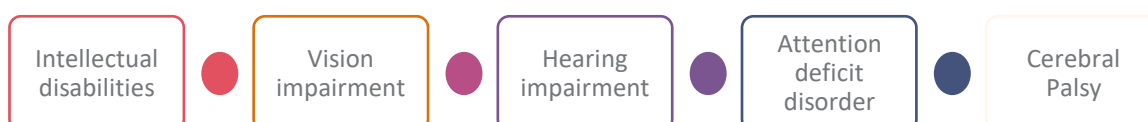
An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Source: Durstine, J.L., 2009, pg. 271

Mode	Frequency	Intensity	Time
Aerobic (weight bearing or impact)	>3 days/week	40-70% HRmax	30-60mins/session
Resistance (hypertrophy and strength)	2-3 days/week	70-80% 1RM 8-12 reps 2 sets	20-40mins
Flexibility	<2 days/week	No pain, static = up to 30secs	30mins/session
General goals		Programming considerations	
• Improve all health components of fitness • Maintain correct or aligned posture • Maintain balance, stability, coordination • Maintain BMD • Improved functional capacity • Decreased falls risk		• Doctor clearance if required • Extended warm up (>15mins) and cool down (>10mins) • Include balance, flexibility and coordination • Strength training for muscle strength and bone mass • Avoid dynamic abdominal exercise, twisting movements, trunk flexion, high impact loading, plyometric • 9-12mths before noticeable change in BMD	

Module four: Exercise considerations for clients with disabilities and neurological disorders

There are many other conditions that need special requirements when undertaking exercise programs for clients with a disability and common neurological disorders. This module will examine a range of disabilities and considerations for exercise including:



The module will also examine two of the most common mental health disorders and the exercise considerations, these are:



SECTION 1 – INTELLECTUAL DISABILITIES

Intellectual disability is a common developmental disorder that affects 668,100 (2.9%) number of Australians, and unfortunately provides life-long chronic issues (2012). From a histological view point the structures of the brain are permanently damaged with symptoms ranging from mild through to severe. There have been 400 reported potential causes of Intellectual disability that can fall into the following categories:

- Genetic and nutritional disorders
- Birth or childhood trauma
- Infectious disease
- Poisons as in foetal alcohol syndrome.



Source: Durstine, J.L., 2009, pg. 361

There are a number of different ways in which people with intellectual disabilities are categorised, and if they meet the following three criteria they are considered as intellectually disabled:

- Significant limitation in intellectual functioning
- Significant limitation in two or more adaptive skills – basic conceptual, social and practical skills one needs for everyday life
- Incidence of the ID before age 18.

Source: Durstine, J.L., 2009, pg. 361

For many people suffering from intellectual disability the intensity for needed support for this population can be classified into four main sub-classifications:

- **Intermittent:** short-term support is on an “as needed basis”
- **Limited:** Episodic, long term low-intensity support is needed
- **Extensive:** Daily support is needed in some environments
- **Pervasive:** Constant high-intensity support is needed across all environments.



Effects of exercise training

It has been well established that exercise training is beneficial for people with intellectual disabilities. The majority of research in this area has been on cardiovascular and skeletal adaptations in the ID population.

A range of studies have shown beneficial effects following endurance training, including:

- Significant improvement in VO₂peak (by 16%) following 16 weeks of cycling
- Increased maximum work rate
- Increased time to exhaustion
- Improved peak VE.

It is important to remember that people with ID have altered body structure (i.e. heart defects) and as such their ability to respond to exercise training with improved fitness may not be compared to general public.

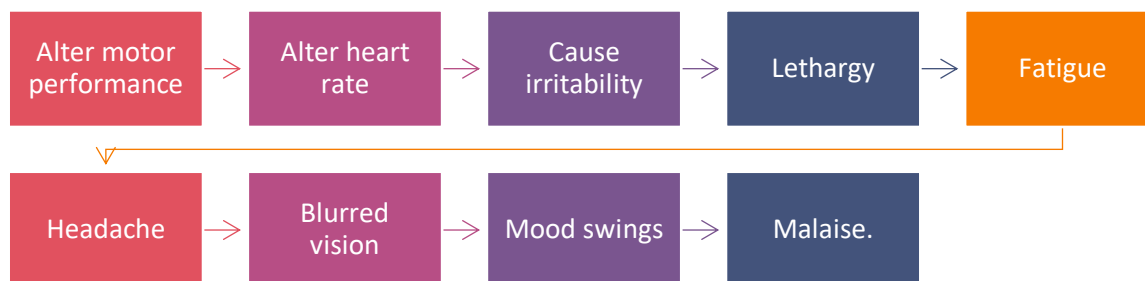


Source: Durstine, J.L., 2009, pg. 365

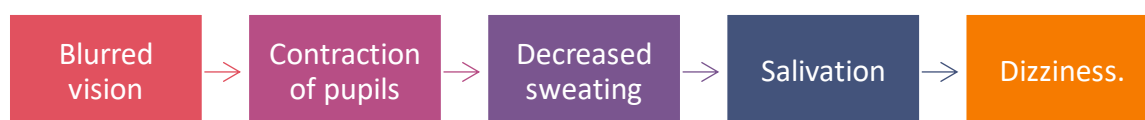
Management and medication

While exercise and physical fitness has no influence on someone's Intelligence Quotient many adapted behaviours (including practical skills) can be significantly improved by regular exercise training. It is generally known that people with disabilities may have secondary condition that they may be medicated for. For example, people with disabilities may also be prescribed a number of the following medications:

1. **Anticonvulsants** (used for seizure disorders), antidepressant medication and stimulants (for hyperactive disorders) may impact negatively on the person with an ID, including:



2. **Antianxiety medication**, used for anxiety symptoms can affect the autonomic nervous system and produce a number of negative effects, including:



3. **Cardiac medication**, such as beta blockers may further blunt the heart rate response to exercise.

Source: Durstine, J.L., 2009, pg. 362

Recommendations and considerations for exercise programming

The incidence of sedentary lifestyle, obesity and low exercise capacity are quite high. Thus individuals with ID need to be pre-screened before prescribing an exercise program to ensure appropriate exercise response and safety of exercise. During the early stages of exercise training the main focus is on promoting daily physical activity – once the exercise is habitual then an emphasis on increasing exercise duration and intensity (Durstine, J.L., 2009, pg. 361). Exercise considerations for this population should focus on motivation as this is the most challenging aspect to implement an exercise program; there are a number of strategies that can be implemented, which have been listed as follows:

- Developing individual preference can make the difference if the client truly engages in the activity or just goes through the motion.
- Activities should be selected according to the individual's chronological age and then modified based on the person's functional ability
- Verbal instruction should be precise, short and simple; action words should be used, so for example, instead of "go":



- Picture cards can be used as reminders on how to perform the activity as well as visual progress is beneficial
- Proper techniques should be used in all activities and skills should be reinforced

- General exercise time should be shortened compared to clients without an ID; as most people with and ID are not motivated to work through the discomfort of a long intense workout
- Behaviour management principles such as cueing, reinforcing and correcting should enhance success
- Use simple movement patterns and demonstrate the task numerous times.

Source: Durstine, J.L., 2009, pg. 366

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Modes	Goals	Intensity/frequency/duration	Time to goal
Aerobic			
Walk, walk/jog Swim Aerobics Cycle	• Weight control or loss • Improve cardiovascular fitness • Improve work capacity	• 60-80% V02peak • 60-80% peak HR • 3-7 days per week • 20-60 min/session	4-6 months
Strength			
Weight machines Isometrics Exercise/resistance bands Caution about the use of free weights	• Increase strength of large muscle groups	• 70-80 of 1RM • 3 sets of 8-12 reps • 1-2 min rest between sets • Monitor closely to prevent injury	10-12 weeks
Flexibility			
Passive stretching Active-assisted stretching Active stretching	• Improve ROM of selected joints • Improve flexibility about a joint	• Hold stretch to a position of mild discomfort • 3-5 days per week • 3-5 reps not to exceed 30s each • Monitor closely to prevent injury	10-12 weeks Not recommended for individuals with Ds.

SECTION 2 – HEARING IMPAIRMENT



It has been estimated that approximately 5.6% of Australians suffer some type of hearing impairment.

There are two common terms used to characterise people with hearing loss:

1. Hard of hearing

A mild to severe loss of hearing in which the individual requires an auditory device for communication purposes.

2. Deaf

A severe to profound level of hearing loss in which the person is unable to use a hearing device to process information or communicate.

Source: Durstine, J.L., 2009, pg. 385

There are five major types of anatomical and physiological alternations that lead to hearing loss:

1. • Loss of the outer ear structure due to injury, disease, or birth defect
2. • Buildup of impacted wax or infection of the external ear structure
3. • Blockages within the middle ear Eustachian tubes caused by infection or disease
4. • Otitis media, most commonly caused by infection, affecting middle ear structure
5. • Otosclerosis, progressive deafness of unknown etiology.

Source: Durstine, J.L., 2009, pg. 385

Effects of exercise training

There are generally no exercise responses that improve or alter hearing loss. It produces the same positive physiological, psychological and skill benefits as for individuals with no hearing loss. There are additional benefits to exercise in those that suffer hearing loss and include:

- More opportunity to improve social skills in group activities
- Practice of movement skills leading to improvements in balance and spatial orientation
- Increase in communication proficiency
- Improve self-image, confidence, self-confidence and reduced social isolation.

Source: Durstine, J.L., 2009, pg. 388

Recommendations and considerations for exercise training

People with hearing loss can generally participate in all types of physical activity that a person with no hearing loss. There are however, a range of special considerations that need to be taken into consideration when training a person that suffers from hearing loss.

Source: Durstine, J.L., 2009, pg. 388

Multiple strategies can be used to enhance the prospects of effective communication. The possible important detail to be aware of is the communication preference of the individuals:

- Always face the person so that he or she can see you face, lips, eyes and body
- Maintain eye contact and speak directly to the person, not to the interpreter
- Demonstrate exactly what is required from start to finish, as many people who are deaf are very visual learners
- Use as many visual cues and concrete examples as possible
- Some individuals with hearing loss may have below-average fitness levels or balance and orientation skills
- The speaker should maintain eye contact to enable speech reading
- Visual and tactile cues should be used to enhance understanding
- Demonstrate the routine or activity is helpful
- A videotape of the test or activity should be shown before the activity is to begin. Instructions should be in written form.



Source: Durstine, J.L., 2009, pg. 388

SECTION 3 – VISION IMPAIRMENT



Visual impairment is vision loss that represents a significant limitation of visual ability resulting from disease, trauma, or congenital or degenerative conditions that cannot be rectified by conventional means.

Effects of exercise training

Regular exercise with people with visual impairments do have positive physiological and psychological benefits.

Additional benefits include the following:

- More opportunity to improve social skills in group activities
- Practice of movement skills leading to improvements in balance and spatial orientation
- Increase in communication proficiency
- Improve self-image, confidence, self-confidence and reduced social isolation
- Improve cardiovascular fitness
- Decreased obesity.

Source: Durstine, J.L., 2009, pg. 393

Recommendations and considerations for exercise programming

Individuals with VI can generally participate in all types of physical activity; there is greater difficulty in mobility and assistance is required.

Exercise prescription is the same for a person who is not visually impaired; however, there are a number of considerations that need to be incorporated:

- Manually or verbally orient the person to facilities
- Keep instructions in large print or Braille
- Play an audio tape describing the routine
- Allow the person to run or exercise with a partner
- Have the person run with a short tether to a partner
- Give regular tactile and verbal cues and feedback
- Orient the person to all aspects of the facility with special attention to exits, use of the pool, and fire evacuation procedures.

Source: Durstine, J.L., 2009, pg. 393



SECTION 4 – OTHER NEUROLOGICAL DISORDERS



Depression

Depression is a mood disorder that affects everyday life for an extended period of time and may begin due to medical conditions, disappointments, prolonged pain, chemical abuse, chronic stress or deaths.

Source: Richards, D., 2011



- Excessive sleeping
- Trouble sleeping
- Dramatic weight changes from appetite changes
- Lack of energy
- Extreme difficulty concentrating
- Withdrawal
- Recurring thoughts of death or suicide
- Irritability.

Source: Richards, D., 2011

Effects on the exercise response:

When developing an exercise program for a client with depression it is important to take the current medications and other comorbidities into account as they may influence the safety and efficacy of exercise

Source: Durstine, J.L., 2009, pg. 393

Effects of exercise training:

Exercise programming has been safely and successfully conducted with individuals that have severe psychiatric disorders. It's important to note that these programs may need to be supervised by an exercise and or psychiatric rehabilitation specialist.

Source: Durstine, J.L., 2009, pg. 393

It has been shown that there are concomitant positive changes in psychological profiles of people with psychiatric conditions; a range of these have been reported in the medical literature, including:

- Improved mood
- Improved self-concept
- Improved work behaviour
- Decreased depression and anxiety
- Improved social network.

Source: Durstine, J.L., 2009, pg. 393

As a personal trainer it is important for you to have an understanding of the benefits of exercise in those clients that experience depression.

Medications, benefits and side effects:



It is important as a personal trainer to have a basic understanding of some of the pharmacological agents that your client may be on, since they can have significant impact on their metabolism, weight, mood etc. The following table summarises the major classes of drugs that clients with depression may be on.

Source: Bryant, B., 2011, pg. 356

Again it is critical to take this into account as the side effects of the medications for treating psychiatric disorders may have negative impact on body image and metabolism.

Drug class	Benefits	Side effects
Antipsychotic medications (examples include Clozaril and Zyprexa)	Treat severe cases of mental illness, i.e. schizophrenia.	• Weight gain • Sedation • Nausea • Vomiting
Antidepressant medication (examples include Citalopram, SSRIs, Paroxetine)	Improve symptoms of depression, including sadness, hopelessness, lack of energy, difficulty concentrating, and lack of interest in activities.	• Insomnia • Weight gain • Dizziness
Antianxiety medication (Xanax and Ativan)	Used to treat anxiety and panic attacks.	• Drowsiness • Potentiation of alcohol effects • Withdrawal

Recommendation and considerations for exercise programming

There is a wealth of information that has shown that programs involving walking, running as well as group dynamic movement activities at low to moderate intensity (50-65% of maximum heart rate) lasting for 20-60 minutes have been shown to be safe and effective.

Source: Durstine, J.L., 2009, pg. 376

An example is shown below of a program for this population as a guide. It must be noted however that programming should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of a medical or allied health professional.

Mode	Frequency	Duration	Intensity	Progression
Aerobic	> 4 days per week	20-30 minutes	RPE 11-14/20	P limit to 30 min session
Strength (all major muscle groups)	2 days per week	1 set of 8-12 reps	50-70% of 1RM	Increase gradually to 2 sets
Flexibility (all muscle groups)	5 days per week	20-60s/stretch	Maintain stretch below discomfort point	N/A

Anxiety

Anxiety is a negative emotional state involving feelings of worry, nervousness and apprehension.

Source: Hetterma, J.M., 2001

Anxiety disorders may include specific phobias, obsessive-compulsive disorders, social phobias and generalised anxiety disorders.

Source: Hetterma, J.M., 2001



- Twitching
- Muscle tension
- Headaches
- Sweating
- Abdominal pain
- Dizziness
- Irregular or rapid heart rate
- Rapid breathing
- Fatigue
- Diarrhoea
- Decreased concentration
- Sexual problems.

Source: Hetterma, J.M., 2001

Effects on the exercise response:



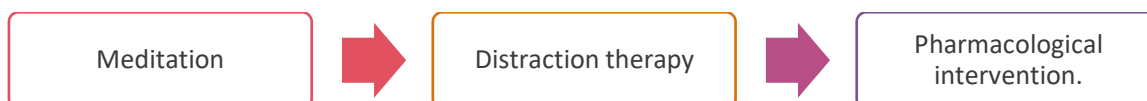
The physiological adjustments during a graded exercise stress test are typically not altered by heightened stress levels or anxiety disorders. However, in some cases when the anxiety is extremely chronic there is the potential for abnormal neuroendocrine responses; this is particularly prevalent at moderate to high-intensity exercise. Concurrent pharmacological intervention can also negatively impact the exercise response.

Effects of exercise training:

There has been a significant body of research that has shown a positive effect on exercise in those people who suffer anxiety – with an observed decrease in anxiety state, 30 minutes following a moderate to intense aerobic exercise.

Source: Durstine, J.L., 2009, pg. 379

The anxiolytic effect of exercise training has been compared to a range of other interventions, including:



Source: Durstine, J.L., 2009, pg. 380-381

It appears that acute sessions of aerobic exercise is as effective in controlling the symptoms of anxiety then that of meditation and pharmacological intervention.

Source: Durstine, J.L., 2009, pg. 381

Resistance training does not appear to have an anxiolytic effect and thus aerobic exercise should be the focus of exercise in this population.

In contrast, to these positive findings others have shown that disturbed mood is associated with overtraining intervention.

Source: Durstine, J.L., 2009, pg. 381

This is where the client chronically pushes themselves beyond physical and psychological limits of exercise training.

As a personal trainer it is important for you to have an understanding of the benefits of exercise in those clients diagnosed with anxiety.

Medications, benefits and side effects:

It is important as a personal trainer to have a basic understanding of some of the pharmacological agents that your client may be prescribed since they can have significant impact on their metabolism, weight, mood etc.



Source: Bryant, B., 2011, pg. 316

The following table summarises the major classes of drugs that clients with depression may be on. Again it is critical to take this into account as the side effects of the medications for treating psychiatric disorders may negative impact on body image and metabolism. Thus consideration when designing an exercise program.

Drug class	Benefits	Side effects
Benzodiazepines	Prescribed for anxiety disorders and is a class of drug that is a central nervous system depressant.	Drowsiness, Ataxia, Diplopia, Vertigo, Memory loss
Beta blockers	Regulate blood pressure and heart function are used to control certain symptoms of anxiety, including seating, heart palpitations and muscle tremors	Fatigue, cold hands, headache, upset stomach, constipation, diarrhea, dizziness, shortness of breath.
Tricyclics (TCA)	Are a group of drugs that are used to control panic attacks – they increase the amount of serotonin and norepinephrine	Blurred vision, constipation, dry mouth, drowsiness, drop in blood pressure when moving from sitting to standing, which can cause light headedness, urine retention.

Recommendations and considerations for exercise programming

Clients presenting with anxiety should be evaluated for the following:



Source: Durstine, J.L., 2009, pg. 383

In addition, neuromuscular function should be assessed as the client's perception, alertness and coordination can be affected by the condition and or the prescribed medication.

Aerobic exercise has been used therapeutically for anxiety disorders; whilst resistance programs have generally been used as a second line approach; an example of a typical program for this population is describe in the following table. There are special considerations for this population that include the following:

- Monitor physical and emotional health
- If the client is unaccustomed to exercise, then they may be prone to injury
- Withdrawal from activity due to medication related side effects
- The personal trainer should emphasise the importance of reporting feelings that include:
 - Tiredness
 - Exhaustion
 - Shortness of breath
 - Chest discomfort
 - Heart palpitations
 - Emotional swings.

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of a medical or allied health professional.

. Source: Durstine, J.L., 2009, pg. 383

Mode	Frequency	Duration	Intensity	Progression
Aerobic	3-5 days per week	20-30 minutes	50% to 85% of MaxHR	Increase frequency, duration, intensity
Strength (8-10 separate exercises targeting major muscle groups)	2 days per week	1 set of 8-12 reps, per exercise	Resistance set at 60-85% of max	Frequency and reps. Remain constant, increasing resistance based on the 2 + 2 method
Flexibility (static stretching for all major upper and lower body muscles)	Following each session	Hold stretch for 15-30 sec	Stretch to point of tightness avoid discomfort	ROM will increase over time
Warm up/cool down	Before and after each session	5-10 min each session	30-45% MaxHR	Low-intensity, large muscle activity
APHRmax – Age predicted Maximum heart rate; ROM – Range of motion.				

Cerebral palsy

Cerebral palsy involves injury to the brain during foetal development or at the time of birth, leading to disorders causing loss of movement and other nerve functions. Mental ability, sensation and voluntary muscle action are affected.

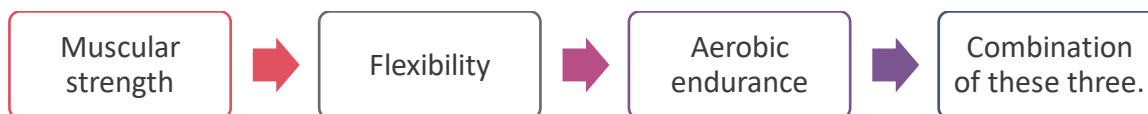


- Seizures
- Muscle contractions
- Mental retardation
- Hearing abnormalities
- Progressive joint contractures
- Limited range of motion
- Speech abnormalities
- Delayed development of motor skills

Source: National Institute of Neurological Disorders and Stroke, 2016

Effects on Exercise Response:

Whilst there is limited research on the benefits of exercise in this population; given the nature of this disorder (i.e., physical disability) there is no reason to suspect that individuals with cerebral palsy cannot benefit from regular exercise programs. Exercise programs for this population should focus on a number of important aspects, including:



Source: Durstine, J.L., 2009, pg. 344

People with CP are predisposed to sedentary lifestyle and as a result are at increased risk of cardiovascular disease and stroke.

Source: Durstine, J.L., 2009, pg. 344

Thus it is important to collect appropriate medical and health history in people with CP before they engage in any form of regular physical activity. Additional effects of regular exercise, include the following:

- Improvement in the sense of well-being
- Improvement in capacity to perform activities in daily living
- Body image
- Lessening of the severity of symptoms such as spasticity and athetosis.

Source: Durstine, J.L., 2009, pg. 344

Management and medication:



As with any client medication requirements are pivotal in ruling out any contraindications or precautions before initiating exercise programs.

Source: Durstine, J.L., 2009, pg. 345).

There are a number of different medications and special considerations for exercise in this population, including:

- Antiseizure medication (including phenobarbital, phenytoin and carbamazepine) and antispasmodic medications may decrease aerobic capacity
- Concomitant cognitive, visual, hearing and speech and swallowing difficulties
- Record any medications and dosages as they may cause confounding impacts
- Use gloves for wheelchair exercise is recommended
- Do not assume decreased cognitive ability on the presence of drooling or the quality of verbal skills.



Source: Durstine, J.L., 2009, pg. 345

Recommendations and considerations for exercise programming:

There is limited research available to substantiate testing protocols, principles and techniques for CP population. There are a number of commonly used methodologies used to test individuals with CP, including:



The progressive goal of all exercise training in this population is to improve health and increase daily functional activities. The primary goals for exercise programming are to identify and mediate the barriers to participation and to determine an exercise regime that complements the individual's interest and abilities.



Exercise programming should be simple and focus on flexibility, balance, core, light cardiovascular and muscular endurance resistance training.

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client

and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Modes	Goals	Intensity/frequency/duration	Time to goal
Aerobic			
Ambulatory: - Schwinn Air-Dyne - Any upper and lower limb ergometer Wheelchair: - Arm ergometer	Increase aerobic capacity and endurance	40-85% $\dot{V}O_2R$ 3-5 days/week 20-40 min/session - Emphasize duration over intensity	Variable
Endurance			
Ambulatory: 6 to 15 min walks Wheelchair: 6 to 15 min pushes	Improve distance covered	1-2 sessions/week	Variable
Strength			
Free weights or weight machines	Improve muscle strength of involved and uninvolved muscle groups	3 sets of 8-12 reps 2 days/week - Resistance as tolerated	Variable
Flexibility			
Stretching (involved and uninvolved joints)	Improve ROM directly related to capacity for ADLs	Before and after aerobic and endurance exercise	Variable

Chronic fatigue



Chronic fatigue syndrome is a puzzling complex disorder defined only by its symptoms (Griffith, J.P., 2008). Chronic fatigue syndrome is characterised by debilitating fatigue that is not relieved by rest or accounted for by any medical or psychiatric condition.



- Frequent sore throats
- Painful lymph nodes
- Difficulty concentrating
- Poor memory
- Low grade fever.

Source: Griffith, J.P., 2008

Effects of exercise training



One of the most interesting responses to exercise in this population is the complaint that their fatigue and other symptoms generally feel worse in the days following any amount of physical exertion.

Source: Durstine, J.L., 2009, pg. 234

The basis of this response in this population is poorly understood, and understandably attempts at exercising conditioning may be frustrating. It is important that subsequent exercise prescriptions take these observations into account. Clients in this population can expect to see a range of benefits of exercise as they progress through their program, benefits include the following:

- Reduces the risk of premature death
- Reduces the risk of heart disease
- Reduces the risk of developing high blood pressure
- Reduces feelings of depression and anxiety

- Helps control weight
- Helps build and maintain healthy bones, muscles, and joints
- Helps older adults become stronger and move about without falling
- Promotes psychological well-being.
- Increases maximal oxygen uptake
- Decreases myocardial oxygen cost
- Decreases heart rate at a given submaximal intensity
- Reduces resting blood pressure
- Decreases blood pressure at a given submaximal intensity
- Increases HDL cholesterol
- Decreases triglycerides
- Increases muscle capillary density
- Increases exercise threshold for the accumulation of lactate in the blood
- Increases exercise tolerance threshold
- Reduces total body fat
- Reduces intra-abdominal fat
- Improves glucose tolerance
- Decreases anxiety and depression
- Enhances physical function and independent living
- Enhances feelings of wellbeing
- Enhances performance of work, recreational and sport activities
- Increases muscle endurance, size and strength
- Improves balance
- Improves coordination



- Improves joint range of motion
 - Improves flexibility
 - Reduces falls risk and injuries from falls
 - Increases bone strength
 - Decreases pain
 - Prevents functional limitation
 - Effective treatment for many chronic conditions
 - Reduces reliance on medications
 - Improves health
- Enhances appearance
 - Increases muscle mass
 - Increases strength

Recommendations and considerations for exercise programming

Little is known about the clinical benefits of exercise training in this population, thus caution is advisable in these clients. General recommendations regarding exercise programs in this population is difficult to accomplish. There is an example of an exercise program below, but it is important to take a number of important guidelines into considerations for this population, including:

- Exercise programming should be implemented to prevent further deconditioning that can be compounded by chronic fatigue. As opposed to trying to optimise aerobic conditioning in traditional training, the focus instead should be on preventing the progression of deconditioning.
- The client in this population should be warned that they may feel worse in the first few weeks of training.
- Exercise programs should be commenced at a very low level with the client's tolerant activity level.
- Aerobic exercise should utilise a familiar set of activities such as walking, which should be started at a low level.
- Flexibility programs should be utilised to preserve range of motion.
- Strength training should focus on preservation and avoid intensity training that may lead to delayed onset muscle soreness (DOMS).
- The progression of exercise activity should focus on moderate-intensity activities in preference of increasing exercise intensity.

Source: Durstine, J.P., 2009. Pg. 236

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Modes	Goals	Intensity/frequency/duration	Time to goal
Aerobic Large muscle activities	• Prevent deconditioning • Maintain functional work capacity	• RPE 9-12/20 • Intensity not main focus • 3-5 days per week • 1-2 sessions per day • 5 min per session, progressing to 60min sessions as tolerated	Approximately 3 months
Strength	• Maintain strength • Avoid muscle soreness	As required for the individual	As required for the individual
Flexibility	Maintain ROM	As required for the individual	As required for the individual
Functional Activity-specific exercises	Increase ease of performing ADLs	As required for the individual	As required for the individual

Module five: Exercise Considerations for Culturally and Linguistically Diverse Groups



Australia is a culturally diverse country and works to protect children and young people of diverse cultural, linguistic, ethnic or religious backgrounds. Officers who work with the government support children, young people and families from culturally and linguistically diverse backgrounds and do so within a legislative and policy framework, for example in there are a number of legislative and policies, including:

- The United Nations Convention on the Rights of the Child
- The Queensland Government's Multicultural Policy 2004: Multicultural Queensland – making a world of difference
- The Child Protection Act 1999
- The Child Safety Practice Manual, Department of Communities, Child Safety
- Department of Communities, Child Safety Policy No. 458-2, Cultural diversity data collection and reporting

SECTION 1 – IMPORTANCE OF CULTURE IN PERSONAL TRAINING

From a personal trainer's perspective, it is important to have a fundamental understanding of a client's background and the role culture has in shaping the person's values and belief system.

So what is culture?

Culture is defined as an integrated pattern of human behaviour that includes thoughts, communications, actions, customs, beliefs, values, and institutions of a racial, ethnic, religious or social group. Toward a culturally competent system of care, as cited by Mo Yee Lee in *A Solution-Focused Approach to Cross-Cultural Clinical Social Work Practice: Utilizing Cultural Strengths* (2003: 385). Based on this definition on how culture impacts human behaviour you can see that taking this into account as a personal trainer will have an impact on the types of programs you put together for clients from culturally and linguistically diverse groups.



There are a number of important considerations from a cultural prospective that need to be kept in mind when undertaking pre-screen and program development, including:

- Every person has a cultural identity, which may or may not be recognised by the person themselves
- Culture and cultural identity is a dynamic process and is constantly changing
- Culture influences the person's beliefs, values and behaviours
- People may identify with more than one culture or cultural group
- People may choose to identify with a culture that was different to their own cultural upbringing.

Culturally and linguistically diverse (CALD) is commonly used to describe people who have a cultural heritage different from that of the majority of people in the dominant country. Previously the term used to describe this population was non-English speaking background (NESB). It is important to note that people from CALD background are homogenous, meaning that there are considerable diversity within each group. There are a range of factors that impact on their beliefs, behaviour, values and attitudes, including:

- The person's age, gender, education and socioeconomic status
- The person's level of proficiency in English
- The reason for migration and how long they have been living in Australia
- Whether the person is a first, second or later generation Australian
- The extent to which they identify with a particular cultural or ethnic group
- The person's level of acculturation into the dominant Australian culture
- Other individual factors.



Acculturation is the process of adopting the cultural traits or social patterns of another group. Participation in physical activity and sporting events in CALD groups is determined by acculturation. A great degree of acculturation is associated with increased participation in sports and physical activity; studies have shown that physical activity and sport were seen as a means of acculturation. Specifically, a longer time in the country (10yrs +) (Tremblay, M.S., 2006), later generations

(being born and having parents born in the new country) and citizenship in the new country also suggested an association with higher participation rates.

Further to this greater education, higher income, and younger age were associated with higher levels of physical activity and sport participation, as was the type of occupation. Language was commonly identified as a barrier to participation in sport and physical activity and language difficulties interacted significantly with other correlates identified.



Web

For additional information on CALD groups and physical activity download the following PDF:

[Sport and Physical Activity in CALD groups](#)

Module six: Exercise and instruction considerations in the older population

SECTION 1 – INTRODUCTION TO MODULE



In this module there is a focus on how to recognise and apply exercise consideration for older adults, together with important aspects around instructing exercise to older clients. The module will initially introduce the generic framework of exercise in this population. It will then examine the training guidelines for older adults and review the pre-screening, fitness tests and programming concepts (please review previous

modules to refresh). The different types of older clients will be introduced and general considerations when undertaking exercise programs in this population. Finally, the module will conclude with an examination of the major biological systems impacted on ageing the characteristics changes, common age related conditions that impact on the system, and the exercise considerations for the older population (including effects of exercise training, management and medication and recommended exercise programming in this population).

SECTION 2 – INTRODUCTION TO EXERCISE FOR OLDER ADULTS

For many older adults, growing older seems to involve an inevitable loss of strength, energy, and vigour. The frailty and decreased energy we associate with ageing, such as difficulty walking over distances, climbing stairs, or carrying groceries, are largely due to muscle loss. This muscle loss results mainly from inactivity. The old saying is true when it comes to muscle: “Use it or lose it”.



Web

For additional information on exercise for the elderly visit the following website
[Personal Training for the Elderly](#)

SECTION 3 – PHYSICAL ACTIVITY PATTERNS

The older generation in Australia is the nation's fastest-growing population group, which makes older people's health an increasingly important public health issue. The proportion of Australians aged 65 years and older is set to increase from 13% (2001 figures) to around 18% by 2020; by 2051, it could be as high as 29% (Australian Bureau of Statistics 2003). With this rising number of older adults unfortunately rises the rate of sedentary behaviour, which is something that individuals are more likely to adopt as they age.



Information: Older adults physical activity participation

According to national data (Armstrong, Bauman et al. 2000), less than half of Australians aged 65 years and over participate in sufficient physical activity to produce health benefit, that being the accumulation of 150 minutes or more of moderate and/or vigorous activity per week. Exercise rates are subsequently lower in women than in men, with about a third of women aged over 65 years being completely sedentary.

The following table is taken from the Australian Bureau of Statistics and describes the percentage of sedentary behaviour in Australian adults from 1995 to 2005.

	Men (%)		Women (%)	
	65-74 years	75 and over	65-74 years	75 and over
2004-2005	31.9	51.5	40.5	58.6
2001	30.9	44.0	38.8	55.9
1995	35.6	44.9	43.7	54.0

Although medical problems occur more frequently with age and older people are more prone to adverse effects from medication, it is also well established that physically active lifestyles benefit people across their lifespan. Older people can gain health and social benefits from being physically active.

Source: Schutzer, K.A., 2004

Exercise can prevent many age-related changes to muscle, bones, and joints. Moreover, they can reverse changes that have already happened as well (Better Health Channel, 2016). Exercise can contribute to stronger bones, aid in slowing the rate of bone loss, and increase muscle mass through weight-bearing exercise like walking or weight training. When designing and creating training programs for older adults, it is important for personal trainers to take into account the changes that occur in the body's musculoskeletal system.



Healthy ageing

Healthy ageing is an important concept in the Australian population. It is a concept that focuses on the health, well-being and independence of older people. The gains from healthy ageing will come from preventing or delaying the onset of disease and disability of ageing and managing them better.

Healthy ageing is not just about health it is also about the quality of life and participation in society. It is important to identify that older people constitute a resource of talents, skills and experience which is of great benefit to society.

Personal trainers add great value to healthy ageing not just in the older population but across the life span. It has been recognised that physical activity plays an important role in maintaining physical capacity, modifying physiological changes associated with ageing, enhancing psychological health and well-being and reducing the risk of many chronic diseases.



The Prime minister's science, engineering and innovative counsel (PMSEIC) prepared a paper promoting healthy ageing in Australia, with the working group identifying a national strategy be aimed at increasing the level of physical activity among older Australians.

Source: PMSEIC, n.d.

The strategy of this initiative was to undertake the following:

- A focus on people aged 45 years and older;
- Considerations of the impediments in the social and built environment to increasing physical activity and way in which they are overcome;
- A multi-sectoral approach involving all levels of government.

Risks of leading to a sedentary lifestyle

Older adults are classified as an at risk group and as such can lead a sedentary life style.

There are a range of factors that contribute to sedentary lifestyle in older people that ultimately lead to poor health outcomes:

- Life stages can impact on older adult's health directly or indirectly through their underlying behavioural changes - Obesity and low physical activity in postmenopausal women contribute to the increased risk of metabolic syndrome, diabetes, cardiovascular disease, low cardiorespiratory fitness and all-cause mortality. Retirement is a major life change that can affect diet, activity,



and sedentary behaviours. Older adults are often involved as carers, providing care for grandchildren, a partner or elderly family member.

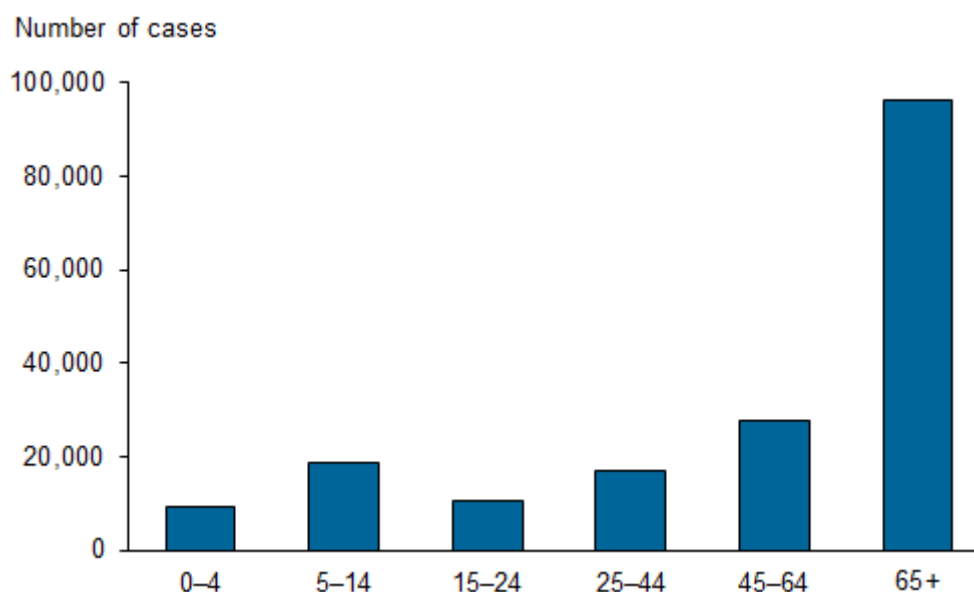
- Normal ageing is associated with increased body fat and decline in lean muscle mass - Increases in body fatness associated with ageing are largely due to increases in intra-abdominal fat mass. A decline in lean muscle mass – ‘sarcopenia’ – also occurs with ageing and accounts for the decreases in basal metabolic rate and muscle strength, hence decreased energy requirements, of older adults. Normal ageing is also associated with reduced bone mass density, and increase risk of fracture upon falling (refer to Module 3: Exercise Considerations for Women).
- Older adults typically have poor nutrition due to low consumption of fruits and vegetables - Around one-third to a half of older adults in Australia do not consume the recommended serves of fruit per day.
- Financial resources do not always guarantee that food can be easily accessible – Factors associated with food insecurity in older adults include poor health, multiple chronic health conditions, non-couple households or living alone, limited mobility, limited financial resources, and a lack of social support or living in rural areas which may reduce access to healthy foods.



Falls in older people

Fall-related hospitalisation is particularly common among older people. In 2011–12, 96,385 people aged 65 and over were hospitalised for a fall-related injury—three and a half times as many cases as 45–64 year olds (Figure 1). Of these, 65,965 (68%) were women compared with 30,420 (32%) men.

Fall-related hospitalisation by age group, 2011





Australians aged 65 and over injured in a fall spent a total of 1,397,589 days in hospital (including the major episode of acute care, any time spent in another hospital, and time spent in rehabilitation). These patient bed days accounted for 10.5% of all hospital patient days for this age group.

The length of time spent in hospital as a result of a fall increased with age. Women aged 65–69 who were injured in a fall made up 4% hospital admissions for any cause for this age group. For those aged 85 and over close to 1 in 5 of the total patient days used by all women in that age range were due to a fall.

Low bone density in older people

As you age, your body may reabsorb calcium and phosphate from your bones instead of keeping these minerals in your bones. This makes your bones weaker. When this process reaches a certain stage, it is called osteoporosis. Many times, a person will fracture a bone before they even know they have bone loss. By the time a fracture occurs, the bone loss is serious.

Women over age 50 and men over age 70 have a higher risk of osteoporosis than younger women and men.

For women

A drop in oestrogen at the time of menopause is a major cause of bone loss.

For men

A drop in testosterone as they age can cause bone loss.

Cardiovascular deficiency in older people

While aging does not itself cause heart failure (HF), it does lower the threshold for manifestation of the disease. As the populations of most developed countries continue to become older, on average, the importance of aging as a risk factor for all cardiovascular disease. While there is generally no change in the resting heart rate with aging, a number of changes do occur in the cardiac conduction system that impact its electrical properties.



SECTION 4 – TRAINING GUIDELINES FOR OLDER ADULTS

There are a number of training guidelines for older adults over the age of 65 years of age.



It is well known that advanced ageing is associated with a loss of muscle mass (due to reduced physical activity and loss of Type II muscle fibres); which needs to be taken into account when developing both aerobic and resistant training programs.

As a personal trainer there are a range of considerations that need to be taken into account in the older population; for

example:

1. A reduction in the client's range of movement means exercises may have to be modified to suit the client's needs. For example, older clients may not have the ability to raise themselves out of the leg press machine, so they might need your assistance.
2. A decrease in muscular power output and speed of movement means the intensity level of the session needs to be modified to suit the client's needs. More time may also be needed in between exercises for the client to recover adequately.
3. Increased risk of fractures or joint dislocations due to falls means that you should prescribe stability exercises for older clients. For example, the lunge requires greater stability than a dumbbell squat and so is a better option for minimising chances of injury.
4. A decrease in glycogen stores, thereby causing tiredness, means that an older client will require longer breaks in between sets to allow adequate recovery time.

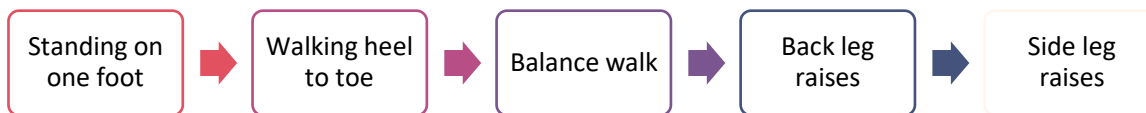


Balance in the elderly and exercises to improve balance

Each year, more than one-third of people age 65 or older fall. Falls and fall-related injuries, such as hip fracture, can have a serious impact on an older person's life. If you fall, it could limit your activities or make it impossible to live independently. Balance exercises, along with certain strength exercises, can help prevent falls by improving your ability to control and maintain your body's position, whether you are moving or still.

Balance Exercises

These five (5) exercises that are shown below are aimed at improving your balance and your lower body strength. They include:



You can do balance exercises almost anytime, anywhere, and as often as you like, as long as you have something sturdy nearby to hold on to if you become unsteady. In the beginning, using a chair or the wall for support will help you work on your balance safely.

Balance exercises overlap with the lower body strength exercises, which also can improve your balance. Do the strength exercises -- back leg raises, side leg raises, and hip extensions -- two or more days per week, but not on any two days in a row.

SECTION 5 – INDUCTION PROCESS

Pre-exercise screening

Regardless of fitness level or previous exercise experience, it is important that personal trainers complete a pre-screening form with their clients (Sports Medicine Australia 2005). This form is completed in an effort to identify possible health risks and challenges, such as high blood pressure, risk of heart attack/stroke, postural abnormalities, etc.

When carrying out the pre-screening process, it is important that all questions be asked and all answers be well documented. If there is any doubt regarding health conditions or risks involved with training programs, seek advice from a certified Allied Health Professional.



Web

The following PDF outlines Sports Medicine Australia's pre-exercise screening system:

[Sports Medicine Australia \(SMA\) - Pre-exercise screening system](#)

Fitness tests

Timed up and go



- Measures the motor ability and dynamic balance of a client
- The client sits on a chair 2.44 metres away from a marker on the floor
- They then stand and walk as quickly as they can to the marker and back, finishing by sitting down in the chair
- The total time this activity takes is recorded

30-second chair test

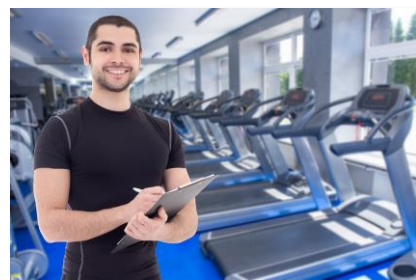
- Measures lower-body strength
- Using a chair, the trainer counts how many times the older client can stand up and sit down in a 30-second period

Chair sit and reach

- Measures lower-body flexibility
- The client sits on the edge of a chair whilst keeping one foot flat on the floor and the other leg extended with toes dorsiflexed
- The client then slides their hands down the extended leg as far as possible
- The trainer measures the distance from the dorsiflexed toes to the middle finger of the hand sliding down the leg
- The test is then repeated using the other leg

Six-minute walk test

- Determines how far the client is able to walk on flat ground for six minutes
- This test will provide an estimate of cardio-vascular fitness and can also be done on a treadmill



Programming

Resistance training

- Begin training program with light weights. Gradually increase the intensity and duration.
- Use machine weights rather than free weights as these require little balance or co-ordination.
- Set a goal of two training sessions per week, with one or two sets and 10 repetitions per exercise.

Cardiovascular training

- Set an intensity of 40-50% of Maximum Volume of Oxygen Consumed per minute (V02 max), and gradually increase this to 70-85%.
- Set a goal of five training sessions per week for 20 to 30 minutes.

The following table summarizes the adaptation to ageing and the general effects of resistance training in the older population.



Physiological category	Impact of ageing	Impact of resistance training
Muscle Strength	Decreases	Increases
Muscle Endurance	Decreases	Increases
Muscle Mass	Decreases	Increases
Muscle Fibre Size	Decreases	Increases
Muscle Metabolic Capacity	Decreases	Increases
Resting Metabolic Rate	Decreases	Increases
Body Fat Storage	Increases	Decreases
Bone Mineral Density	Decreases	Increases

SECTION 6 – OLDER ADULT CLIENT TYPES

When training older clients, it is important to understand that, just like younger adults, not all older adults are at the same level of health and fitness. Some may have been training for quite some time and, because of this, their health could be excellent. On the other hand, some may never have trained and will therefore have quite a low level of health and fitness.

It is due to these health and fitness differences that the older population can be broken into the following categories:

- Frail older adult
- Medically cleared older adult
- Active older adult
- Experienced exercise participant older adult

These categories are further discussed in the following material.

The frail older adult



Definition

The frail aged is described as an older client with a poor attention span and who can take a little while to carry out basic tasks (Broe 2002).

The frail adult client can have postural challenges brought on by tight muscles as well as having poor balance. Frailty is due to reduced brain reserves in multiple brain systems, leading to an increased likelihood of functional decline under stress, including delirium, loss of mobility, and falls.



When programming for this group of older clients, a personal trainer must take health restrictions into account and prescribe an exercise program that suits each client's needs. For example, a selection of exercises that require little stability or coordination, such as the use of machine weight equipment for resistance training, or cardiovascular equipment like recumbent bikes to improve cardiorespiratory training.

The medically cleared older adult



Definition

The medically cleared older adult has been identified as low or moderate risk level from a pre-exercise screen. They are able to commence a tailored physical activity program without the need to seek medical clearance.

However, older people should seek medical clearance if:

- They have been diagnosed with heart problems or high blood pressure.
- They have been sedentary (no exercise) for over a year.
- They are over 65 years of age and are sedentary.
- They suffer from diabetes.

After medical clearance has been obtained, the personal trainer must prescribe a program according to that client's particular illness or injury whilst abiding by the guidelines provided by the Allied Health Professional. The types of activities and exercises programmed for this population may include light machine-resistance training and chair or aqua-based activities.



The active older adult



Definition

The active aged group is defined by the World Health Organisation (2002) as older adults who optimise opportunities for health and participation in society as well as cultural and spiritual activities.

Active ageing allows people to realise their potential for physical, social, and mental wellbeing throughout their life whilst providing them with adequate protection, security, and care when they need it. These older adults are active in their lifestyle, taking every opportunity to participate in a wide range of activities.



Web

For additional information from World Health Organisation Ageing and Life Course:
[Ageing and Life Course](#)

The experienced exercise participant older adult



Definition

The experienced older adult includes those older clients who have been exercising for a period of time. This may be five or more years. These clients have an understanding of exercise and equipment, such as what it does and how it works.



Due to their active lifestyle, those in the experienced exercise group may not face challenges similar to those faced by such groups as the frail aged. Because of their experience with exercising, the experienced exercise group may require little cueing with regards to their exercises. However, personal trainers should monitor the intensity of exercise to ensure that clients do not train at a level above that of which they are capable.

Module seven: Prescribing exercise for elderly with medical conditions



SECTION 1 – HEART DISEASE

Heart disease is the most common cause of death in older people, with an increase in heart attack risk. Typical cardiovascular anatomy and physiology that occur with ageing are responsible for alterations and decreased performance in cardiovascular function.

These include:

- Decreased cardiac output
- Lower maximum heart rate
- Decreased V02 max
- Decreased stroke volume
- Increased blood pressure
- Reduction in blood flow
- Decreased capillary to muscle fibre ratio
- Decreased ability to dissipate heat via sweat due to reduced blood flow to the working muscles.

Source: Totoro, G.J., 2014, pg.792

SECTION 2 – CARDIOVASCULAR CONDITIONS

Cardiovascular conditions may be most frequently encountered by fitness professionals, or they may be the primary focus of efforts to improve the fitness and wellbeing of clients- assisting in the reduction of risk factors and preventing cardiovascular disease.

Risk factors

There are many risk factors that put a client at risk of developing heart disease and these need to be screened before commencing an exercise program.



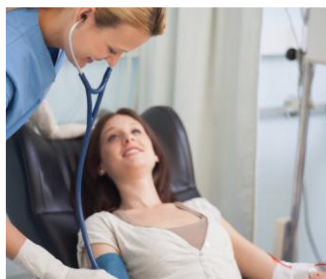
Some of these risk factors include:

Non-modifiable risk factors



- Age
- Family history/ hereditary
- Gender
- Ethnicity

Medical risk factors



- Cardiovascular disease
- COPD
- Asthma
- Cystic fibrosis
- Diabetes
- Thyroid disorders
- Renal disease
- Liver disease

Lifestyle/ behavioural risk factors



- Obesity
- Smoking
- Physical inactivity or sedentary lifestyle
- Alcohol consumption
- High stress levels
- Limited or disturbed sleep
- Obesity
- Smoking

Warning signs



As a fitness professional, it is your responsibility to constantly monitor your clients and be aware of any adverse signs or symptoms they may display. These could indicate a possible heart problem, respiratory problem or metabolic issue and can lead to very serious complications.

If your client displays any of the following signs and symptoms, it is crucial that you stop the session immediately.

- Shortness of breath
- Pallor
- Dizziness or light headedness
- Swelling of ankles
- Nausea or vomiting
- Fatigue
- Claudication / leg cramps
- Redness
- Unusual heart rate response
- Loss of coordination

Cardiovascular pathologies

A cardiovascular condition exists when there is a problem with the heart, circulation of blood throughout the body or the return of blood to the heart. Conditions may include:

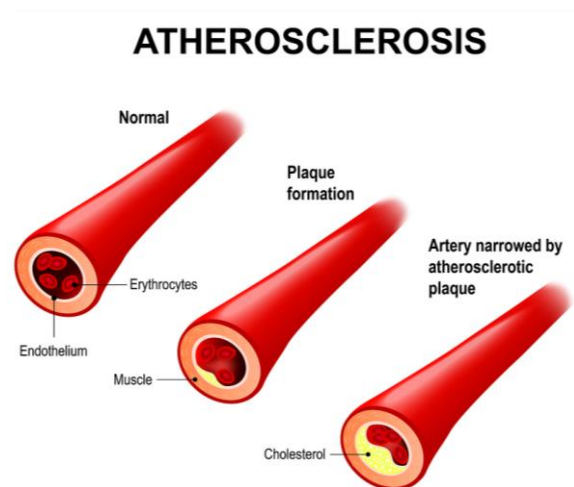
Hypertension	• High blood pressure frequently results from excess build up of fat and sodium in the blood vessels
High cholesterol	• Elevated cholesterol levels or low density lipoproteins in the blood
Coronary heart disease	• Narrowing of coronary arteries due to atherosclerosis and arteriosclerosis
Peripheral vascular disease	• Blood vessels external to heart and brain affected by inflammation or tissue damage
Cerebrovascular disease	• Blockage creates inadequate blood flow to the brain

Benefits of exercise for cardiovascular and respiratory conditions include:

- Improved circulation
- Improved respiration
- Decreased heart disease risk
- Controls abnormal blood lipids
- Controls diabetes
- Controls obesity
- Reduced blood pressure
- Reduced number of respiratory attacks and hospitalisations
- Reduced medication dose/frequency
- Reduced risk of cancers – colon, breast
- Improved psychosocial and physical outcomes
- Better compliance with treatment regimens
- Reduced impact of disease symptoms and treatment related side effects
- Survival benefits.



Source: Durstine, J.L., 2009, pg. 66



Atherosclerosis

The Australian Atherosclerosis society (2012) describes atherosclerosis as a chronic disease of the arterial system characterised by abnormal thickening and hardening of the vessel walls due to accumulation of fats, inflammatory cells, and connective tissue. This causes arteries to lose elasticity and vessels to narrow from the build-up of plaque.

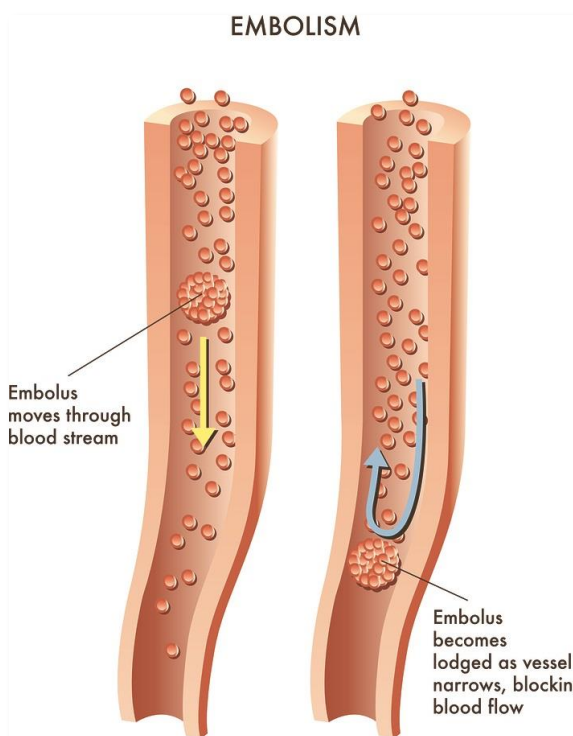
Intermittent claudication

Intermittent claudication is characterised by pain in the legs, mostly the calves, that commences when walking or doing other exercise and is usually relieved with rest. Intermittent claudication is a result of the body failing to pass enough blood down to the lower limbs and back to the heart to meet oxygen demands. This causes an imbalance between oxygen/blood demand and the delivery or supply. When exercise is stopped, less oxygen is needed and therefore the demands can be met and pain ceases.

Embolism

An embolus is a part of a clot that has broken away and floats through the blood stream. When this clot causes a blockage it is known as an embolism and blood can no longer flow through the vessel.

To function properly, the body's tissues and organs need oxygen, which is transported around the body in the bloodstream. However, if an embolism blocks the blood supply to a major organ, such as the brain, heart or lungs, the organ will fail.



Coronary heart disease

Coronary Heart Disease is also known as Coronary Arterial Disease. The National Heart Lung and Blood Institute (2012) define coronary heart disease (CHD) as blockages in vessels that supply blood to the heart, known as the coronary arteries. This is due to a build-up of plaque which narrows the arteries, restricting blood flow. CHD causes angina (chest pain) and shortness of breath and can lead to a heart attack if complete artery blockage occurs.

Peripheral vascular disease (pvd)

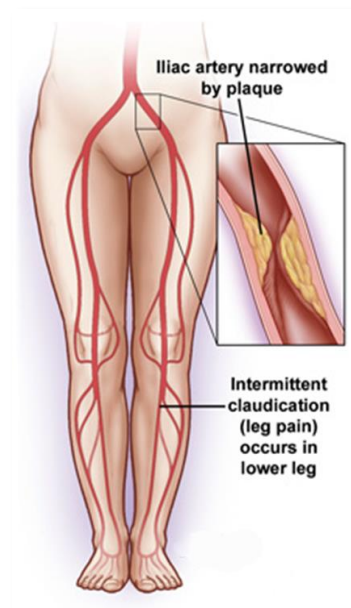
PVD is also known as peripheral arterial disease (PAD) and is a chronic disease of the lower extremities caused by atherosclerosis (narrowing and hardening of the arteries). When blood vessels supplying blood to the lower extremities are narrowed, functional capacity of the limbs is reduced and pain is caused. This can then lead to intermittent claudication and wounds if the condition progresses.



Web

Some general guidelines for cardiovascular exercise prescription for healthy adults.

[Fitness Australia Exercise Guidelines](#)



SECTION 3 – CARDIORESPIRATORY EXERCISE CONSIDERATIONS

The purpose of exercise for cardiorespiratory conditions is to improve the systems and decrease the side effects. Although a holistic exercise approach is best, a focus on cardiovascular exercise is necessary to get the designated results.

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Mode	Frequency	Intensity	Time
Aerobic (large muscle groups)	>3 days/week	RPE 11-16/20 Low-mode 40-80% MaxHR	20-60mins/session (may be in 10min lots) SLD or interval based
Resistance (circuit or progressive compound)	2-3 days/week	Muscular endurance 8-10 different exercises Single set 8-12 reps <i>Angina</i> Light 40-50% maximum velocity contraction (MVC) <i>Myocardial infarction</i> UB 30-40% 1RM LB 50-60% 1RM	<20mins/session 48hrs rest btw sessions

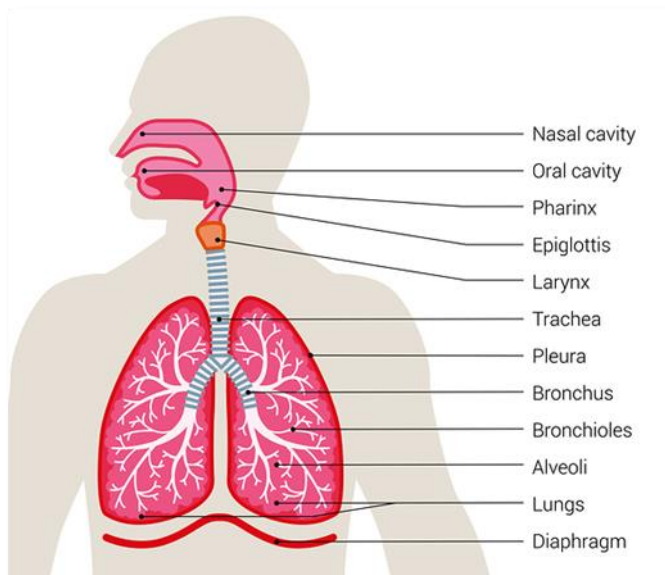
Mode	Frequency	Intensity	Time
Flexibility	<2 days/week	No pain Static 10-30secs	30mins/session
General Goals		Programming considerations	
- Improved VO2 - Decreased BP - Decreased submax HR - Decreased CVD risks - BP control at rest and exercise - Decreased CVD risks - Increased functional ability - Increased EE		- Extended warm-up (>15mins) and cool-down (>10mins) - Monitor for S&S of cardiac complications - Avoid Valsalva breathing - Avoid isometric exercises - Monitor for hypotensive response - Conservative initial exercise intensities	

Source: Durstine, J.L., 2009, pg. 69-71

Respiratory system

The normal process of ageing is associated with a number of changes in both the structure and function of the respiratory system. These include:

- Alveoli enlargement – less area for gas exchange as air spaces become bigger and lose elasticity.
- Decrease in chest wall spring-like structure - more effort to breathe in and out.
- Decrease in respiratory system muscles strength.
- Decrease in lung volume - breathe at a higher rate to ensure they are delivering enough oxygen to their working muscles.



Source: Totor, G.J., 2014, pg.878

Benefits

There are a range of generic benefits of exercise for clients suffering from respiratory conditions including:

- Improved circulation
- Improved respiration
- Decreased heart disease risk

- Controls abnormal blood lipids
- Controls diabetes
- Controls obesity
- Reduced blood pressure
- Reduced number of respiratory attacks and hospitalisations
- Reduced medication dose/frequency
- Reduced risk of cancers – colon, breast
- Improved psychosocial and physical outcomes
- Better compliance with treatment regimens
- Reduced impact of disease symptoms and treatment related side effects
- Survival benefits.

Source: Durstine, J.L., 2009, pg. 130-133

Asthma

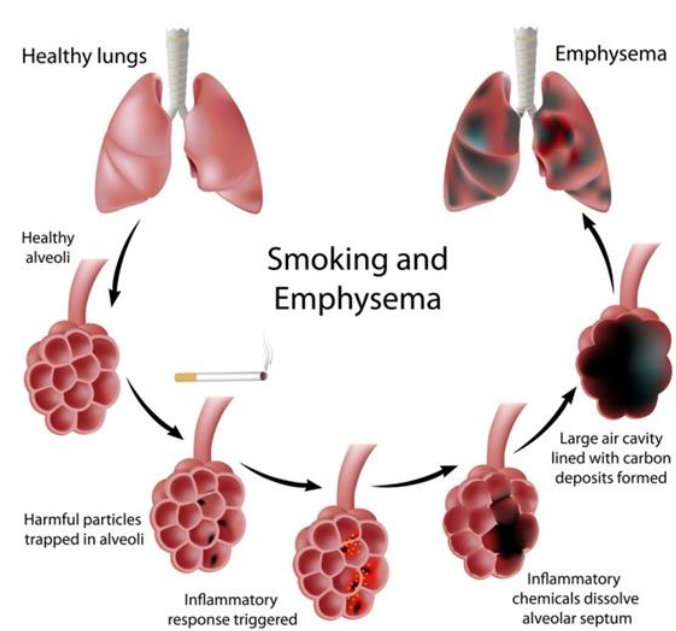
The condition and exercise considerations for asthma are described in Module 2.

Chronic Obstructive Pulmonary Disease (COPD)

The Health Institute of Australia (2012) describes the condition as obstructive lung diseases, including chronic obstructive pulmonary disease (COPD) which is a lung disease in which the lung is damaged, making it hard to breathe. In COPD, the airways are partly obstructed, due to either chronic bronchitis or emphysema, making it difficult to get air in and out.

COPD cause a number of changes in both anatomy and physiology of the pulmonary system, including:

- Ventilatory impairments
- Abnormalities of gas exchange
- Cardiovascular impairments (i.e. reduced physical activity that leads to cardiovascular deconditioning)
- Muscular impairments (i.e. peripheral muscle deconditioning)
- Symptomatic limitation (i.e. breathlessness)
- Psychological disturbances (i.e. chronic anxiety due to fear of anxiety as a result of the COPD)
- Depression.



Source: Durstine, J.L., 2009, pg. 130

Management and goals of COPD



There are a range of objectives for the management of clients with COPD. Individuals with COPD have some degree of physical deconditioning and as such exercise training is a crucial aspect to the clinical management and rehabilitation. The goals for managing COPD, include the following:

- Optimise respiratory system and pay careful attention to bronchodilator therapy (including inhaler dosage, frequency and technique)
- Exercise training to correct physical decongestion, lactic acidosis and reduce ventilator requirements during exercise
- Reduce potentially limiting symptoms including dyspnea and fear
- Breathing retraining to improve ventilator efficiency.

Source: Durstine, J.L., 2009, pg. 131



Web

The additional information on lung diseases.
[National Heart Lung and Blood Institute \(2012\)](#)

Recommendations and considerations for exercise programming

Exercise should be encouraged for all individuals suffering from COPD. The exercise prescription should be flexible enough to account for fluctuating clinical status. It is important for the personal trainer to account for any changes in the client and reassess the goals and risks of the exercise program.

The recommended mode of exercise training for older people with COPD, include:

- Walking
- Cycling
- Swimming
- Conditioned exercise (i.e. tai chi).



Source: Durstine, J.L., 2009, pg. 132

The mode of exercise selected should be enjoyable and that the client enjoys and directly improves their ability to perform usual daily tasks. It is also important to identify if oxygen is required during training. If there has been a history of arterial oxygen tension is less than 55 mmHg or oxyhemoglobin is less than 88% then supplemental oxygen is required.

The following table shows an example of the range of recommended exercise programs for older people with COPD. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Modes	Goals	Intensity/frequency/duration	Time to Goal
Aerobic			
Large muscle activities (walking, cycling, swimming)	• Increase O₂ • Become less sensitive to dyspnea • Develop more efficient breathing patterns	• RPE 11-13/20 (comfortable pace and endurance) • Monitor dyspnea 1-2 sessions, 3-5 days per week • 30 min sessions (it is possible that shorter exercise session may be required initially)	2-3 months to ensure completion
Strength			
Free weights Isokinetic/isotonic machines	• Increase maximal number of reps • Increase isokinetic torque/work • Increase lean body mass	• Low resistance, high reps 2-3 days per week	2-3 months
Flexibility			
Stretching Tai chi	Increase ROM	3 days per week	Ongoing
Neuromuscular			
Walking, balance exercise Breathing exercise	• Improve gait, balance • Improve breathing efficiency	N/A	Ongoing

SECTION 4 – MUSCULOSKELETAL SYSTEM

Musculoskeletal conditions are a major burden on individuals, health systems, social care systems, and Australian society. Musculoskeletal conditions are prevalent, and their impact is widespread throughout the world. They are the most common cause of severe long-term pain and physical disability, and they affect hundreds of millions of people globally.

Source: World Health Organisation, 2014

The Victorian Government's Better Health Channel (2016) stated that nearly half of all Australians over the age of 75 have some kind of disability. Common conditions affecting the musculoskeletal system in older people include:

Condition	Description
Osteoarthritis	Cartilage within the joint breaks down, causing pain and stiffness.
Osteomalacia	Bones become soft due to associated problems with Vitamin D metabolism.
Osteoporosis	Bones lose mass becoming brittle increasing the likelihood of fractures.
Rheumatoid arthritis	Joint inflammation.
Muscle weakness and pain	Any of the above conditions can affect the proper functioning of the associated muscles.



The age-related changes of the musculoskeletal system are of special concern in the elderly because of the risk of falls. Normal changes attributed to ageing contribute to activity intolerance and impaired physical mobility, leading to weakness and an increased risk of falls. As a personal trainer, you must be aware of the certain physiological changes that occur in aged people or in your client as they age. Each one of these changes has physical implications on individuals because their muscles, joints, and bones age along with the rest of their body.

Aging muscular changes

- Muscle fibres reduce in number and shrink in size.
- Muscle tissue is replaced more slowly and is replaced with a tough, fibrous tissue.
- Changes in the nervous system cause muscle to have reduced tone.
- Bones become less dense with tissue and lose calcium and minerals, therefore being rendered weaker.
- Joint movement becomes stiffer and less flexible due to decreased fluid inside the joint.
- Ligaments shorten and lose flexibility.



Web

For additional information on ageing muscles, bones and joints:

[Ageing - muscles, bones and joints](#)

SECTION 5 – MUSCULOSKELETAL CONDITIONS

A musculoskeletal condition is when there is an issue with the bone, joints or muscles. This can create pain, inflammation, movement difficulties, etc.

Pathophysiologies

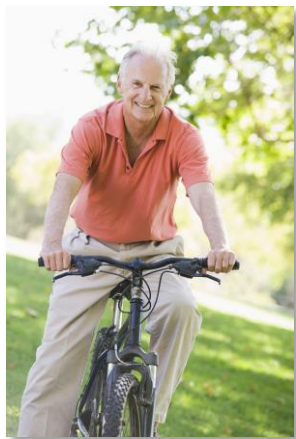
Musculoskeletal conditions include:

- **Rheumatoid arthritis** – overactive immune system with chronic inflammation affecting synovial joints systemically and causing stiffness, fatigue, malaise, joint pain, swelling and warm joints.
- **Osteoarthritis** – degenerative joint disease causing pain and stiffness locally, aggravated by prolonged use and relieved by rest
- **Osteoporosis** – bone mineral density is reduced, increasing fracture risk resulting from lack of physical activity, low body fat levels, inadequate calcium intake, high protein diet, smoking, alcohol abuse, excessive caffeine intake, lack of vitamin D and amenorrhoea
- **Low back pain** – acute or chronic pain from lower back or more regionally, ranging from dull to sharp stabbing pains originating from poor posture or an incident/accident
- **Injuries** – neck, knee, muscle strains, ligament strains



- **Muscular dystrophy** – progressive muscle weakness and atrophy.

The benefits of exercise for musculoskeletal conditions include:

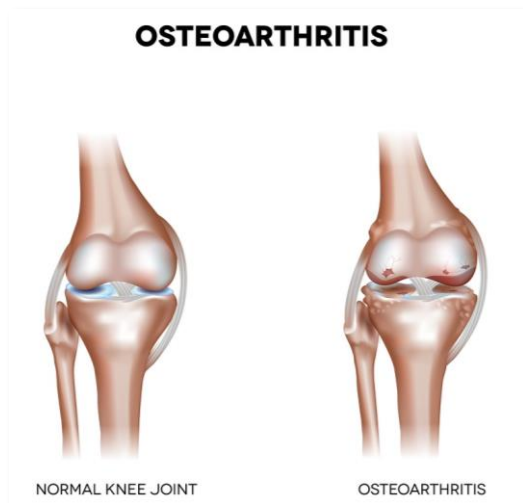


- Increased strength, posture, balance
- Enhanced wellbeing, mood and sleep quality
- Greater joint mobility, flexibility
- Improved endurance and fitness
- Eases stiff joints and relaxes sore muscles
- Reduces pain and fatigue
- Maintains muscle strength, preventing poor posture
- Improves all health related fitness components
- Improves reaction time, reducing falls risk
- Increases mobility, helping to maintain independence.

Source: Elward, K., 1992

Exercise considerations

Specific exercise prescriptions for arthritis and osteoporosis are detailed as follows. In regard to soft-tissue conditions (low back pain, neck issues, muscle strains), these will be dealt with in more depth in Certificate IV Fitness Posture. However, it is all about strengthening what is weak and stretching what is tight.



Osteoporosis

This condition and the exercise considerations have been described in module 3.

Arthritis

The purpose of exercise prescription for arthritis is to increase range of motion at the joint, to decrease pain and to increase muscle strength in order to decrease load on the joint.

Warm water exercise (hydrotherapy) is helpful for people with arthritis. The resistance of moving through water boosts muscle strength and endurance. Some of the benefits include:

- Increased muscle strength, posture and balance
- Enhanced sense of wellbeing, mood and sleep quality
- Greater mobility and flexibility of joints
- Improved endurance and fitness
- Reduced inflammation and pain
- Eases stiff joints and relaxes sore muscles
- Prevention of contractures and deformities
- Reduced pain and fatigue (tiredness).

Source: Durstine, J.L., 2009, pg. 262



Web

For additional information on arthritis and benefits of exercise:
Better Health Channel - [Arthritis and exercise](#)

Effects of exercise training

Individuals with inflammatory or degenerative joint disease are able to participate in regular physical activity, to address a range of health related conditions (Durstine, J.L., 2009, pg. 260), including:

- Improved cardiovascular status
- Neuromuscular fitness
- Flexibility
- General health.

Improving each of these aspects above have been shown to improve a number of symptoms associated with arthritis, including:

- Improved function
- Decreased joint swelling
- Pain
- Improve social and physical activity.

Management of arthritis

The management of arthritis in the older population includes joint protection, exercise and education for self-management have each been reported as essential (Durstine, J.L., 2009, pg. 261).

The goals are to undertake the following:

- Decrease impairment
- Maintain or restore function
- Protect joint structure from further damage
- Maintain healthy levels of physical activity
- Control the destructive inflammatory process.

Recommendations and considerations for exercise programming

Joint protection is one of the main aims of exercise programming in the older population; as a number of considerations are recommended:

- Select low impact activities and functional exercises for strengthening if appropriate
- Older adults that have symptomatic hip or knee involvement should avoid the following types of exercise:
 - Stair climbing
 - Contact sports
 - Activities requiring one-legged stance



- Rapid stop and go actions.
- Muscles should be conditioned in the older person before exercise intensity is increased
- Flexibility and joint ROM should be included as key exercise programs
- Overstretching and hypermobility in the older population with arthritis should be avoided
- If there is pain or swelling, then the load on the joint should be reduced.

Source: Durstine, J.L., 2009, pg. 262

Exercise programs for this population should be individually designed and should address the following:

- Use low intensity and duration during initial phase of the program
- If appropriate exercise dose should be accumulated during several occasion across the day alternate exercise modes should be used to allow for changes in disease status
- Set time goals rather than distance goals
- Stretching and warm up should be performed daily
- Avoid activities that cause increase joint pain.



The following table shows an example of the range of recommended exercise programs for this population group. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Mode	Frequency	Intensity	Time
Aerobic (major muscle groups)	3-5 days/week	60-80% MaxHR RPE 11-16	5-30mins
Resistance	2-3 days/week	Pain tolerance Goal of muscle strength	Start with 2-3 reps Increase to 10-12
Flexibility	1-2 sessions/day	No pain, static = up to 30secs	30mins/session
General Goals		Programming considerations	
• Increase CV endurance • Maintain or improve muscle strength • Increased ROM by reducing stiffness • Improve gait, balance, posture		• Not recommended for high reps, high impact • Duration more important than intensity with aerobic exercise	

SECTION 6 – METABOLIC SYSTEM



As they age, a client's metabolic rate will decrease in line with the decrease in their muscle mass. This means that an older client will potentially have higher levels of body fat even though their daily calorie intake levels may not change.

Metabolic conditions to be considered also include Type 2 Diabetes, which is growing in prevalence in ageing populations.

Diabetes

The condition and exercise considerations are described in module 2.

Hypoglycaemia

Often blood glucose levels can be low in a diabetic when exercising which causes a condition known as hypoglycaemia. Symptoms of hypoglycaemia include:

- Dizziness
- Trembling/shaking
- Hunger or thirst
- Decrease in performance
- Fatigue
- Rapid pulse and shallow breathing
- Headache
- Sweating
- Reduction in consciousness.

When exercising, blood glucose levels decrease even further as glucose is used for energy. To minimise the effects of a diabetic suffering hypoglycaemia during exercise the following things could be done:

- Drink sugared fluids during exercise
- Inject insulin away from working muscles so absorption is slower
- Completely avoid exercise if blood glucose levels are too low
- Keep a sugared snack nearby and consume if there is any indication of low blood sugar levels
- Keep hydrated before, during and after exercise
- Avoid alcohol before exercise
- Consume adequate carbohydrate in the 2-3 hours before exercise.



SECTION 7 – EXERCISE GUIDELINES



The main goal for treatment of diabetes is to achieve good blood glucose control and avoid complications related to high blood glucose. Since exercise has an insulin-like effect on blood glucose levels, exercise should be considered as an addition to the medical management of diabetes. The purpose of exercise for diabetic conditions is to increase muscle mass and energy expenditure to improve metabolism.

Exercise training fits into the treatment scheme of diabetes by addressing the management of obesity. This is where exercise professionals can make the biggest impact on the treatment of diabetes.

Benefits of exercise for diabetic conditions include:

- Decreased blood pressure
- Enhances quality of life
- Improved insulin sensitivity and blood glucose control
- Improved muscular strength, power, and endurance
- Increased bone strength
- Increased muscle mass and reduced fat stores
- Reduced associated cardiovascular and lifestyle risk factors (cholesterol, BP, weight management, stress)
- Reduced stress, anxiety and depression.

An example is shown below of recommended program guidelines for this population as a guide. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Mode	Frequency	Intensity	Time
Aerobic (large-muscle groups, interval, walking, swimming, cycling)	>4 days/week	Low intensity 40-70% MaxHR Mod : 55-70% MaxHR = 12-13	20-60mins/session Interval and SLD
Resistance	2-3 days/week	Low resistance, high reps (hypertrophy) 1-3 sets 8-10 reps 8-10 exercises	30-60mins/session
Flexibility	<2 days/week	No pain, static = up to 30secs	30mins/session

General goals	Programming considerations
- Improved metabolic control - Improved body composition - Increased VO2 - Increased work capacity - Increased strength and endurance - Improved CVD risks - Achieve and maintain healthy body weight - Education - Improved mobility, balance, coordination for daily living	- Doctor clearance if required - Extended warm-up (>15mins) and cool-down (>10mins) - Interval training good for poor tolerance - Resistance training better adherence for those that are obese or have mobility, foot, balance, PAD conditions - Light weights - Ensure breathing correctly - Monitor glucose pre- and post-exercise

SECTION 8 - NEUROLOGICAL SYSTEM

As people age, their brain and nervous system go through natural changes. The brain and spinal cord lose nerve cells and weight. Nerve cells may begin to transmit messages more slowly than in the past. Waste products can collect in the brain tissue as nerve cells break down, causing abnormal structures to form. The breakdown of nerves can also affect the senses. When training older clients, it is important to take note of their reflexes, reaction time, and movement because these may be quite slow.

Alzheimer's

Alzheimer's is a form of dementia that results in progressive brain degeneration (Alzheimer's Australia, n.d.). Memory is impaired and changes can occur with decision making ability, judgment, attention and other areas of mental function and personality. Signs and symptoms include:

- Misplacing items
- Getting lost on familiar routes
- Personality changes
- Losing interest in things the person previously enjoyed
- Repeating statements
- Forgetfulness
- Forgetting current events
- Depression
- Delusions
- Difficulty with basic tasks such as meal preparation
- Problems choosing proper clothing



Management of Alzheimer's disease

The primary goal for AD treatment is to improve memory and cognition and to attempt to delay disease progression. Currently there are five (5) drug available for the treatment of AD, including:

- Acetylcholinesterase inhibitors
- Rivastigmine
- Galantamine

- Tacrine
- N-methyl-D-aspartate.

Effects on the exercise response

There are a limited number of studies that have examined the effects of exercise training on persons with AD. Practically, people with AD should be able to achieve the same types of benefits of exercise than older people without AD, including:

- Improved mobility
- Improved fitness
- Increased quality of life
- Improvement in mood
- Delay in onset of mental status
- Improvement in cognition after 3 months of aerobic exercise
- Reduced levels of depression.



Source: Rovio, S., 2005

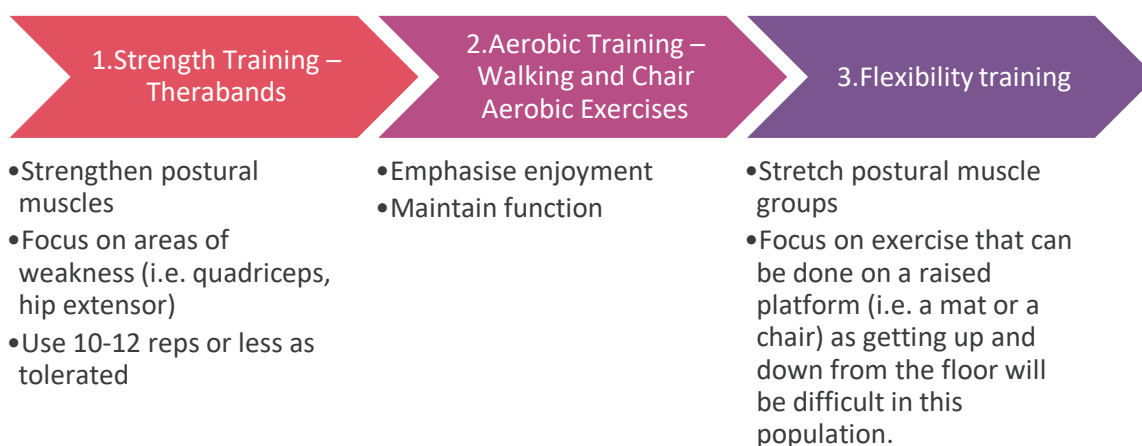
Recommendations and considerations for exercise programming

It is important to remember that clients with AD are susceptible to increased feeling of agitation and impaired cognition and therefore long exercise programs should be avoided. Exercise training for clients with AD should address three major considerations:

- Minimise problems arising from declining physical and mental health
- Recognise behaviour changes that may cause the client to become agitated to ensure they have a willingness to continue the exercise program
- Low intensity programs should be incorporated in the initial stages.

Source: Durstine, J.L., 2009, pg. 262-263

There are a number of specialised considerations for this population group when putting together an exercise program, including:



Source: Durstine, J.L., 2009, pg. 262-263

Parkinson's

Parkinson's is a brain disorder characterised by shaking and difficulty with walking, movement and coordination. The nerves in the brain involved with movement progressively deteriorate.



- Muscle stiffness
- Difficulty bending arms and legs
- Loss of balance
- Difficulty initiating movement such as getting up from a chair
- Slow movements
- Shuffling walk
- Inability to resume movement once it has stopped (freezing)
- Muscle aches and pains
- Slow speech

Physical activity should be performed with a carer and should focus on flexibility, balance, core, muscular endurance and light cardiovascular endurance.

Effects on exercise training

Exercise training in individuals with Parkinson's Disease can have significant variable outcomes based on the complexity and progression of the disease and any medications they may be prescribed.

Documented benefits of exercise in this population include the following:

- Motor performance
- Trunk rotation
- Hand-eye coordination
- Stability and balance during walking
- Muscle volume and strength.

Source: Durstine, J.L., 2009, pg. 351



Recommendations for exercise programming

Because of the complexity of Parkinson's disease it is often difficult to evaluate.

Complicating the exercise prescription may be direct (are effects that occur directly as a result of the Parkinson's disease, i.e. tremor and rigidity), indirect (are those effects that include aerobic deconditioning or loss of range of motion) and composite effects (these occur because of combination effects of direct central nervous system changes and compensatory musculoskeletal symptoms, including axial mobility and balance problems).

Source: Durstine, J.L., 2009, pg. 355

The following table provides an example of an exercise program for Parkinson's disease. It must be noted however that programming for this specific population group should be individualised to meet the specific needs of the client and is often done in collaboration with or under the guidance of the appropriate medical or allied health professional.

Mode	Goals	Intensity/frequency/duration	Time to goal
Aerobic			
Leg and arm ergometry Rowing	Maintain or improve work capacity	60-80% peak HR 3 days per week <60 min per session	3 months
Endurance			
Short walking sessions (20-30 mins; supervised)	Increase work capacity	- Speed dependent on individual 4-6 sessions per day	2 months
Strength			
Weight machines Closed kinetic chain activities	Maintain strength of arms, shoulders, legs and hips	- Use light weights 1 set 8-12 reps 3 sessions per week	2 months
Flexibility			
Stretching	Increase/maintain ROM and manage spasticity	1-3 sessions per week	3 months
Functional			
ADLs Postural changes	Maintain capacity to perform as many ADLs as possible	3-4 sessions per week	2 months

SECTION 9 – SUMMARY OF AGE-RELATED CONDITIONS AND TRAINING PRINCIPLES

It is important that personal trainers be aware both of the age-related conditions that affect exercise and how to adjust training sessions to suit their client's needs. Session progression must be at a slower pace for older adults due to their increased risk of injury. An example of correct progression is starting a client with wall push-ups, moving to push-ups on their knees, to machine bench press, barbell bench press, and dumbbell bench press.



Attachment 3

Please open and consider **Attachment 3 – Summary of age-related conditions and training principles**.

The following attachments provides examples of age-related conditions that could affect an older client's ability to participate in training sessions.

- Attachment(s) for this unit can be found in the *Learning Resources* section of this unit in My eCampus.**

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