ACTIVE AGEING COMMUNITIES (AAC) PROGRAMME

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Active ageing communities

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Executive summary

The Active Ageing Communities (AAC) programme is a community-based intervention for older adults designed for fitness and recreational sport environments with the main aim of creating communities for active and healthy ageing. The programme is based on international recommendations and scientific evidence.

The AAC programme is a 24-weeks complex intervention designed with four modules.

1. **Educational awareness module**

Engaging in healthy life behaviours requires the awareness of modifiable and non-modifiable risk factors. This module is designed as three structured presentations dedicated to the participants and their family and delivered by the fitness staff. The format is not "traditional lecturing" and passive listening, but rather dynamic interaction with the audience. Key information is provided in a simple way with frequent examples and questions to the participants asking to share their experience. We wish to create a link between the knowledge that the participants should acquire with their own personal life and start reflecting on what is potentially modifiable. The three themes proposed are 1) *Biological processes of ageing. What happens to our body when we get older?* 2) *Physical activity, exercise, and sedentary behaviour* 3) *Nutrition and foods in ageing.*

2. **Social inclusion and connectiveness module**

Sense of belonging and reduced feelings of loneliness among older adults have been shown to have a positive impact on quality of life and health outcomes. Moreover, including meaningful activities in programmes can increase participants motivation and adherence to the programme. The main aim of this module is to increase social inclusion and "connectiveness" among the participants by two main components: 1) *Peer-led social activities* and 2) *Intergenerational events.*

3. **Exercise module**

The health benefits of exercise are well established. The exercise module of the AAC programme builds on WHO's newly updated physical activity guidelines for older adults and most up to date scientific evidence. The programme is designed with biweekly frequency (2 non-consecutive days), 1 hour per session, for 24 weeks in total. The exercise programme is divided into three blocks. *The*

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first block of the intervention is used as familiarisation, where learning exercise techniques and understanding of training intensity are included. The second block has the main goal to increase physiological capacity in terms of maximal muscle strength and aerobic capacity. Functional training (i.e. physical function and balance) will be progressively added. The third and last block has the main goal to increase muscle power, aerobic capacity, functional training (i.e. physical function and balance) and motor skills (e.g. complex reaction time).

4. Behavioural change module

This module aims to magnify the effect of the module 1-3 by establishing healthy habits beyond the "borders" of the fitness facility and extending the AAC programme into the community space. The role of the fitness instructor is to facilitate this process and create the condition for self-empowerment and self-management. The main aim of this module is to increase motivation to promote and maintain physical activity and optimize retention to the programme. The module is designed as 10 Instructor-led behaviour change meetings carried out in parallel with the 24-weeks AAC exercise programme. The meetings will include discussions to share "successful solutions" and identifying barriers and facilitators to increase and maintain physical activity. The behaviour change meetings will use motivational interviewing techniques and other techniques based on social-behavioural models such as the Transtheoretical Model developed by Prochaska and DiClemente (also known as Stages of Change Model), goal setting, self-monitoring and habits formation to support behaviour change.

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Introduction

The Active Ageing Communities (AAC) programme is a new ambitious community-based intervention for older adults designed for fitness and recreational sport environments.

The AAC programme is 24 weeks long and aim to i) improve overall health, physiological capacity (e.g. muscle strength) and physical function (e.g. walking), ii) create a feeling of belonging, into their very own Active Ageing Community, for older adults and perceive and experience physical and psycho-social benefits such as weight loss, improved aerobic capacity, sense of fun, and enjoyment, iii) empowering the participant to establish long-term sustainable active life style.

The AAC Programme is designed with four different modules:

1. **Educational awareness module**
2. **Social inclusion and connectiveness module**
3. **Exercise module**
4. **Behavioural change module**

The programme will help to reduce levels of social isolation and exclusion of older people, whilst also promoting the importance of regular physical activity and healthy lifestyles.

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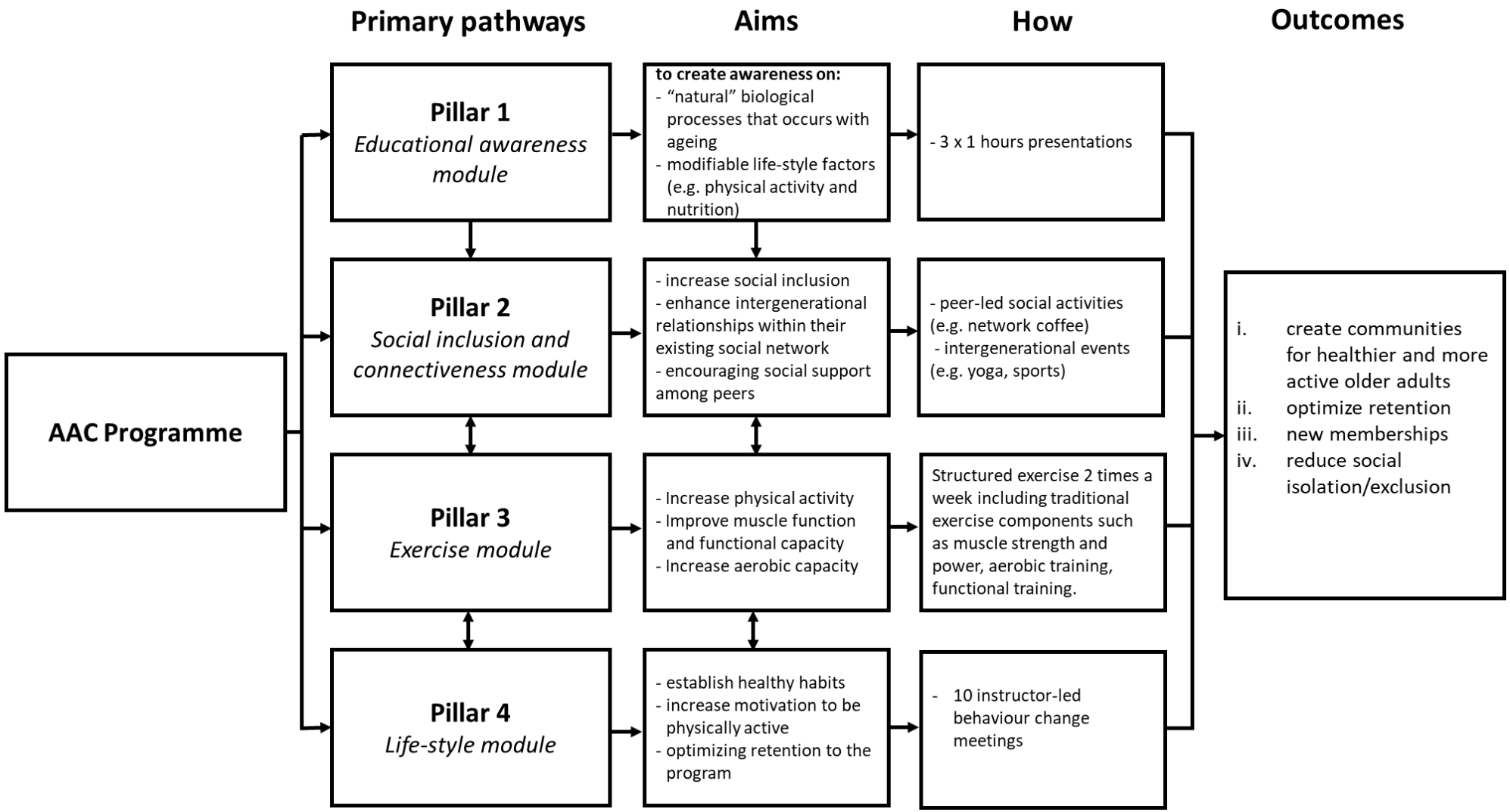
Framework of the AAC Programme



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Pillar 1 - Educational awareness

Why: The aim of this component is to create awareness, in older adults, their family and other members, of the "natural" biological processes that occurs with ageing, and to provide some basic knowledge about two key modifiable components which may affect the way we get older (e.g. exercise, daily physical activity and nutrition).

The goal of this component is to create awareness of three main themes:

1) ***Biological processes of ageing. What happens to our body when we get older?***
2) ***Physical activity, exercise and sedentary behaviour***
3) ***Nutrition and foods in ageing***

How: This module is designed as structured presentations (power point/PDF) dedicated to the participants and their family and delivered by the fitness staff during three meetings (45-60 minutes).

Format: When presenting, the fitness staff should use simple, informal, and engaging language and try to avoid "lecturing". The fitness staff is recommended to ask questions to the audience to activate them in the discussion about the different themes. The three themes will be discussed in group sessions in pillar 4, either immediately after the presentation or within a few days (*see pillar 4 for more information*).

We recommend that where possible, the fitness club should use a peer (an older adult from the community or fitness centre) or a "known person" from the community to share their thoughts and experience on specific topics (e.g. going from physically inactive to active or starting to eat healthier). This may also be organized in relation to the group session in pillar 4.

Why inviting families during this pillar?

The goal of integrating intergenerational approach in the educational module is to create family support for the older adults who have decided to engage in the programme. Such approach has been shown to be effective in reinforcing behaviour changes. Participants should thereby be offered the possibility to invite family members or friends to the meetings. This may also work as *"mouth to mouth"* model to recruit new older adults or family members to the fitness club community.

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The three presentations will be developed in English. To support the instructor, each slide will contain specific notes explaining in detail what the take home message is.

Please note that, the text in the slides has been kept to minimum, to minimize the burden of translation in the different languages and facilitate communication with a direct and easy to understand set-up. The most important aspect is to trigger interest, to facilitate awareness and to prevent participants to be overwhelmed by high level of details. The staff at University of Southern Denmark will record the three presentations in English and will share them together with the explanatory notes with the fitness clubs.

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1. Biological processes of ageing. What happens to our body when we get older?

Aim

The aim of the first presentation is to increase the awareness of the "natural" biological ageing processes. Topics such as changes in our body as we age (e.g. muscles, bones, heart), including common chronic conditions associated with older age (e.g. diabetes, osteopenia, osteoporosis, cognitive impairments) will be presented. Also, differences between accelerated versus normal aging trajectories will be shown.

Notes to the slides for this module are provided here below.

Slide 1 – *Front slide*

Start welcoming all the participants and their families to the first meeting. Explain about the format (e.g. simple language, Q & A) and the three themes the fitness staff will present. Let the audience know that questions are more than welcome during the presentation and that you will ask them questions as well and hope to have a lively conversation. Please make them aware that this is not a typical "seminar or lecture but rather a "conversation". Please remember to ask if this is ok with them and if they may have any suggestion on the format.

Slide 2 - *Increase in Life expectancy in the past 3 centuries*

QUESTION for the AUDIENCE: Is there anyone in the audience who knows what life expectancy is?

Life expectancy is defined as the number of years a new-born is expected to live. As you probably know life expectancy has not been the same (or constant) in the past couple of hundred centuries but has dramatically increased. In 1800 there was little medical knowledge worldwide. Demographic research indicates that no countries in the world had a life expectancy above 40 years and the global life expectancy was 29 years. Over the following 150 years some areas in the world achieved substantial health improvements. In 1950 life expectancy increased to over 60 years in several regions including Europa. Nevertheless, in other areas such as African countries, the life expectancy was still extraordinary low, and it was estimated around 30 years. The global life expectancy was 46 years. In recent decades substantial health progresses have occurred along with health policies both the most developed as well as the least developed countries. Countries which were least developed

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in 1950 experienced the greater progress. In 2015 global life expectancy was 71 years. Today life expectancies in some of the most developed countries has reached the average age of over 80 years. In 2019 the life expectancy in Spain, Switzerland, Italy, and Australia was over 83 years. Japan is currently the country with the highest life expectancy (about 85 years of age).

Slide 3 - *We live longer but how do we live?*

Whether extra years of life gained through increased life expectancy are spent in good or bad health is a crucial question. Living longer does not necessarily means living better.

QUESTION for the AUDIENCE: You may ask a question here regarding what you would consider acceptable and unacceptable for longer life? This question can also be asked during the pillar 4.

Slide 4-5 – *Healthy Life-Years &* What about the specific countries? How many years do we expect to live in a healthy condition?

Healthy Life-Years is an indicator developed few years ago and it is defined as the number of years that a person is expected to live in healthy conditions. This focuses on the quality of life spent in good health and with good function (for example without chronic diseases; being able to perform the daily activity we normally would perform at younger age). So, the focus here is the quality of life rather than the quantity of life (life expectancy). Healthy life years is an important indicator of the relative health of the population.

Slide 6 - *There is no 'typical' older person*

There is no typical older person. Some 80-year-olds have levels of physical and mental capacity that compare favourably with 30-year-olds. Others of the same age may require extensive care and support for basic activities like dressing and eating.

Slide 7 - *What affects ageing?*

Although some of the variations in older people's health are genetic, much is due to people's physical and social environments – including their homes, neighbourhoods, and communities, as well as their personal characteristics – such as their sex, ethnicity, or socioeconomic status.

These factors start altering ageing trajectories at an early stage. The environments where people live from childhood combined with their personal characteristics, have long-term effects on how they age.

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Environment may also influence the development and maintenance of healthy behaviours. Maintaining healthy behaviours throughout life, particularly eating a balanced diet, engaging in regular physical activity, and refraining from smoking and excessive use of alcohol all contribute to reducing the risk of non-communicable diseases and improving physical and mental capacity.

Behaviours also remain important in older age. For example: strength training to maintain muscle mass and good nutrition can both help to preserve cognitive function, delay care dependency, and reverse frailty.

Supportive environments enable people to do what is important to them, despite losses in capacity. The availability of safe and accessible public buildings and transport, and environments that are easy to walk around are examples of supportive environments (WHO).

QUESTION for the AUDIENCE: What is a supportive environment in your opinion? Have you experienced different environments, for example one more supportive and one less supportive?

Slide 8 - *What are some of the most important factors for healthy ageing?*

QUESTION for the AUDIENCE: Ask the audience what the opinion about this. What is important to get older in a "good way"?

The factors I am going to present you in few minutes are considered some of the most important modifiable aspects. When we define a factor as "modifiable we refer to a given condition, for example nutrition, which can be altered if the person modify the way he/she eats (e.g. type of food such as protein intake, daily calory intake, patterns such as when food is ingested during the day).

Physical activity: This is one of the most potent modifiable factors influencing our trajectories of ageing. The evidence is simply overwhelming! The question which is often asked is: what is the best form of physical activity when I am old? The best form of physical activity is indeed the one you enjoy and that you can fit in. Nevertheless, some types are more effective than others. For example, as people age, there is a loss of muscle mass. This is a natural phenomenon and we will get back to it later today. If such loss reaches a critical level, it will affect the ability to do activities of day-to-day living, like washing, shopping, visiting friends. It can also contribute to other important aspects of our life such as poor balance and the consequent greater risk of falling. Physical activity should

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ideally target these aspects, but strength training may be more effective in reducing such loss of muscle mass

Nutrition: Food is one of the important pleasures of life for most of us. As people age nutritional needs change. We have all met many people spending many years planning and trying to lose weight. In old age, priorities need to change. Losing weight often means losing "precious" muscle mass. Unless weight loss is accompanied by an exercise programme and adequate protein intake, there is a risk of muscle loss leading to a decrease in strength and in fact, accelerate even faster the aging process.

Social Engagement: People with higher levels of social engagement have decreased mortality and maintained their higher health status better and longer. It is not just about the number of friends someone has; it is the quality of these relationships. Supportive and rewarding relationships should be cultivated. A higher level of social engagement can even help recovery from illness and can even decrease the chance of leaving hospital with a new disability.

Physical function:

Physical function is usually described as the ability to perform tasks such as walking, chair rise or stair climbing. Maintaining physical function is important for everyday life. Functional limitations, which can be determined by functional tests (e.g. gait speed, balance, and chair rise), have shown to predict future disability, institutionalization, falls, cognitive function, hospitalization and mortality. Experiencing difficulties in rising from the chair we have always used or getting in and out of the bed or getting dressed are signs of decline in physical function.

Cognitive Stimulation: The old saying *"use it or lose it"* is very true for our brains. Our brain retains the ability to learn and change well into old age. It is not enough to keep doing the same routine, to protect our brain against decline, we need to keep challenging ourselves. A study on older adults who were provided with brain training in memory, reasoning and speed of processing showed that the intervention improved their level of functioning in activities of daily living. Like physical activity, the right cognitive activity is one that you are interested in.

Slide 9 - *Maintaining physical function is important for living independently*

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Physical function: Maintaining a good physical function is important for living independently with a high quality of life. Functional limitations have shown to predict future disability, institutionalization, falls, cognitive function decline, hospitalization and mortality. Physical function is associated with everyday activities (e.g. cleaning, shopping, showering). Physical function is strongly affected by 1) muscle mass and muscle quality, 2) neuromuscular function and control and 3) cardiovascular function.

Slide 10 - What are fundamentals for physical function?

Muscle mass and quality: Muscle mass is one important factor to maintain a good physical function. Low muscle mass contributes to a poor neuromuscular function (e.g. strength) and physical function. When we age muscle mass and muscle quality (strength pr. muscle mass) decline along with fat-infiltration in the muscle.

Neuromuscular function and control: The neuromuscular function is often measured as the ability to produce muscle strength or muscle power. Muscle strength is defined as the maximum load/weight (e.g. kg) one can lift only one time. Muscle power is the product of muscle strength and speed. This means that muscle power depends on how fast one can move such load/weight. Muscle power play a key role for tasks where speed is important, for example when attempting to reverse a potential fall after stumbling.

How strong and powerful you are, depends on the muscle mass and the quality of your muscles. In other words, it depends on how strong your muscles are. Nevertheless, in order to maintain a high level of physical function (e.g. walking) a good postural control is essential. Postural control can be defined as the way our central nervous system integrates the information from our sensory system (e.g. pressure receptor in our toes) and provide a coordinated motor response which allows us to maintain a controlled upright posture. This is extraordinary important for example when we have to rapidly react to unexpected perturbations.

Cardiovascular function: The cardiovascular function is also important for maintaining physical function and everyday activities (e.g. shopping, vacuum cleaning). One way to measure the cardiovascular function is to assess maximum aerobic capacity (Vo2max) on a treadmill or bicycle. Maximum aerobic capacity can be defined as the maximum work that an individual can do which is assessed by the oxygen used during such work. There different key physiological components

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important for the VO2max, including the maximum amount of blood that the heart can pump through the circulatory system in a minute, also defined as maximum cardiac output, or how much oxygen can be extracted by the working muscles. The maximal aerobic capacity is also associated with the functional endurance, which in other terms tells us how far you can walk during a given time.

Slide 11 - *BUT… What happens to the body when we age?*

In the next few slides, we will present what happens as we age. We will focus only on few key aspects (e.g. muscle mass, muscle strength and cardiovascular function).

Slide 12 - *Did you know that…? (Muscle mass)*

This picture shows an MRI scanning from the thigh of a young 24-year-old subject old (left side), a sedentary 66 years-old subject (mid-section) and an active 66-year-old subject (right side). The grey colour indicates muscle mass. Muscles in grey are larger for the younger and the active older adult compared to the sedentary older adult. Furthermore, there is an increase in fat (white colour) below the skin (subcutaneous fat) and within the muscle (intermuscular fat) in the sedentary older adults compared to the active older adults. The decrease in muscle mass and increase in fat play both a key role on muscle function (e.g. muscle strength or how strong you are).

Slide 13 - *Did you know that…? (Muscle mass)*

The loss of muscle mass occurs from middle-age (~1%/year), and in severe cases can lead to a loss of ~50% by the 8–9th decade of life. Muscles are plastic, which means that they can "re-grow" even in very old people if a specific type of exercises are initiated (e.g. heavy strength training). Strength training is very effective to increase muscle mass as we will experience in the next months if there is a sufficient level of daily protein intake. So, remember to eat protein! We will talk about this in the third seminar. The figure shows the individual decline of muscle mass, indicating that this may depend, for example, on physical activity and nutritional level.

Slide 14 - *Did you know that…? (Muscle function)*

Maximal muscle strength tends to peak in the 20's and 30's then plateaus until the 50's and then afterwards it decreases with a rate of 12-15 % per decade, with more rapidly losses with aged above

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65 years (between 1.5 to 3% pr. year). Muscle power seems to decline earlier and more rapidly than maximal muscle strength (up to 3.5 % pr. year after the age of 65).

How strong and powerful we are, depends on the muscle mass/quality and the ability to stimulate the muscle by the nervous system.

QUESTION for the AUDIENCE: Have you experienced a change in how strong you are (muscle strength) or how rapid and powerful you are (muscle power) compared to when you were younger? Ask if anyone can provide a personal experience and if not may add a personal case.

Muscle function is important for maintaining physical function, to perform daily activities (e.g. shopping, cleaning, vacuum, etc.) and to live an independent life. A person needs a certain amount of muscle function (e.g. muscle strength) to perform daily activities. Even simple tasks such crossing a road with green light require the ability to generate enough walking speed before the traffic light turns red. Walking speed is generated by neuromuscular system which translates the muscle contractions of your leg muscles into rapid movements to allow you to cross the road. When muscle strength and power are markedly reduced, we will be unable to generate strength and power enough to allow us to cross the road before traffic light turns red.

Slide 15 - *What happens to your muscle function if… you fall or get sick and are in bed for few days?*

The figure shows what happens to the muscle strength after a short-term disuse. Most of us has experienced short-term immobilization for example after an ankle injury or a fracture. Now imagine, if you are unable to get up from the bed because acute lung disease such as pneumonia or an injury such as a fracture. Both conditions require immobilization of a limb or bed rest. The figure shows a rapid decline in muscle strength within the first days of disuse (Example: after only 5 days disuse you can lose up to 10 % muscle strength). Now this may not seem a lot to you but please consider that this corresponds to 3-6.5 years of normal biological decline. So, in other words, if you stay in bed and are more or less immobilized your body will deteriorate extraordinary fast. This can have important functional consequences for the older adults, especially for those who are already frail. The most important consequence is that this subject may be unable to stand on his/her own feet, or rise from chair, or climb a stair after few days of bed rest. Therefore, it's important to start

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exercising shortly after the disuse period to regain the muscle strength and minimize as much as possible bed resting.

Slide 16 - *Did you know that…? (Cardiovascular function)*

Did you know that your heart will beat about 100,000 times each day, so when you are 70 years old, your heart will have beaten close to 2.5 billion times? … and do you know how long are your blood vessels if we take one by one out of our body and stretch them? If we align out of our body our blood vessel, they will extend close to 100,000 kilometres… Yes, 100.000 km!

Slide 17 - *Did you know that…? (Cardiovascular function)*

Aerobic capacity declines with ageing approximately 10 % pr. decade from the age of 25. The rate of declines seems to be similar between groups with different fitness level (this is the bad news). The good news is that a person who has trained and has a higher maximum oxygen uptake/consumption will start from a much higher level than someone who is sedentary. A person needs a certain amount of aerobic capacity to perform daily activities such as shopping, cleaning, showering. This means that the person with better aerobic capacity may experience fatigue much later and may be able to perform everyday activities with no problem. Furthermore, it is never too late to increase your cardiovascular function, we will come back to this in the next presentation.

Slide 18 - *Did you know that…? (Bones)*

Similar to muscles, bones undergo a remarkable change with increasing age. Bone mass and bone strength are progressively reduced as we age, especially women after menopause. Key factors related to such changes are the level of physical activity, loss of calcium and other minerals as well as hormonal changes. Low bone density is an indication of a fragile bone which means that a bone has a greater risk of fracture. Osteoporosis is a common problem among older people, especially post-menopausal women, and is a major cause of hip fractures. The spine is made up of bones called vertebrae and a reduced density of these (combined with the loss of fluid in intervertebral discs) result in a curved and shortened trunk. This is one of the reasons why we may experience that we get a bit shorter as we age.

Slide 19 - *"Physiological bank" I*

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As mentioned earlier, to carry out daily activities we need a given level of muscle function (e.g. muscle strength) and aerobic capacity (illustrated with the dotted line). When we are young daily activities are not very demanding. This is because our level of maximum strength and aerobic capacity (for example) are high and the activities we perform daily are not demanding. In other words, we do not even consider that for example getting dressed, may be "heavy". Nevertheless, when we grow older both our maximum strength and aerobic capacity declines. Both aspects will be discussed more in details in the next presentations. The declines may make activities such as getting dressed progressively more difficult for some older adults. This also means that even light activities of daily living such as cleaning and doing laundry are difficult to carry out and may generate fatigue.

Slide 20 – *"Physiological bank" II*

As an example, the difference between the amount of muscle strength it cost to perform a daily activity such as climbing the stair compared to the maximal capacity (e.g. maximal muscle strength) is what we call reserve capacity. A higher reserve capacity is vital in terms of acute events that requires immobilization of a limb (e.g. fracture) or bed rest (illness). This is illustrated by the figure where two 80 years old adults have different reserve capacity. The one with the lower reserve capacity (red one) might reach the threshold of function (muscle or aerobic capacity) where performing daily activities becomes impossible. Imagine that you always need some level of strength for example to get out of a chair or get dressed. If your strength decreases below the level, you need to push your body off the chair someone will need to help you!

Slide 21 - *Sensory system*

The sensory system provides us the relevant information which allow us to navigate through the environment and carry out any activity we wish. Just as an example … maintain our posture upright seems quite simple since we have learnt many years ago and have forgotten how difficult was to go from laying to standing. Nevertheless, despite this is more or less "automatic" it is a rather complex task which require the integration of many sensory feedback from different areas of our body, for example the "mechanoreceptors, or the receptors which measure pressure, in our toes. Vision also play a fundamental role, but we still maintain our upright position even with our eyes closed.

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Vision: Our eyes undergo several age-related changes as we age. For example, it takes longer for the eye to focus on close objects and visual scanning becomes difficult. These simple changes may lead to falls. Decrease in eyesight can reduce quality of life and threaten ability to live independently at home and in the community.

Vestibular system: Vestibular system monitors motion and provides orientation, such as "what is up and down". Studies have shown that the number of nerve cells in the vestibular system decreases with age and this may result for some people in balance and dizziness problems.

Somatosensory system: The somatosensory system is the normal feedback our joints and muscles provide to the brain. With age such feedback declines (for example the number of pressure receptors in our toes) and can potentially contribute to postural instability and poor balance in older adults.

Slide 22 – *Balance*

QUESTION for the AUDIENCE: Ask the audience how their balance is today compared to when they were younger and ask whether and how this may affect their life?

Balance is related to the sensory system (previous slide) as well as neuromuscular function and control. Balance is a crucial component of everyday life from getting out of bed in the morning to sitting, standing and walking throughout the day.

Poor balance is linked with several adverse health outcomes, perhaps most notably increased falls risk, but also with increased risk of disability, fractures, hospitalization.

Slide 23 – *Falls I*

QUESTION for the AUDIENCE: Ask the audience if someone ever experienced a fall? Ask if they can describe what happened.

Accidental falls can be catastrophic and cause wrist, arm, ankle, and hip fractures, especially in people with osteoporosis, and head injuries if we are not able to protect our head during the fall for example by reducing the impact with our arms.

Slide 24 – *Falls II*

Okay, too many bad news? Good news come now! What can we do?

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Stay Active: As you have heard, when we get older, muscle function and balance decline and this can lead to an unexpected fall. Exercises designed to improve muscle function and reaction time can significantly reduce the risk of falling by improving posture, coordination, muscle strength, muscle power and balance. The evidence is simply overwhelming!

Take care your eyes: Poor vision can be a critical component for loss of balance and a fall. Get your eyes and glasses checked regularly – at least every 2 years. This will show potential risk factors which may be easily modified.

Check for hearing problems: As we get older, we may experience changes in our hearing, and it may be more difficult to hear conversations and some specific "tones". Talk to your doctor as soon as you think your hearing has declined. Hearing issues can severely affect the balance. The problem may be something easily treated, such as a build-up of ear wax or an ear infection, or the use of an hearing aid may be needed. If so, this may be truly worth!

Manage your medications: Certain medications can make us dizzy and affect our balance. Let your doctor know immediately if you experience side effects of new medications – the doctor may need to check the dose or eventually provide alternatives. Also, ask the doctor if there is a potential interaction with the other treatment you have and finally ask the doctor if there is any medication that can be removed.

Eat well and support your bone health: Getting enough energy and protein is important in keeping up muscle mass and function and preventing falls. Keep your bones healthy and strong by eating calcium-rich foods and try to be exposed to sunlight which will active the production of vitamin D. Also remember to do some weight-bearing exercises. We will talk about this in the next seminar.

Choose the right shoes: Problems with your feet or shoes can affect your balance and increase your risk of tripping or falling. Make sure your shoes fit well and do not tend to slip off. Avoid sandals with little support and shoes with high heels.

Slide 25 – *Falls III*

1. **Remove things that can make you trip over such as raised doorway thresholds, area rugs, and clutter:** Rugs and mats at the top or bottom of the stairs are a trip hazard and can easily lead to a fall, so it's a good idea to move them out of the way. Use non-slip protection under

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the carpets (e.g. tile and wooden floors). Welcome mats and small rugs inside your entryway may seem like an inviting touch, but they're also a tripping hazard. Remove furniture and electric wires from walking areas.

2. **Secure sufficient indoor and outdoor lightning:** Install a night light near the bed to make sure that if you wake up during the night you can see potential hazards and where you are walking. You can install a motion-activated light that turns on automatically. Check that your outdoor areas have good lighting.
3. **Mount grab bars near toilets and on both the inside and outside of your tub and shower:** The floor is likely slippery in the bathroom after a bath.

Slide 26 – *Common chronic conditions associated with older age*

QUESTION for the AUDIENCE: Ask if they have any chronic condition and how it affect their lives?

Arthritis is one of the most common medical conditions among older people and causes pain, stiffness, and restricted movements. Physical activity and exercise can prevent and be an effective treatment of arthritis.

Hypertension is common among older adults. Many will live hypertension without noticing, so it's important to have regular checks at your GP. Risk factors for hypertension is smoking, poor diet and physical inactivity.

Diabetes causes an excessive raise of blood sugar (glucose). Type 2 diabetes is the most common form and is more frequent in older people. Prevention and management of Type 2 diabetes is healthy eating, weight loss and regular physical activity.

COPD or Chronic Obstructive Pulmonary Disease is lung and airways disease, relatively common with ageing, which can cause breathing difficulties. There is no cure for COPD, but treatment with medication and inhalers is effective to control this condition. Physical activity and exercise are important to prevent COPD and, most importantly, to maintain functional capacity while living with COPD. One of the most important risk factors for COPD is smoking.

Osteoporosis is a condition that weaken the bones and is a common problem occurring with increasing age and especially in post-menopausal women. Weight-bearing exercises and strength

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training can help prevent and combat the condition. Calcium and D-vitamin are particularly important as well.

Slide 27 – *Take home message*

1. There is no 'typical' older person
2. There are several very Important modifiable factors for healthy ageing: *1. Nutrition, 2 Physical activity, 3. Social Engagement, 4. Physical function, 5. Cognitive stimulation.*
3. Muscle mass, muscle function (e.g. muscle strength) and aerobic capacity declines with age, but the rate of the decline depends on multiple factors like physical activity level and nutrition
4. Falls can lead to serious injuries such as hip fractures. Balance problems, muscle weakness, poor eyesight and slower reaction time can increase the risk of falling. Many falls happens in and around the home therefore be aware of poor lightning, slippery surfaces, trip hazards and unsafe footwear. Nevertheless, many falls can be prevented with proper exercise and management of potential home hazards.

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2. Physical activity, exercise and sedentary behaviour

Aim

The aim of the second presentation is to increase the awareness on how physical activity, exercise and sedentary behaviour can positively modify ageing trajectories and onset of chronic conditions. Furthermore, to provide overview of the physical activity and sedentary behaviour guidelines and few tips on how sedentary behaviour can be reduced.

Notes to the slides for this module are provided here below.

Slide 1 – Front slide

Start welcoming all the participants and their families to the second meeting. Let the audience know that questions are more than welcome during the presentation and that you will ask them questions as well and hope to have a lively conversation. Please make them aware that this is not a typical "seminar or lecture but rather a "conversation".

Slide 2 - To start: two important definitions Physical activity and exercise: Is it the same thing?

Slide 3 - *What is physical activity?*

What is physical activity? Physical activity can be defined as any movement of the body that requires energy including activities undertaken while working, carrying out household activities, travelling, and engaging in recreational pursuits.

Slide 4 - *What is exercise?*

What is exercise? Exercise can be defined as a subcategory of physical activity that is planned, structured, repetitive, and aims to improve or maintain one or more components of your physical fitness (e.g. muscle strength, balance, cardiovascular fitness).

Slide 5 - *It all started in 1953…*

Jeremy Morris was one of the first researches to investigate the relationship between active (conductors) and inactive (drivers) persons and what this behaviour meant for their health. About 31,000 men aged 35-64 employed as bus, trams and trolleybus drivers and conductors, motormen and underground railway guards were observed. These employees were selected because the numbers were large, and the groups were homogeneous as regards to occupation and socio-

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economic status. The investigators concluded that employees with job tasks which required higher level of physical activity had lower rates of coronary heart disease.

Slide 6 - *Fitness level and mortality*

The conclusion from the research study by Steven Blair and his colleague was "*Regular physical activity by older women and men has similar effects as in younger individuals. Active and fit persons are at much lower risk for CVD and all-cause mortality than their sedentary peers. Perhaps even more importantly, maintaining a fit and active way of life retards functional decline and delays the development of frailty*". In the study the authors performed a fitness test on over 2500 men and women and followed them for approximately 10 years.

Slide 7 - *Fitness level, risk factors and mortality*

Jonathan Myers and his colleagues did a treadmill exercise test on more than 6000 men who were then followed for more than 6 years. For all the investigated risk factors and diseases, the relative risk of mortality increased as the fitness level decreased. This means that if you smoke or are obese, the risk of mortality decreases when increasing your activity level.

Slide 8 - *What if there was a drug called exercise?*

Exercise is medicine. The expression started as the name of a health initiative and is now a catch phrase used by doctors, fitness experts, and others who want to motivate you to move. Exercise is working on more than one component (disease or risk factor). As many other drugs it has some side effects (these should be presented with a smile ☺).

Slide 9 - *Physical activity recommendation for older adults*

In the previous slide we discussed about Exercise is medicine. So, what is the prescription? Physical activity guidelines are designed for everyone including YOU. Prescription can be individual in a way you can choose which activity and when and how to perform them… but remember that the medication should be taken in one way or another.

QUESTION for the AUDIENCE: Ask the participants if they know the guidelines and present them afterwards.

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The first point "*Aim to be physically active every day. Some physical activity is good, more is better. Every minute counts.*" is very important as the guidelines with 150-300 mins of moderate might sound unrealistic for many of the older adults at this point.

Slide 10 - *Intensities of physical activity*

Physical activity can be performed in a variety of intensities ranging between light, moderate and vigorous (high) activity.

Light physical activity requires more energy than sitting, but the least energy compared to moderate and vigorous physical activity. Some examples of light physical activity include standing up, moving around your home, cleaning or dusting, making the bed, preparing food and washing the dishes.

Moderate physical activity requires more energy than light physical activity, but less than vigorous physical activity. Some examples of moderate physical activity include vacuuming, dancing, brisk walking, pushing a lawn mower and sweeping the floor.

Vigorous physical activity requires the most energy compared to light and moderate physical activity. Some examples of vigorous physical activity include running, aerobics, shovelling snow, very fast walking, walking upstairs swimming, biking, sports like tennis or football.

Slide 11 - *Step counting - Recommendations for older adults*

QUESTION for the AUDIENCE: Do you know the recommendations? Ask whether someone counts their steps and if they think 10.000 steps sounds reasonable?

The magic number "10,000" dates to a marketing campaign conducted shortly before the start of the 1964 Tokyo Olympic Games. A company began selling a pedometer called the Manpo-kei: "man" meaning 10,000, "po" meaning steps and "kei" meaning meter. It was hugely successful, and the number seems to stay as a recommendation. Since then, several studies have compared the association between step counts and health and not surprisingly increasing step counts was associated with lower mortality. Nevertheless, fewer studies have been conducted with older adults, but one large study looked at more than 17.000 women and followed them for 4.3 years. The average step counts were approximately 5500 and the study confirmed a lower mortality rate with increasing steps. More importantly, women who average approximately 4400 steps/s had lower mortality (32 %) rate than those doing 2700 steps pr. day.

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Slide 12 - Steps: how do we count them? *1, 2, 3, 4… 10.000 or?*

You can use a pedometer, activity monitor or your cell phone to monitor how many steps you are walking each day. If you start counting your steps, then walk with the monitor for a week under normal circumstances and slowly try to increase the number of steps you take each day.

Slide 13 - *What is Sedentary behaviour?*

In the last decade, sedentary behaviour has been widely studied from a scientific point of view. As a result, it has emerged as a new risk factor for health.

QUESTION for the AUDIENCE: How many hours do you think you normally sit/or lay during your day while you are awake?

Slide 14 - *Did you know that… (Acute effects of sitting)*

The first paragraph is from a study exposing 20 young endurance trained men to one week of bed rest and assessed triglyceride levels on days 1, 3, and 7. After 1 day of bedrest triglyceride levels was increased by 30 % compared to the control group which was not bed resting.

The second paragraph is from a study comparing two groups of 12 healthy adults. Insulin-stimulated glucose uptake was 39% lower following a day of acute sitting in comparison to a day that minimized sitting.

The third paragraph is from a study examine the same 13 elderly women doing two different experiments. Either they were seated for two hours (control experiment) or they performed slow walking (40 mins) in a two hours period after a meal. Blood glucose concentration was determined before and two hours after the meal. Blood glucose showed to be 45 % higher when sitting for two hours compared to slow walking.

Slide 15 - *Did you know that…*

Older adults sit on average 9.4 hours pr. day, corresponding to 65-80 % of their waking time. Some of the main sedentary activities is watching TV, reading and transportation (car, bus, train).

Slide 16 - *Why focus on sedentary behaviour?*

If we sleep approximately 8 hours, we have 16 hours of waking time. If we do 0.5 hours of exercise/physical activity (follow the recommendations of physical activity) we have 15.5 hours left

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for other behaviours. If most of the time is spent in sedentary behaviour this represents a risk for negative health related outcomes, independent of the amount of exercise we do. Therefore, it's important to think about both sedentary behaviour and physical activity in our daily life.

Slide 17 - *Why so much focus on sitting time?*

Current evidence suggests that prolonged sitting is linked to a wide range of negative health outcomes including increased rates of obesity, type 2 diabetes, colorectal cancer, and ultimately increased risk of early death, despite the levels of completed moderate-to-vigorous physical activity.

Slide 18 - *What happens if I sit less?*

By replacing some sitting with standing and light physical activities (e.g. doing the dishes, cleaning, shopping, etc.), it may be possible to:

1. Reduce the risk of being affected by the above-mentioned diseases
2. Reduce blood pressure
3. Reduce cholesterol levels
4. Maintain or improve physical function (i.e. increased ability to do daily activities)
5. Improve mental health

Slide 19 - *Frequently asked questions*

Are you telling me I should never sit down?

- Definitely not! Sitting is a natural behaviour which gives the body time to rest and recover after performing daily activities. However, what we are saying is that small, regular reductions in current sitting time are likely to have a positive impact on health.

Do I have to exercise all the time to reduce my sitting time?

- Not at all! Any activity which does not involve sitting can be used. This means very light physical activity such as standing and gentle walking can all be used to reduce sitting time as well as more moderate and vigorous physical activities.

Slide 20 - *How can I reduce my sitting time?*

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1. Identify how much you are sitting and when you are sitting the most during the day to understand the possibilities to reduce your sedentary behaviour (e.g. decrease the amount of TV in the evening)
2. Organize walks or physical activities with your family, friends or neighbours. The social component as a tool to help facilitate and maintain a healthy behaviour
3. Try breaking up screen time (e.g. watching television or sitting in front of your computer or tablet).
4. Take advantage of commercial breaks when watching TV (get coffee or water).

Slide 21 - *How can I reduce my sitting time?*

5. Ask yourself: Is it necessary to sit down for this activity?

   a. Stand up instead of sitting down when it is possible (speaking on the phone).

6. A good thumb rule would be to break up long periods of sitting (i.e. one hour or more) with at least five minutes of any physical activity.

7. Schedule daily life activities when you usually are sitting the most (e.g. watch the news while hanging the laundry).

8. Buy a pedometer or activity monitor or use your cell phone to monitor how many steps you are walking each day. Walk with the pedometer for a week under normal circumstances and slowly try to increase the number of steps you take each day.

9. Incorporate new habits into your daily life activities

- Park your car far away from the supermarket entrance.
- Carry your shopping bags instead of using a trolley.
- Use a lawn mower instead of a robot.
- Pick up the coffee/tea from the kitchen instead of using a thermos.
- Or other and better local examples

Slide 22 - *How do you see yourself reducing sitting time?*

QUESTION for the AUDIENCE: How do you see yourself reducing sitting time?

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Slide 23 - *Sedentary behaviour recommendation for older adults*

Unfortunately, there is currently not enough evidence to set a daily time limit on the sitting behaviour of older people. Nevertheless, research is showing that reducing the total amount of sedentary behaviour will benefit your health as well as breaking up longer periods of inactivity. There is evidence showing that high amounts of moderate to vigorous-intensity physical activity may decrease the negative effects of high levels of sedentary behaviour.

Slide 24 - *It's never too late to start exercising*

The fitness clubs have the possibility to ask someone to present a positive story after becoming active again or for the first time in old age. This could be one from the local fitness centre or community. Otherwise, you can use the story about Carl. Carl participated in the HANC project which is presented in the next slide.

Slide 25 – *Exercise and muscle mass*

Training of the older adults was carried out at a local senior activity center. Thirty minutes of heavy-load strength training performed three times per week in combination with protein supplementation increased muscle mass, as well as strength and functional capacity in mobility-limited older adults. Muscle mass increased by 4 % (measured by DXA scans) and when comparing the results to the "normal" declines the exercise group gained 4-5 years of muscle mass in 10 weeks. Nevertheless, two things seem important to increase muscle mass in older adults 1) training volume of the muscle(s) you want to increase 2) sufficient amount of protein during the training intervention.

Slide 26 – *Exercise and muscle function*

The intervention was developed within the public health care framework using facilities of the municipality and was structured as supervised exercise training (twice a week for 12 weeks, primary focus on muscle power and balance training). 65 older adults were assigned to either exercise or control group (maintaining normal lifestyle). Both groups were assessed before and after the 12-week period. The exercise group increased their muscle strength by 25 % and muscle power by 23 % without any changes in the control group. The increase in muscle function translated into an increased in physical function (balance, gait and chair rise). When comparing the results to the

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"normal" declines in muscle function the exercise group gained 7-8 years of muscle function in 12 weeks.

Slide 27 – *Exercise and aerobic capacity*

In this study High Intensity Interval Training (HIIT) was demonstrated as feasible and safe within older adults. For the study they used a non-weight-bearing all-extremity ergometer as shown in the picture on top. The training was high frequency (4 times a week) and low volume (only 25 minutes). Aerobic capacity increased by 10.1 % after 8 weeks of training.

Slide 28 - *It's never too late to start exercising…*

The results from the previous slide shows that low functioning older adults can improve muscle mass, muscle function and aerobic capacity by engaging in exercise two-four times a week. Furthermore, the improvements in muscle mass and muscle function is a key element for maintenance of functional independency and independent living.

Slide 29 - *What can we expect when we start exercising? Voice from our participants*

In the slide expected outcomes is listed from two European projects. Older adults from the projects have been interviewed about the different outcomes they have experienced after participating in an exercise intervention.

Slide 30 – *Take home message*

1. Physical activity and exercise lower the risk of mortality and wide range of chronic diseases, improves physical and mental health and prevent falls.
2. Aim to be physically active every day. Some physical activity is good, more is better. Every minute counts.
3. Do activities that improve strength, balance, and flexibility on at least two days a week
4. Reduce sedentary behaviour and break up periods of inactivity
5. It's never too late to start exercising…
6. There is good evidence that exercise is an effective tool to maintain function and thereby independent living.

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3. Nutrition

Aim

*The aim of the third presentation is to increase the awareness on the basics of a healthy nutrition and how this can positively modify ageing trajectories**.** Furthermore, to understand nutritional guidelines (e.g. recommendations of protein).*

Notes to the slides for this module are provided here below.

Slide 1 – Front slide

You should start welcoming all the participants and their families to the second meeting. Let the audience know that questions are more than welcome during the presentation, and that you will ask them questions as well with the wish of having a lively conversation. Please, make them aware that the format of this presentation is not a typical "seminar or lecture" but rather a "conversation".

Slide 2 - *What is nutrition?*

QUESTIONS for the AUDIENCE: Ask the audience to define nutrition: What is nutrition? What is bad and good nutrition? Why is nutrition important for us? Ask them to talk among themselves for 5 minutes.

Use this question as an icebreaker and make sure not to judge the participants by their answers.

Slide 3 - *Why is good nutrition important?*

The World Health Organization defines nutrition and good nutrition as *"the intake of food, considered in relation to the body's dietary needs".* It classifies nutrition into "good nutrition" and "poor nutrition", where poor nutrition may affect your health in a negative way.

Important to mention to the participants:

Please, notice that WHO uses the terms "good nutrition" and "poor nutrition". This does not mean that some types of food are good or bad. This means that the overall quality of the diet can be either good or bad, but one single food item (e.g. a burger) cannot be categorized as "bad food". Regardless, if you only eat burgers your overall diet may be classified as poor.

Slide 4 - *Why is good nutrition important?*

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It may be hard to convince people that nutrition or food is as important as fuel for the car. The consequence of using the wrong type of fuel can be perceived immediately… the car will simply not drive! The consequences of a poor nutrition are not immediate, but they accumulate over time with the incidence of lifestyle diseases such as Type 2 diabetes, cardiovascular diseases, to mention few of them.

This does not mean that you are NOT allowed to eat certain types of food generally considered "unhealthy" (e.g. high fat food). It simply means that if you do this very often, your body will be lacking important nutrients to keep the *"engine running smoothly"*.

Slide 5 - *Food for your muscles*

With increasing age natural changes in muscle mass and strength will happen. There will be large individual differences due to e.g. diseases which may not be modifiable. Nevertheless, our diet and our level of physical activity are two extraordinary important modifiable factors.

The figure illustrates changes in muscle mass and strength with increasing age:

The upper line illustrates the development in muscle mass and strength which generally are maximized in early life, especially if we are active and perform regular physical activity or any type of sport. A good nutrition at early stage also contributes to reach our "maximum peak". If we reach such "peak" in early life and maintain similar conditions (e.g. good nutrition and regular physical activity) in the adult life, when we reach older age our muscle mass and strength will be significantly greater compared to other people of the same age who did not engage in an active and healthy life style. In other words, we will have minimized the losses that would normally occur with increasing age.

The lower line illustrates muscle mass and strength following a normal development with regular physical activity or/and proper nutrition.

The figure illustrates the importance of a good nutrition and regular exercise throughout the lifespan as this may minimize the loss of muscle mass and strength in old age.

Slide 6 - *Nutrition guidelines*

So…What is good nutrition?

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According to the WHO guidelines good nutrition is defined as a well-balanced diet. A well-balanced diet is crucial in maintaining a good health and in minimizing loss of muscle mass, strength and physical function.

QUESTION for the AUDIENCE: How would you define a well-balanced diet? What does it contain according to the participants? The answer will be given in the end of the class

Slide 7 - *Nutrition guidelines: Carbohydrates: What is the source?*

A part of a healthy diet is to eat sufficient amount of carbohydrates.

Carbohydrates are found in the group of starches (bread, pasta, potatoes etc.), fruits and sugars (sweet drinks, candy etc.).

Slide 8 - *Nutrition guidelines: Carbohydrates: Which type of carbohydrate?*

Carbohydrates are classified into simple and compound carbohydrates:

Simple carbohydrates, such as sugar, go into the blood quickly. They are found in e.g. marmalade, cake, candy etc. This type of carbohydrates should be eaten with moderation.

Compound carbohydrates, such as starch are found in bread, pasta or potatoes. They have a slow digestion and go into the blood gradually. This type of carbohydrates should be the majority of carbohydrates ingested daily.

Slide 9 - *Nutrition guidelines: Carbohydrates: Where are they absorbed in our body?*

The carbohydrates are the primary energy source for our brain and muscles. Carbohydrates are stored in the liver and muscles.

Slide 10 - *Did you know that…*

Did you know that it is recommended that carbohydrates should represent 45-60% of our daily energy intake?

Slide 11 - *Nutrition guidelines: Fat: Where does it come from?*

Fat comes from:

- *Meat, poultry and fish*
- *Pure fat and oils*

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- *Nuts*
- *Dairy products*
- *Fatty seeds*

Slide 12 - *Nutrition guidelines: Fat: Which type of fat?*

Fat is divided into three groups: Saturated fats, unsaturated fats and cholesterol.

Slide 13 - *Nutrition guidelines: Fat: Where is fat stored in our body?*

Fats are stored in the fat tissue and are used primarily as storage of energy in the body.

Slide 14 - *Did you know that…*

Did you know that it is recommended that fats present 25-40% of our total daily energy intake?

Nevertheless, we should not consume too much saturated fat. A too high intake of this type of fat has been associated with several serious lifestyle diseases (high cholesterol level, Cardiovascular Diseases, Type 2 Diabetes etc.).

Slide 15 - *Nutrition guidelines: Proteins: Where do they come from?*

Animal origin:

- Meat, fish and poultry
- Dairy products (cheese, milk, yoghurt etc.)
- Eggs

Plant origin:

- Pulses, nuts and seeds
- Cereals and bread

Slide 16 - *Nutrition guidelines: Protein: Where are they stored in our body?*

Proteins are the ”building blocks” of our body as they constitute a great part of our muscles. With increasing age, our muscle mass will decrease and to minimize this loss a sufficient protein intake is necessary. Proteins also constitute a great part of our cells and immune system, which further highlights the need of a sufficient intake.

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You should think of the processes in the body as a construction work: all cells within the body are continuously broken down and to rebuild them we need protein.

Slide 17 – *Did you know that…*

Did you know that:

- The ageing body needs more protein intake due to age-related changes in muscle mass and poorer uptake of the proteins we consume.

- It is recommended that proteins present 15-20% of our total daily energy intake?

- Among older adults approx. 54% has been reported with a protein intake below the recommended guidelines.

QUESTION for the AUDIENCE*: Are you one of them? Despite you may not feel it, low intake of protein will turn into an accelerated aging process*

Slide 18 – What is the *recommendation of daily protein intake?*

QUESTION for the AUDIENCE: How much protein intake do you think is recommended? Do all people need the same amount of protein?

Slide 19 - *How much protein is recommended?*

People <65 years of age: 0,8 g protein per kg of body weight per day

People ≥65 years of age: 1,2 g protein per kg of body weight per day

Until very recently all adults were recommended the same amount of daily protein intake (0,8 g/kg/day) independent of age. This recommendation has been updated since there is an overwhelming evidence showing the benefits of a higher protein intake for better functioning in older age.

Slide 20 - *Example: Protein need I*

To illustrate the different needs of protein depending on age, we will show you this example.

Here we have an 85-year old woman and a 37-year-old woman with the same bodyweight (60 kg).

Slide 21 - *Example: Protein need II*

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The 85-year-old woman is recommended to ingest 1,2 g protein per kilo body weight per day. This corresponds to 72 g protein per day. The 37-year-old woman is recommended to have 0,8 g protein per kilo body weight per day, corresponding to 48 g protein per day in total.

So, despite they have the same body weight, the older woman needs 1/3 more protein than the younger woman.

Slide 22 - *Example: Protein need III*

QUESTION for the AUDIENCE: What do you think of this:

Did they know that the recommended protein intake for older adults was higher than for younger adults?

Please, make the audience reflect on their protein intake compared to e.g. their children. Do they then think they eat more protein or same amount?

Slide 23 - *How much is 24 g protein?*

The 85-year-old woman from the example is recommended to eat 72 g of protein per day, whereas the younger woman is recommended to eat 48 g protein per day. Let us look at this example to illustrate how much food this actually is.

I will give you an example which may be extreme., Please bear with me. The older woman should consume 120 g of beef, 3-4 eggs and 4 glasses of milk per day, whereas the younger woman should "only" consume 120 g of beef and 3-4 eggs.

Please note that only very few people will consume their proteins through this kind of diet. Most people will get their proteins from a wide range of foods throughout a day. This a very simple example but it gives you the idea of how much extra an older woman should consume each day to meet the recommendation.

Slide 24 - *How will you make sure you get enough protein?*

QUESTION for the AUDIENCE: How will you make sure to get enough protein?

Please set the scene for a discussion among the participants: What are the advantages or disadvantages of their proposals?

Slide 25 - *How do you make sure to get enough protein? Tips and tricks*

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One way to ensure an adequate intake is by tracking the food intake throughout the day. This is of course quite time-consuming. So, some simple tips may help:

- Remember that protein does not only come from meat, eggs and dairy products but also grains, cereals, pulses, nuts and seeds. Vary your intake and remember that these protein-rich foods also contain other important nutrients that should be varied as well. Meat, eggs and dairy products contains a high amount of fat, which we should be careful not to consume to high an amount of. Grains, cereals and seeds contains both fats but also fibres and carbohydrates which are also essential to the body. Therefore, you should know your sources of food and their nutrients and vary them so that your body get all nutrients. Nutrients are always reported on the labels of the food we buy. You can have a look at it. (maybe the instructors can bring some examples for this)
- Make sure you always include some protein source in all meals
- If it is hard for you to consume enough food to reach your protein need (e.g. because you get too full before getting through a whole meal), then remember/try to drink protein rich drinks (protein enriched drinks, milk, chocolate milk or something similar)
- Track your body weight – if you lose weight, make sure to increase your energy- and protein intake. If you increase your body weight, make sure to decrease your energy intake but not your protein intake *(very important point!)*

Slide 26 - *Example: The low-protein breakfast*

One tip was to eat some protein-rich food at every meal. Here is an example that stresses the importance of this tip.

This is a picture of a low-protein breakfast: Coffee/tea, white bread with butter and marmalade. The protein content in this meal is 3 g.

QUESTION for the AUDIENCE: What could we add to this meal that would increase the protein level?

Slide 27 - *Example: The high-protein breakfast*

If you changed the marmalade (or other sweet fillings) with cheese and an egg (boiled, fried etc.) the protein content would be almost 7 times higher (20 g).

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Slide 28 - *Example: Cold meal I*

QUESTION for the AUDIENCE: How much more protein do you think this would contain?

The answer is 4 times as much *(see next slide)*

Slide 29 - *Example: Cold meal II*

So, by adding more egg and shrimps you increase the protein level by four times

Slide 30 - *Example: Hot meal*

This is an example of a hot meal. To increase the protein-level in a hot meal it is important that a protein-rich type of food constitutes greater portion on your plate (meat, fish, poultry, eggs, dairy products, pulses etc.). The increase of the protein-rich foods will lead to a decrease in the other foods such as vegetables, fruits, potatoes, rice etc.

With increasing age your total energy need will decrease. This means, that if you do not want to gain weight by consuming the same amount of energy as when you were younger, you will have to decrease your energy intake. In order to do so, it is very important not to decrease your intake of the protein-rich foods as you still need a high amount of protein. Therefore, intake of other types of food such as carbs or fat should be decreased as illustrated on the plate.

Slide 31 - *Example: Drinks*

With increasing age, it may be difficult to consume all needed nutrients (including protein). Therefore, it may be necessary to add protein-rich drinks to your daily diet. These drinks can be added to your main meals or you can use them as ”snack meals” in between your main meals.

As an example, you could replace your water, soda or juice with milk, protein enriched milk or chocolate milk to increase your protein intake. The drinks contain 7 times more protein (e.g. a glass of milk compared to a glass of soft drink).

Slide 32 - *How to increase protein intake without increasing the total energy intake?*

- If you increase your intake of protein-rich foods without decreasing your intake of other nutrients, your total energy intake will increase and potentially lead to a weight gain
- Make sure to decrease your intake of carbohydrates and fats if you increase your protein intake

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Slide 33 - *How to distribute the macronutrients in old age? An example*

Summary of the recommendations for the total daily intake of macronutrients:

- Carbohydrates: 45-60%
- Fats: 25-40%
- Protein: 15-20%

How could they be distributed to avoid weight gain with an increased protein intake?

- Carbohydrates: 50 E%
- Fats: 30 E%
- Protein: 20 E%

Slide 34 - *One last thing to remember: Hydration I*

There is one last very important thing to remember when considering nutrition in ageing: Hydration.

- 60% of our body consists of water and water is essential for us in order to survive
- We need water to adjust our body temperature
- A sufficient amount of water counteracts constipation

Slide 35 – *One last thing to remember: Hydration II*

In this slide you see the recommended amounts of fluids in old age. People aged ≥65 years of age are recommended to drink 30-40 ml of fluid per kilo body weight per day.

If we use the previous example, the 85-year-old woman will need 1800-2400 ml of fluid per day.

Remember that it is advisable to quench one's thirst in water and not soft drinks (i.e. drinks with a high content of sugar).

Slide 36 - *Nutrition guidelines: A healthy diet*

According to WHO, good nutrition can be defined using these guidelines:

Energy intake should be in balance with energy expenditure:

- Try to compare energy balance with economy: If you use more money (energy expenditure) than you earn (energy intake), your bank account will have a negative balance. If you spend

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less money (e.g. you are more inactive and spend less energy) your bank account (YOUR BODY WEIGHT!) will increase… not too good!

Make sure your diet is well-balanced:

- Eat a variety of foods that provide the necessary and principal macronutrients (carbohydrate, fat and protein) and micronutrients (vitamins and minerals)

Eat five portions (or 400 g) of fruit and vegetables per day:

- Five portions of fruit and vegetables per day reduces the risk of chronic diseases and helps to ensure an adequate daily intake of dietary fiber. An adequate intake of dietary fibers reduces the risk of constipation, colon and rectal cancer, cardiovascular diseases and type 2 diabetes

Reduce your total intake of fat and replace fat of animal origin with fat of plant origin:

- You can reduce your total intake of fat by:
    - Steaming or boiling instead of frying when cooking
    - Limiting the consumption of baked and fried foods and pre-packed snacks and foods (e.g. chips, cakes, pies, biscuits etc.)
    - Choosing low-fat products (e.g. skimmed milk instead of whole milk)
    - Replacing fat of animal origin with fat of plant origin reduces your total cholesterol and reduces the risk of blood clots, coronary heart diseases and type 2 diabetes. You can replace fat of animal origin with fat of plant origin by:
        - Reducing your intake of meat and replacing it with vegetable origins (e.g. lentils, chickpeas, beans etc.)
        - Using vegetable oils instead of butter, margarine, ghee etc.

Limit your intake of salt and sugars:

- In many countries, most salt come from processed foods (e.g. ready meals, processed meats such as bacon, ham etc., bread and salty snacks). You can limit your intake of salt by:

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- Limiting the use of salt and high-sodium condiments such as soy sauce, fish sauce and bouillon when cooking and preparing foods
- Limiting your intake of salty snacks
- Choosing products with a lower salt content (e.g. bread, crackers, sliced meat, cheese etc.)
- Choosing homemade food over convenience food

- A high intake of free sugars increases the risk of dyslipidaemia, hypertension and type 2 diabetes. You can limit your intake by:

Limiting your intake of sweet food and drinks (e.g. soda, juice, candy, cake etc.)

Slide 37 - *A healthy diet – a healthy body weight?*

Use your body weight as an indicator of a healthy diet:

- You should neither lose weight or gain weight as this can be bad to your health and affect you in your daily activities, unless you do it on purpose, and after having consulted your doctor.
- If you lose weight your body doesn't get the energy and nutrients it needs

Slide 38 – *Take home message*

1. Make sure to eat a well-balanced diet containing both carbohydrates, fats and proteins
    - A well-balanced diet will also ensure your intake of vitamins and minerals
2. A well-balance diet will help you preserve both muscle mass and muscle strength and thereby your physical function
3. Pay especially attention to your protein intake: Your ageing body needs more protein than when you were younger to preserve muscle mass and strength
4. Control your body weight
    - Avoid both obesity and weight loss
5. Remember to stay hydrated

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Pillar 2 – Social inclusion and connectiveness module

Why: Physical activity programmes provide an opportunity for social participation and social inclusion. Group-based exercise programmes have been shown to foster a sense of belonging and reduce feelings of loneliness among participants. These factors have been shown to have a positive impact on quality of life and health outcomes. Moreover, including social activities in programmes can increase participants motivation and adherence to the programmes. The AAC programme has explicitly designed a pillar to consider a diversity of elements that foster social inclusion and promote engagement in a meaningful activity.

Key goal: Increasing social inclusion and "connectiveness" among the participants

Format

Pillar 2 comprises two components which potentiate each other:

- **COMPONENT 1: Peer-led social activities**
- **COMPONENT 2: Instructor-led Intergenerational events**

Social inclusion and connectiveness among participants are initiated through exercise module in Pillar 3 (instructor-led) and the behaviour change module in pillar 4 (instructor-led group meetings). Nevertheless, social inclusion and connectiveness are maintained and reinforced through the periodic peer-led social activities and the intergenerational events (pillar 2). The instructors will initially coordinate and facilitate the social activities and, progressively with the external support from participants which finally will turn into peer-led activities.

COMPONENT 1: Peer-led social activities

The idea is to promote peer-led activities in the local area, i.e. provide walking routes and ideas for coffee mornings, etc. These activities should start from session 3 of the behaviour change module (pillar 4) once participants already know each other. The ideal time to conduct them is right after or before the exercise programme, especially, when no other behaviour change programme sessions are planned. The instructor should encourage participants to regularly join such informal activities. A fixed schedule for example after or before the programme to participate is recommended in order to create fixed routines.

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COMPONENT 2: Intergenerational events

These events aim at producing "positive reinforcement" by involving family members and/or people from the "social circle" (e.g. friends, neighbours). Activities are conducted together across age-groups.

Each club should consider what they deem feasible in their local area considering different factors like cultural norms, local opportunities, and weather. There are plenty of activities older people can do with their children/grandchildren/friends like walking, gardening, virtual training, gaming… and any intergenerational sport event. The program includes **at least two intergenerational events during the intervention period.** Such intergenerational activities are designed by each club. The type of activity and set-up depend on the selected activity and location as well as the availability of the participants invited (e.g. family walk on Sunday morning).

Few examples of activities suggested by the National Fitness Associations involved in the project are reported here below. These suggestions should be considered as inspiration for other countries. We recommend that each club may design the 2 intergenerational activities which match their environment and participants in the best manner. Nevertheless, despite a variety of activity may be developed, a common theme among all clubs should be *"designing activities where different generations play together or perform something together"*.

Example provided by:	**Informal social activities *(peer-led)***	**Intergenerational activities *(led by the instructor or the club)***
Ireland	• Walking groups • Coffee morning	• Family day event at the end of the programme • Referral incentive, e.g. bring a friend who is not a member of the leisure center for free
Check Republic	• Coffee at the park • Group walks	• Group Nordic walking • Yoga in the park
Greece	• Walks in parks, beaches, mountains • Sea activities (swimming, rackets, etc.) • Indoor/Outdoor chess or other board games	• Road races from 2 to 4 km Local traditional dances • Bike rides • Outdoor group programmes of physical activity

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	• Visits to archeological sites and museums, theater and cinema performances, etc.	
Italy		• Intergenerational sport activities including both generations of grandparents and grandchildren. E.g.: Functional Circuit, where naturally there is a low / medium strength / cardio activities, where grandparents and grandchildren are getting together as a team, and trying to gain points in order to win gadgets like t-shirt (to promote the Club), or football game tickets etc.
Portugal	• Running clubs inside the gymnasiums. These groups are made up of people of various ages and have a concept that mixes the exercise part with the social part.	
Other ideas	• Environment day: collecting plastic or garbage from parks, beaches… in form of informal competition collaborating with the municipality. It can be helpful to promote the Club. • Celebrating participants birthdays during the project period • Dancing • Playing cards	

All these examples are subject to national Covid-19 restrictions.

As perfectly expressed by the Italy team of the project: *"This kind of activities generates an experience through the fitness activities and a positive and great moments to remember!"*

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Pillar 3 – Exercise module

The health benefits of exercise are well established and includes lower risk of cardiovascular disease, hypertension, cancer, type 2 diabetes. Furthermore, exercise can prevent falls and improve bone health, physical and mental health as well as quality of life in older adults.

This module is planned, organized, and delivered by fitness instructors and it is performed in the fitness facilities. Areas around the fitness facilities may be also used sporadically and according to the fitness club's location. This is because the exercise programme can be adapted outside the fitness facility, for example in recreational areas. We recommend performing the exercise module in groups of 8-12 older adults, preferably the same group as in Pillar 4.

The exercise module builds on WHO's newly updated physical activity guidelines for older adults and most up-to date scientific evidence. In addition, the exercise programme aims at incorporating the personal goals and preferences of the older participants developed in Pillar 4. This means that for example, if the personal goal of a participant is to lose weight or improve leg muscle strength, the exercise programme should try to incorporate exercise elements to achieve such goal.

The intervention will be tailored according to the older adults' functional capacity and will include traditional exercise components such as strength, power, aerobic, functional and balance training. Functional capacity is defined as the functional level of the single person, for example in terms of balance or functional performance.

Safety (1): before initiating a training programme

A properly designed exercise programme with appropriate instructions for exercise technique and proper spotting is generally safe for older adults, nonetheless injuries and other adverse events can always occur. Nevertheless, a medical check of the participants is always recommended before involving them in the intervention. This is mandatory in some, but not all European countries. Where this is not mandatory, we recommend the participants to visit their own physician before entering the intervention. If possible, the fitness clubs are also recommended to perform a simple self-screening tool such as the Physical Activity Readiness Questionnaire (PAR-Q). The updated version (2021) can be found via the following link https://doi.org/10.14288/hfjc.v14i1.351.

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Safety (2): during the training programme

For specific training components such as strength and power training, participants with limited range of motion (e.g. shoulder, hip, knee, and spine joint) and/or pain (e.g. joint pain) are recommended not to exceed the threshold of uncomfortable pain and exercises should be adapted accordingly (e.g. alternative exercises, lower intensity, different type of contractions such as isometric versus dynamic).

Design

The exercise programme is periodized into three blocks (*see figure 1*). The programme is designed with biweekly frequency (2 non-consecutive days), 1 hour per session, for 24 weeks in total. Strength, power, and aerobic training are the primary exercise components of the AAC programme as they are effective to counteract declines in muscle mass, strength, aerobic capacity, neuromuscular function, and functional capacity. Secondary exercise components are physical function, balance, and flexibility. We recommend combining primary and secondary components. This can be achieved for example by performing functional strength training (e.g. squat) on a balance mat.

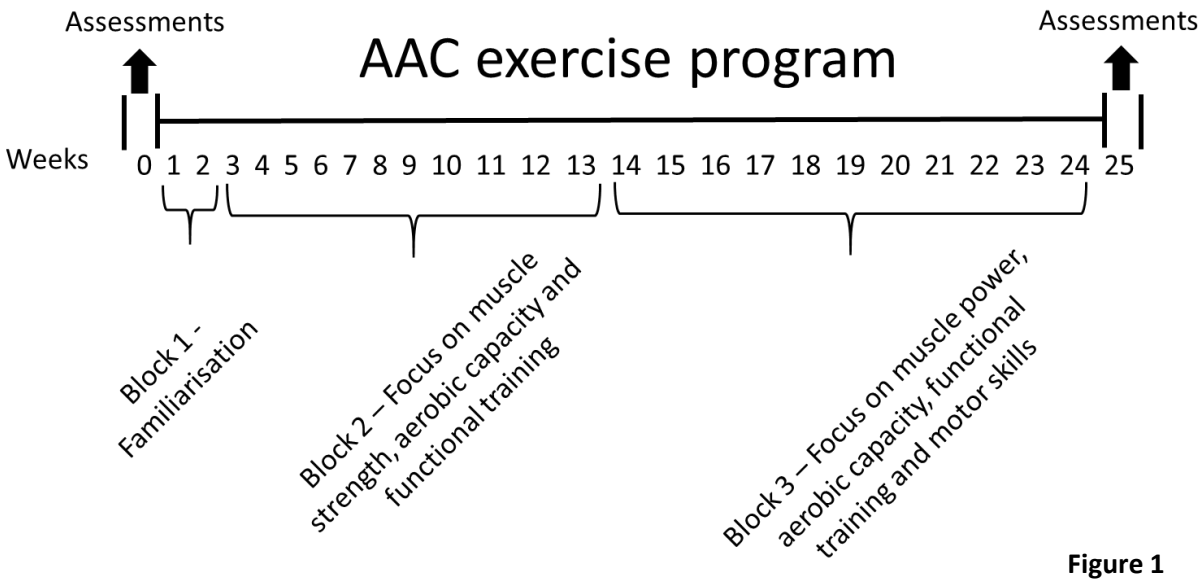

Figure 1

All training sessions should include a 5–10 minutes general and/or specific warm-up, incorporating, where possible, social interactions (e.g. games). The warm-up should be followed by 40-50 minutes

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of different exercises adapted to individual's functional and fitness level. All training sessions should end with a cool-down (breathing exercises and stretching) for 5–10 min. After the familiarisation block (see below), the warm-up and/or cool down may be self-managed by the participants to save time for the key exercise components which need the presence of the instructors.

Block 1 (Week 1-2) – Familiarisation

The first block of the intervention will be used as familiarisation. Introduction to the different type of exercise components (e.g. strength training, aerobic training, balance) and focus on learning the technique in the specific exercises (e.g. strength training) are the main goal of the first block. Furthermore, the first four sessions will be used to instruct the participants to self-estimate the individual baseline intensity for block 2 and 3.

Block 2 (Week 3-13) - Focus on muscle strength, aerobic capacity, and functional training

The second block has the main goal to increase the physiological capacity in terms of maximal muscle strength and aerobic capacity. Functional training (i.e. physical function and balance) will be progressively added.

Block 3 (Week 14-24) - Focus on muscle power, aerobic capacity, functional training, and motor skills

The third and last block has the main goal to increase muscle power, aerobic capacity, functional training (i.e. physical function and balance) and motor skills (e.g. complex reaction time).

Progression and individualization

The AAC exercise programme includes the key principles of progression and individualization. Progression is defined as "*the act of moving forward or advancing toward a specific goal over time until the target goal has been achieved*" (ACSM 2009). Progressive overload (e.g. absolute or relative resistance/load for a given exercise/movement) and periodization (e.g. change between muscle strength in block 2 and muscle power in block 3) is implemented to make sure the training is *moving forward*.

Individualization is also an important factor to consider especially with teams composed of older adults with different level of function and fitness. The exercise programme should be designed to

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consider specific physical (e.g. limited range of motion because of artificial knee) and medical conditions (e.g. osteoarthritis) of the individual.

Exercise components of Pillar 3

Strength and power training

Ageing is associated with a decrease in muscle mass and neuromuscular function which leads to functional decline and difficulties performing activities of daily living. Strength and power training have been shown as an effective tool to counteract these processes, slowing the rate of decline, and improving management of chronic conditions (e.g. type 2 diabetes and COPD), physical function and quality of life. Strength and power training are thereby essential components of pillar 3.

Block 1: The first two weeks of the exercise programme will be used as familiarisation with focus on i) learning optimal exercise techniques and ii) introducing the assessment of exercise intensity. The participants will perform 4-6 exercises, 1-2 set(s) per exercise, doing 10–15 repetitions at a lower relative resistance with 1-2 minutes rest in between.

Block 2*:* Weeks 3-13 will focus on increasing maximal muscle strength. The participants will perform 6-8 exercises, 3-4 sets per exercise, doing 6-12 repetitions achieving intensities of 65-80% of 1 repetition maximum (1RM) with 1-2 minutes rest in between sets. Block 2 will be periodized with larger volume and lower intensity (e.g. 3 sets x 10-12 reps with 12-14 RM/2 RIR) for the first half and lower volume and higher intensity (e.g. 3-4 sets x 6-8 reps with 8-10 RM/2 RIR) for the second half.

Block 3: Weeks 14-24 will focus on increasing muscle power performing exercises at maximum acceleration of the load during the concentric phase of the movement (e.g. double leg press: maximum acceleration throughout the whole push off until legs are semi extended). The participants will perform 6-8 exercises, 2-3 sets per exercise, doing 8-12 repetitions achieving intensities of 40-70 % of 1 repetition maximum (1RM) with 1-2 minutes rest in between sets. Information about relative intensity from block 2 should be used to estimate the load/intensity for block 3. Block 3 will be periodized with larger volume and lower intensity (e.g. 3 sets x 10-12 reps with 40-50 % of 1 RM) for the first half and lower volume and higher intensity (e.g. 3 sets x 8-10 reps with 50-70 % of 1 RM) for the second half.

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Participants are encouraged to focus on maximum acceleration of the load from the very beginning of the movement and throughout the entire range of motion. There are different forms of power training which can be recommended to use:

i. traditional training exercises (e.g. leg press) performed with maximum acceleration during push-off phase (concentric contraction) and controlled velocity during lowering the weight (eccentric contraction)

ii. ballistic exercises (e.g. countermovement jump/box jump, ball throwing). This may include concentric-only (e.g. squat jump) and eccentric/concentric coupled movements (e.g. countermovement jumping)

iii. plyometric exercises for more skilled participants (e.g. drop jump)

Exercise selection

We suggest including major muscle groups targeted through multi-joint movements using bodyweight, machines, free-weights, resistance band, medicine balls or any other material available (e.g. water bottles or sand sacks). As a minimum the following is suggested to perform at each exercise session:

- 1 upper body pull (e.g. pulldown or row)
- 1 upper body push (e.g. chest press or shoulder press)
- 1 lower body push (e.g. squat or leg press)
- 1 lower body pull (e.g. deadlift or hip trust)
- 1-2 core exercise(s) (e.g. plank, abdominal crunch, lower back extension)

The selected exercises should be applied with the principles of *progression and regression*. Regression is simply a way to decrease the demand of an exercise or movement. Conversely, a progression does the opposite by increasing the demand.

Example:

Lower body push:

Regression				**Progression**
Leg press	squat (body weight)	front squat	goblet squat	back squat

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Intensity

Training intensity can be calculated in different ways. In the AAC programme we suggest using one of the following methods ordered in the way we would prioritise.

1. Repetition Maximum (RM)

Intensity of strength and power training is often defined as the training load (i.e., in percentage or absolute value) relative to maximal dynamic strength (i.e., 1RM) of a specific exercise (*see table 1*). If possible, we suggest performing one "*3-8-RM test*" (*see below*) for 1 or 2 main exercises (e.g. leg press and chest press). The RM test will provide valuable information to the instructors and older adults to estimate the intensity during the programme period.

Table 1

Repetitions	% 1 RM
1	100
2	95
3	93
4	90
5	87
6	85
7	83
8	80
9	77
10	75
11	70
12	67
15	65

Essentials of Strength Training and Conditioning (3rd ed.), 2008, Human Kinetics

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Example of a "*3-8-RM-test*" in Leg Press

- Step 1. Specific warm-up with 10-12 repetitions with a relatively low load (e.g. 50 kg)

1-minute break

- Step 2. Try to estimate a load the older adults can lift 7-9 times by adding 20-30 % load (e.g. 60-65 kg)

2-minute break

- Step 3. Try to estimate a load the older adults can lift 4-5 times by adding 10-20 % load (e.g. 66-78 kg). The older adult should perform this set to failure (range 3 to 8 RM). If the older adult performs more than 8 repetitions, follow step 3 again. Use the results for calculating the load that should be used in block 2 and 3.

Example on how to calculate load in Leg Press for block 2 and 3

Example: your participant, completes 4 repetitions with 75 kg as a result from the "*3-8-RM-test*" in the beginning of block 2 or block 3.

Block 2: 3 sets x 10 repetitions with 12 RM. For this session we would like to estimate the 12 RM load for leg press. 4-RM represent 90 % of 1 RM and 12 RM represents 67 % of 1 RM (*see table 1*): 75 kg x (100/90) x 67 % ≈ 56 kg

Block 3: 3 sets x 10 repetitions with 50 % of 1 RM. For this session we would like to estimate the 50 % of 1 RM load for leg press. 4-RM represent 90 % of 1 RM: 75 kg x (100/90) x 50 % ≈ 42 kg

As an alternative to RM testing, the instructor can use a formula to estimate 1-RM. We recommend using Epley Formula: ***1RM = w x (1+r/30)***, where w=weight of lifted reps and r=number of reps lifted.

Example: An older adult has lifted 50 kg 10 times.

1 RM = 50 kg x (1+10/30) ≈ 67 kg

Use table 1 to estimate the load for block 2 and block 3.

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2. Reps In Reserve (RIR)

Reps in Reserve (RIR) is defined as the extra number of repetitions the participant can potentially perform before failure. The RIR is estimated by the participant and it is frequently used in daily practice, especially with relatively large groups. This method can be used to assess the intensity during the AAC programme period.

Example for block 2:

Week 3-8: 3 sets x 12 repetitions with 2 RIR. Increase the load if the older adult think he/she can do more than 2 repetitions after completing the 12 repetitions.

Week 9-13: 4 sets x 8 reps with 2 RIR. Increase the load if the older adult think he/she can do more than 2 repetitions after completing the 8 repetitions.

3. Rate of Perceived Exertion (RPE)

Rate of Perceived Exertion (RPE) is a concept initially developed by Gunnar Borg to quantify perceived exertion of aerobic exercise. The original scale is based on heart rate (RPE 6 to 20). This scale has evolved to the now commonly used 1 to 10 scale which is based on a subjective perception of exertion (*see table 2*).

Table 2

RPE Scale	Repetition In Reserve
10	Maximum effort
9	1 repetition in reserve
8	2 repetition in reserve
7	3 repetition in reserve
5-6	4-6 repetition in reserve
3-4	Light effort
1-2	Little to no effort

Zourdos et al 2016

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Example for block 2:

Week 3-8: 3 sets x 12 reps with 8 RPE. Increase the load if the older adult rate the RPE lower than 8.

Week 9-13: 4 sets x 8 reps with 8 RPE. Increase the load if the older adult rate the RPE lower than 8.

Overall considerations

The RM test method may not be feasible because of the complexity and time required to calculate relative loading for each exercise, despite being a more precise measure of intensity.

Different methods may be combined (e.g. RM for one or two main exercises (e.g. leg press and chest press) and RIR/RPE for the remaining exercises).

Aerobic training

Aerobic capacity declines with ageing and is important to perform daily activities such as shopping, vacuum cleaning and showering. Regular aerobic training has numerous cardiovascular and musculoskeletal benefits for older adults and can improve management of chronic diseases (e.g. Type 2 diabetes).

Recommendations for older adults indicate *at least 150–300 min of moderate-intensity aerobic physical activity, or at least 75–150 min of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate-intensity and vigorous-intensity activity throughout the week for substantial health benefits.*

Despite the AAC programme attempts to incorporate recommendations, the training frequency of the programme in the fitness club can only provide part of the volume/intensity for such recommendations. Recommendations can be achieved by combining pillar 3 and pillar 4 (e.g. brisk walking, cycling).

For the aerobic component of pillar 3, we recommend using High Intensity Interval Training (HIIT) and varying intensity and volume (see below for examples) or a combination of HIIT and continuous aerobic training, as time for longer and continuous bouts is limited in the AAC exercise programme.

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Longer continuous bouts (> 30 minutes) of for example moderate intensity should be implemented in the Pillar 4 (e.g. brisk walking/jogging, swimming or cycling).

The format of the strength/power training described above can also be conducted as circuit training/HIIT with lower breaks and lower intensity or as super sets (e.g. upper body vs lower body) to incorporate the aerobic component. The aerobic training can also be integrated as part of longer warm-up sessions.

During the familiarisation block the instructors and older adults will work on how to assess intensity for the aerobic exercises.

Aerobic component for block 2 & 3 (*figure 1*) can be periodized and progressed in different ways as suggested here below:

- Variation of exercises (by selecting different exercises from the exercise library)
- Use different bout and break lengths of the interval training
    - 3 rounds of 4 exercises (60 s. work / 30 s. break)
    - 6 rounds of 4 exercises (30 s. work / 15 s. break)
    - TABATA (20 s. work / 10 s. break)
- Combine HIIT and continuous aerobic training
    - HIIT once a week
    - Continuous bouts once a week (e.g. 3 x 5 minutes)

Intensity

We recommend using intensities between 50-70% of maximum heart rate or 4-6 RPE for moderate intensity and 70-85% of maximum heart rate or 7-8 RPE for vigorous activity to ensure aerobic adaptions. Furthermore, we suggest progressing towards lower resting periods, for example a ratio of 2:1 (e.g. 60 seconds work / 30 seconds break).

Intensity during the exercise period should be calculated using one of the following methods:

1. Rate of Perceived Exertion

Table 3	
RPE Scale	**Rate of Perceived Exertion**
10	**Max effort activity**

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	Feels almost impossible to keep going. Completely out of breath, unable to talk. Cannot maintain for more than a very short time.
9	**Very hard activity** Very difficult to maintain exercise intensity. Can barely breathe and speak only a few words.
7-8	**Vigorous activity** Borderline uncomfortable. Short of breath, can speak a sentence.
4-6	**Moderate activity** Breathing heavily, can hold a short conversation. Still somewhat comfortable but becoming noticeable more challenging.
2-3	**Light activity** Feels like you can maintain for hours. Easy to breathe and carry a conservation.
1	**Very light activity** Hardly any exertion, but more than sleeping and watching TV.

2. Talk test

The *Talk test* is a way to measure exercise intensity based on the ability to carry on a conversation.

- Steady conversation is associated with ***moderate intensity*** aerobic exercise.
- ***Vigorous intensity*** is an exercise intensity where only a few words are sustainable

Exercise selection / library

- All strength and power exercises with lower intensities
- Marching/Jog in place
- Lateral jumping / Side-to-side step
- Jumping jacks / Step out jacks
- Jump twist
- Jump ropes
- Prisoner march
- Butt kicks
- Step-up
- Knee raises
- Boxing in the air
- Relay
- Toe taps behind
- Cross ski
- Fast feet drill
- Speed skater
- Skater taps
- Knee knee + toe toe
- Hammer slam
- Steam engines

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Continuous aerobic training may include walking, jogging, rowing, using an elliptical trainer, cycling, aerobics, Nordic walking, swimming, dancing or any other activity such as playing sports (e.g. football fitness) and games which increase heart rate and respiratory frequency.

Functional training

Balance, physical function (e.g. walking or stair climbing) and gross motor skills (movement coordination) are important factors for older adults to reduce late-life disability, risk of falls and to live independently.

Functional training of the AAC exercise programme should include multi-joint, complex and dynamic movements which increase the functional capacity (e.g. ability to rise from a chair) and thereby the ability to perform activities of daily living (ADL). Functional training should incorporate also similar movement patterns as performed daily (e.g. activities of daily living such as lifting objects, carrying bags while walking). Instructors should include functional training in each exercise session, for example as part of the strength training component (e.g. loaded sit-to-stand), aerobic component (e.g. jumping jacks with different arm movements) or as an independent component (e.g. agility drill, tandem walking).

Exercise selection

Balance activities can be designed to challenge the visual (e.g. eyes open/closed), vestibular (e.g. move head) and somatosensory (e.g. stand on foam) systems. When training dynamic balance, activities such as walking on different surfaces, with varied elevations, and performing a dual task (cognitive and functional task such as catching, throwing and reaching), incorporating different gait patterns (e.g. narrow walking, longer strides, zigzag walking) and variations in gait speed, will be performed.

<u>Example of simple static balance training</u>

- 2-legs standing side by side, semi-tandem, tandem, one leg stance, one leg stand on foam, one leg stand while rotating arms, one leg stand while doing coordination exercise
    - Add eyes closed
    - Add moving the head in different directions

<u>Example of dynamic balance training & sensory/cognitive integration</u>

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- Walking following music rhythm
- Walking backwards & sidewards
- Narrow & tandem walking
    - Add reading a newspaper while walking
    - Add math calculation (or any other cognitive tasks) while walking (ask simple math operation e.g. 4+3*2)
    - Add walking with eyes closed guided by a friend (e.g. car exercise)

Examples of physical function training

- Loaded step-up
- Farmer walking
- Loaded sit-to-stand

Example of simple and complex reaction time & cognitive integration

- Sound reaction time: every time the instructor makes a sound change walking direction (e.g. 90 degree right or left)
- Visual reaction time change immediately walking direction when the instructor point in a specific direction (e.g. left, right, back and forward).

Flexibility Training

Flexibility is an important component for older adults to maintain functional independence and perform daily activities such as getting in and out of the car, bending to pick up something from the floor, dressing or bathing. Flexibility is defined *as the ability of a joint, or a series of joints, to move through a full range of motion without injury*.

Guidelines for flexibility training in the AAC programme:

- Stretching should be part of the cool-down for each exercise session
- Stretch all major muscle groups
- Keep breathing slowly while holding the stretch
- *Type:* Static stretching
- *Intensity:* Stretch to the point of slight discomfort or feeling of tightness in the muscle
- *Time:* 30-60 seconds of static stretching

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- *Volume:* 2 repetitions of each stretch

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How to combine the different exercise components in a single training session?

Example of an exercise session from Block 2 (week 4 of the AAC programme)

- **General warm-up (approx. 10 minutes)**
- **Strength and functional components (approx. 35 minutes)**

The strength and functional training should be completed as a circuit training with 8 different exercises and 1 min rest in between sets.

Exercise 1: Leg press

Number of sets	Repetitions	Intensity	Rest	Type
3	12	14 RM / 2 RIR	1 min	Lower body push

Exercise 2: Pull-down

Number of sets	Repetitions	Intensity	Rest	Type
3	12	14 RM / 2 RIR	1 min	Upper body pull

Exercise 3: Loaded sit-to-stand (dumbbell or kettlebell)

Number of sets	Repetitions	Intensity	Rest	Type
3	12	2 RIR	1 min	Functional

Exercise 4: Kettlebell Swing

Number of sets	Repetitions	Intensity	Rest	Type
3	12	2 RIR	1 min	Lower body pull

Exercise 5: Chest press

Number of sets	Repetitions	Intensity	Rest	Type
3	12	2 RIR	1 min	Upper body push

Exercise 6: Tandem walk on a 5-10-meter course

Number of sets	Time	Intensity	Rest	Type
3	30	-	1 min	Balance

Exercise 7: Abdominal crunch

Number of sets	Repetitions	Intensity	Rest	Type
3	12	-	1 min	Core

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Exercise 8: Lower back extension

Number of sets	Repetitions	Intensity	Rest	Type
3	12	-	1 min	Core

- **Aerobic component (approx. 10 minutes)**

The aerobic component is completed together in the exercise group.

3 rounds of 4 exercises (30 s. work / 15 s. break)

- Exercise 1: Jumping jacks / Step out jacks
- Exercise 2: Marching/Jog in place
- Exercise 3: Knee raises
- Exercise 4: Steam engines

- **Flexibility component (5 minutes)**

Static stretching, 2 times, 30 seconds of each stretch

- Stretch 1: Hip flexors (Kneeling hip flexor stretch)
- Stretch 2: Hamstrings (Sit-and-reach stretch)
- Stretch 3: Plantar flexors (Standing calf stretch)
- Stretch 4: Hip extensors (Knees to the chest in a supine lying position)
- Stretch 5: Chest (Wall chest stretch)

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Example of an exercise session from Block 3 (week 15 of the AAC programme)

- **General warm-up and aerobic components (approx. 15 minutes)**

The group is divided into two teams who should compete in different workout games.

- Workout game 1: Tic tac toe.

Make a game board on the floor with 9 squares. Each team should have a different object to place on the game board. All persons should be placed behind a line with 5-10 meters to the game board. One person from each team, at a time, can place an object on the board. The first team to get three objects in a row wins the game.

- Workout game 2: Cone wars

Place half of the cones upright with the other half lying on their side. One team should set those cones lying on their side upright, while the other team should knock the upright cones down onto their side. Then set a timer for two minutes. Once the "Go" command is given, each person/team will begin knocking over or standing the cones upright. The main aim with this game is to bend in the lower extremities (knees and the hips) while keeping the back straight. It is also important to note that you may only use your hands to move the cones. After the two minutes, the team with the most cones in the position they were assigned to place them is the winner.

- **Power and functional components (approx. 40 minutes)**

The power training will focus on performing exercises at maximum acceleration of the load during the concentric phase of the movement.

Exercise 1: Leg press

Number of sets	Repetitions	Intensity	Rest	Type
3	10	50 % 1 RM	1 min	Lower body push

Exercise 2: Medicine Ball Power Drop – Lying supine

Number of sets	Repetitions	Intensity	Rest	Type
3	10	-	1 min	Ballistic

Exercise 3: Fast squat (Regression: Chair Rise / Progression: Counter Movement Jump)

Number of sets	Repetitions	Intensity	Rest	Type
3	10	-	1 min	Plyometric

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Exercise 4: Medicine Ball Slam (medicine ball)

Number of sets	Repetitions	Intensity	Rest	Type
3	10	-	1 min	Ballistic

Exercise 5: Kettlebell Deadlift

Number of sets	Repetitions	Intensity	Rest	Type
3	10	-	1 min	Lower body pull

Exercise 6: "Farmer-Walk" (with dumbbells or kettlebells) on a 5-10 meters course

Number of sets	Time	Intensity	Rest	Type
3	30 sec.	-	1 min	Functional

Exercise 7: Single-leg balance variations

Number of sets	Time	Intensity	Break	Type
3	15-30 sec.	-	1 min	Balance

Exercise 8: Plank

Number of sets	Time	Intensity	Break	Type
3	15-30 sec.	-	1 min	Core

- **Flexibility component (5 minutes)**

Static stretching, 2 times, 30 seconds of each stretch

- Stretch 1: Hip flexors (Kneeling hip flexor stretch)
- Stretch 2: Hamstrings (Sit-and-reach stretch)
- Stretch 3: Plantar flexors (Standing calf stretch)
- Stretch 4: Hip extensors (Knees to the chest in a supine lying position)
- Stretch 5: Chest (Wall chest stretch)

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References

1. American College of Sports M. American College of Sports Medicine position stand. Progression models in resistance training for healthy adults. *Med Sci Sports Exerc.* 2009;41(3):687-708.
2. Bull FC, Al-Ansari SS, Biddle S, et al. World Health Organization 2020 guidelines on physical activity and sedentary behaviour. *Br J Sports Med.* 2020;54(24):1451-1462.
3. Cadore EL, Izquierdo M. New strategies for the concurrent strength-, power-, and endurance-training prescription in elderly individuals. *J Am Med Dir Assoc.* 2013;14(8):623-624.
4. Di Lorito C, Long A, Byrne A, et al. Exercise interventions for older adults: A systematic review of meta-analyses. *J Sport Health Sci.* 2021;10(1):29-47.
5. Fragala MS, Cadore EL, Dorgo S, et al. Resistance Training for Older Adults: Position Statement From the National Strength and Conditioning Association. *J Strength Cond Res.* 2019;33(8):2019-2052.
6. Zourdos MC, Klemp A, Dolan C, et al. Novel Resistance Training-Specific Rating of Perceived Exertion Scale Measuring Repetitions in Reserve. *J Strength Cond Res.* 2016;30(1):267-275.

Pillar 4 – Behavioural change module

This module aims at magnifying the effect of modules 1-3 by establishing sustainable healthy habits beyond the "borders" of the fitness facility and extending the AAC programme into the community space. The space outside the fitness facility is presented as environment for engaging in active-life style. The role of the fitness instructor is to facilitate this process and create the condition for self-empowerment and self-management. The final goal is to support older adults to achieve the WHO recommendation level of physical activity.

Awareness and behaviour change are key components for new members who wish to engage for the first time in physical activity programs. Also, existing members may be only active during structured exercise performed in the club and yet, being far from achieving recommendations of physical activity. Behaviour change such integrating physical activity in their everyday life may be required

Ideally, behaviour change should be sustained over time and, in the case of the AAC project be maintained following the completion of the programme.

Therefore, this pillar includes a behaviour change programme comprising established techniques such as goal setting.

Key goal: the key goal of this module is to increase motivation to promote and maintain physical activity and optimize retention to the programme

COMPONENT 1: Instructor-led behaviour change meetings

- How do we reach the key goal of increasing motivation to increase and maintain physical activity and optimize retention to the programme?

These aspects are to be reached by group activities organised by the fitness instructors named instructor-led behaviour change meetings. The meetings will include discussions to share "successful solutions" and identifying barriers and facilitators to increase and maintain physical activity. The behaviour change meetings will use motivational interviewing techniques and other techniques based on social-behavioural models such as the Transtheoretical Model developed by Prochaska and DiClemente (also called the Stages of Change Model), goal setting, self-monitoring and habits formation to support behaviour change.

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The program will include a two-hour online course for fitness instructors (see *Online training for fitness instructors*) and an operating manual will be developed by SDU in collaboration with project partners and external consultants (see *Instructor-led behaviour change meetings* below). This will be targeted to group facilitators (e.g. fitness instructors and specially trained centre staff. The training course will be recorded in order to allow instructors to complete the training with flexibility. In addition, a one-hour online session will be conducted to resolve doubts and train the trainers on how to apply the techniques that they will be introducing to the participants, such as goal setting. Moreover, an online forum will be created for trainers to post any questions or queries before and during the implementation of the programme. The forum will be also used to supervise the accomplishment of the goals they set in the training.

COMPONENT 1: Instructor-led behaviour change meetings: These meetings support behaviour change by providing the participants with the skills needed to develop and maintain healthy habits (self-efficacy, goal setting), enhanced by peer support and motivational techniques.

The specific sessions with their aims and how they are to be conducted are explained below.

Instructor-led behaviour change meetings

Ten sessions will be organized during the 24 weeks ACC programme. The first session should be organized as the very first meeting of the AAC programme. Similarly, the last behaviour session should be the last meeting with the instructor where the program will be evaluated.

These sessions should ideally take place right after or before the exercise sessions (pillar 3) and last 45 min-1 hour depending on the size of the groups. We recommend performing the behaviour change meetings in groups of 8-12 older adults, preferably using the same groups as in pillar 3.

The detailed sessions are reported in the table below.

Weeks and session	Aim	Conduction of the sessions
Session 1	To introduce the participants to the programme and start sharing views of healthy lifestyle.	The instructor presents the ACC programme to the participants and they introduce themselves to the group and explain their motivations and expectations to join. Participants are invited to bring a personal object from home for this session to introduce themselves. E.g., a

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		picture of their grandchildren, a handcraft they have made, etc. The behaviour change programme is presented by the instructor. Participants share views and ideas about health, self-care and healthy lifestyles. At the end of each session, participants are encouraged to share their thoughts on the session. One easy dynamic to apply is that each participant says one word which summarises/represents his/her experience of the sessions, e.g. "joy". Another option is to rate "My mood today" verbally or with a "mood thermometer". They could also be encouraged to create cooperatively a board with paintings, handcrafts, small writings, etc. This cooperative board could be also created as part of the unstructured social activity involving as much participants as possible.
Session 2, 3 and 4	To share personal experiences and challenges regarding healthy lifestyles	Second-Fourth session: The instructor facilitates a **discussion of the content after each presentation of pillar 1** (3 x times 30min-1hour) to share personal experiences and challenges regarding ageing, healthy lifestyles related to sedentary behaviour, physical activity, exercise and nutrition. To facilitate the group discussion, the instructor should post open questions such as: *how do you experience what was presented? Which information was appealing to you? Which recommendation would you like to apply in your daily life?* Clubs are encouraged to invite a senior member of the club as a role model to share with the participants his/her successful experience conducting healthy habits. It is important to choose a member that lives in a similar context and conditions as the participants. Ideally, these sessions could be conducted right after the presentation of Pillar 1 or a few days after.

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		The instructor should mention that the content can be used to establish personal goals in the next sessions.
Session 5	To establish personally meaningful long-term goals.	The instructors help participants establish **long-term functional goals** that they would like to achieve after completing the intervention. These goals have to be meaningful in their daily life for their well-being in any of the spheres of the programme: physical function, mobility, social inclusion, connectiveness and experience of ageing. In other words, the goals have to be achievable with the activities conducted in the AAC programme.
Session 6	To establish a specific goal	The instructors help participants establishing a **specific goal** related to their lifestyle to be fulfilled by the next group meeting. Reaching this specific goal should support attainment of their identified long-term goal.
Session 7	To review the accomplishment of the specific goal	The instructor does an extensive review on the accomplishment of the specific goal setting activity. Participants explain whether they have achieved it or not and why, what made it challenging, what was easy. All participants are also encouraged to ask questions and provide ideas to support each other in the achievement of the goals. Problem solving techniques will be applied. Participants might reformulate the goal or keep it.
Session 8	To identify and share physical activity assets outdoors in their neighbourhood	The instructor does a quick review on the accomplishment of the specific goal setting. Using local maps, participants identify and share potential outdoor physical activity areas in their neighbourhood, **discuss the benefits and limitations of the different physical activity areas** and agree on a group walk in the neighbourhood for the next session.
Session 9	To experience the own neighbourhood to discover	The instructor does a quick review on the accomplishment of the specific goal setting activity.

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	outdoor possibilities to practice physical activity	The group complete a walk **in the neighbourhood** starting and ending at the club visiting interesting places where to do physical activity outdoors, e.g., parks or outdoor gyms.
Session 10	To review the accomplishment of personally meaningful long-term goals and close the programme.	At the end of the programme, the instructor does an extensive review on the accomplishment of the personally meaningful long-term goals. Participants explain whether they have achieved it or not and why. All participants are also encouraged to ask questions and provide ideas to support each other. The group shares and discusses their thoughts and feelings about the programme. We recommend using this session to wrap up the older adults' participation in the AAC programme. For instance, participants can be invited to make an imaginary gift to someone else from the group. The group could share a farewell meal as an informal activity or also with the instructor.

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Online training for fitness instructors

Content of the course and/or training for fitness instructors

1. Introduction to pillar 2 and 4:
    a. The relevance of social inclusion for health and well-being
    b. Social relationships as a key factor for behaviour change and to adhere to interventions.
    c. Why behaviour change meetings?
2. Tools to promote social inclusion
    a. In-depth description of the sessions in module 2
        - Social intergenerational events
        - (un)structured social activities, e.g., celebrate birthdays
3. Theories and tools to promote behaviour change:
    - COM-B/Behaviour change wheel. Facilitators and barriers
    - the Transtheoretical Model developed by Prochaska and DiClemente (also called the Stages of Change Model)
    - Tools and concepts from the Social cognitive theory: Self-efficacy, goal setting and problem solving.
    - Getting inspiration from the SITLESS programme (1) and from the FEELING WELL programme (2, 3).

In the course, instructors will be introduced to the behaviour change techniques that are to be applied by themselves to the participants during the programme. Moreover, to train their abilities as facilitators, they will apply themselves the techniques with their colleagues. We attempt to engage older people in the training to show also real cases to the trainers.

References

1. Giné-Garriga, M.; Coll-Planas, L.; Guerra, M.; Domingo; Roqué, M.; Caserotti, P.; Denkinger, M.; Rothenbacher, D.; Tully, M.A.; Kee, F.; et al. The SITLESS Project: Exercise Referral Schemes Enhanced by Self-Management Strategies to Battle Sedentary Behaviour in Older Adults: Study Protocol for a Randomised Controlled Trial. *Trials* **2017**, *18*, doi:10.1186/s13063-017-1956-x.
2. Coll-planas, L.; Blancafort, S.; Rojano, X.; Roqué, M.; Monteserín, R. Promoting Self-Management , Health Literacy and Social Capital to Reduce Health Inequalities in Older

Adults Living in Urban Disadvantaged Areas : Protocol of the Randomised Controlled Trial AEQUALIS. **2018**, 1–10.

3. Blancafort Alias, S.; Monteserín Nadal, R.; Moral, I.; Roqué Fígols, M.; Rojano i Luque, X.; Coll-Planas, L. Promoting Social Capital, Self-Management and Health Literacy in Older Adults through a Group-Based Intervention Delivered in Low-Income Urban Areas: Results of the Randomized Trial AEQUALIS. *BMC Public Health* **2021**, *21*, 1–12, doi:10.1186/s12889-020-10094-9.

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Appendix

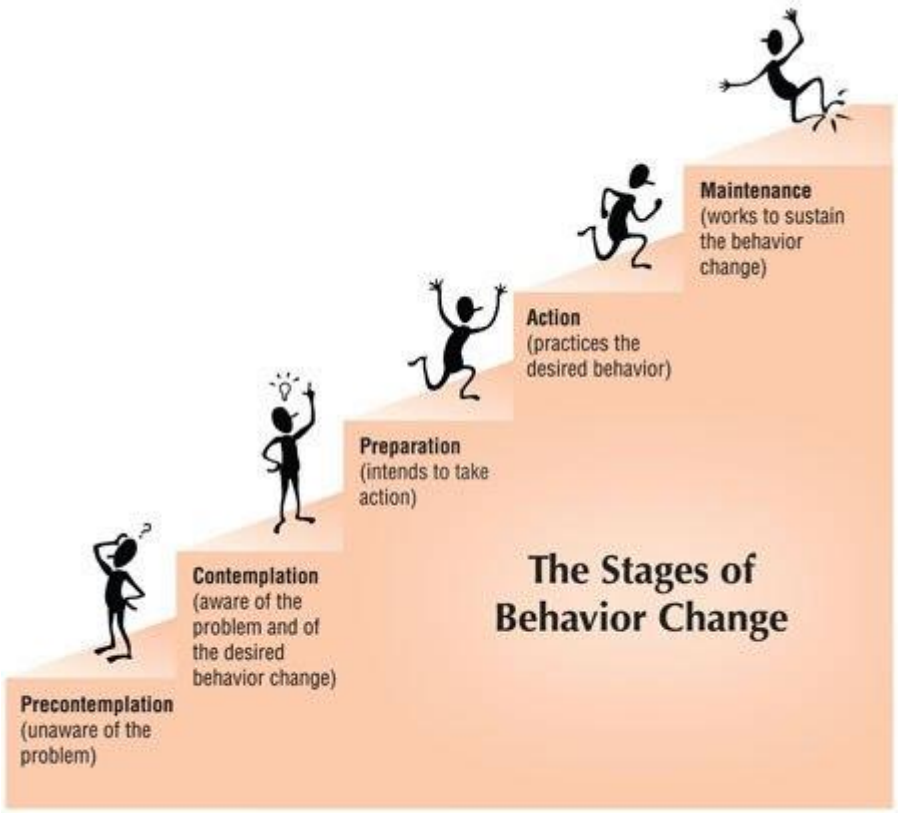
Following figures will be used in the online training programme:

Prochaska and Diclemente's (1983) Transtheoretical model of health behaviour change

The Transtheoretical Model focuses on the decision-making of an individual and is a model of intentional change. The model operates on the assumption that change in behaviour, especially habitual behaviour, occurs continuously through a cyclical process.

Prochaska and Diclemente (1983) introduced the model, based on individuals moving through a series of stages when modifying behaviour: precontemplation, contemplation, preparation, action and maintenance. For each stage of change, different intervention strategies are most effective at moving the person to the next stage of change and subsequently through the model to maintenance, the ideal stage of behaviour.

Further reading: https://www.ncbi.nlm.nih.gov/books/NBK556005/



Sources: Grimley 1997 (75) and Prochaska 1992 (148)

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COM-B/Behaviour change wheel

The COM-**B** model of behaviour is widely used to identify what needs to change in order for a behaviour change intervention to be effective. It identifies three factors that need to be present for any behaviour to occur: capability, opportunity and motivation.

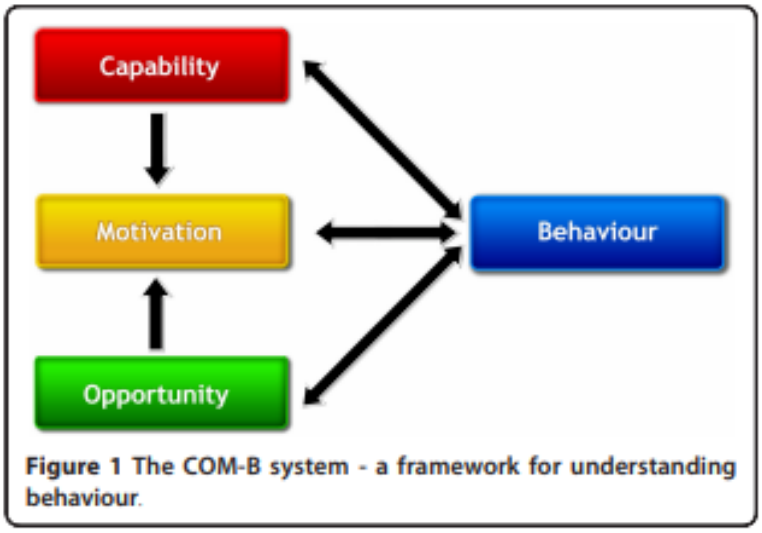
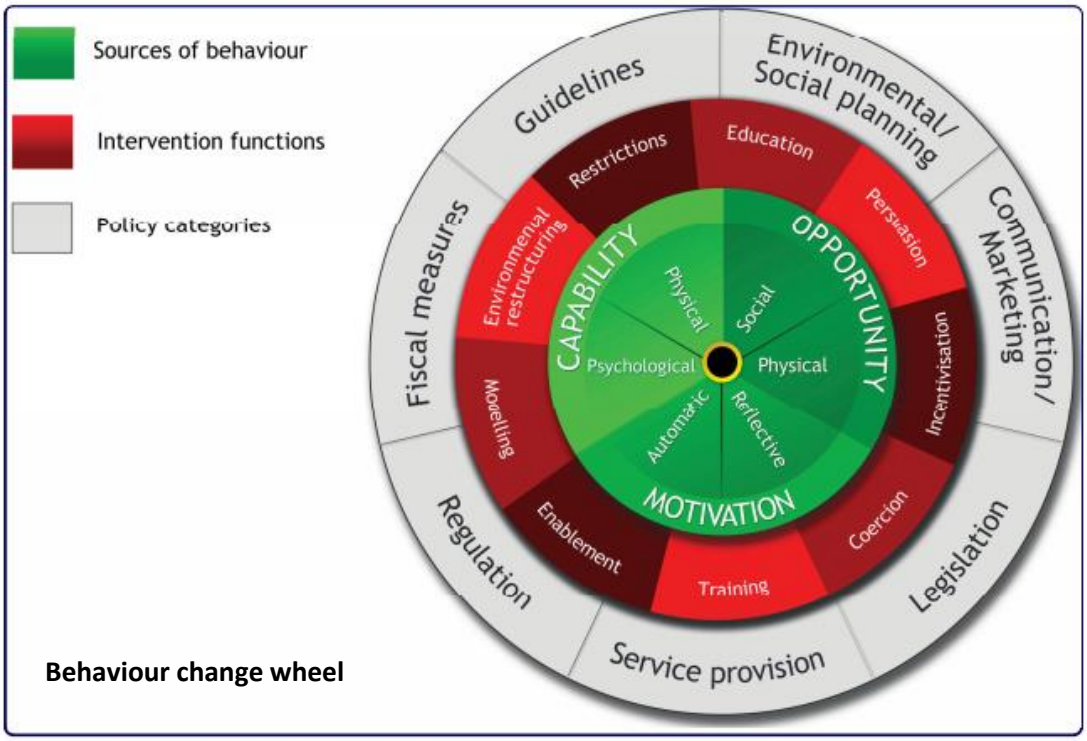


Figure 1 The COM-B system - a framework for understanding behaviour.



Behaviour change wheel

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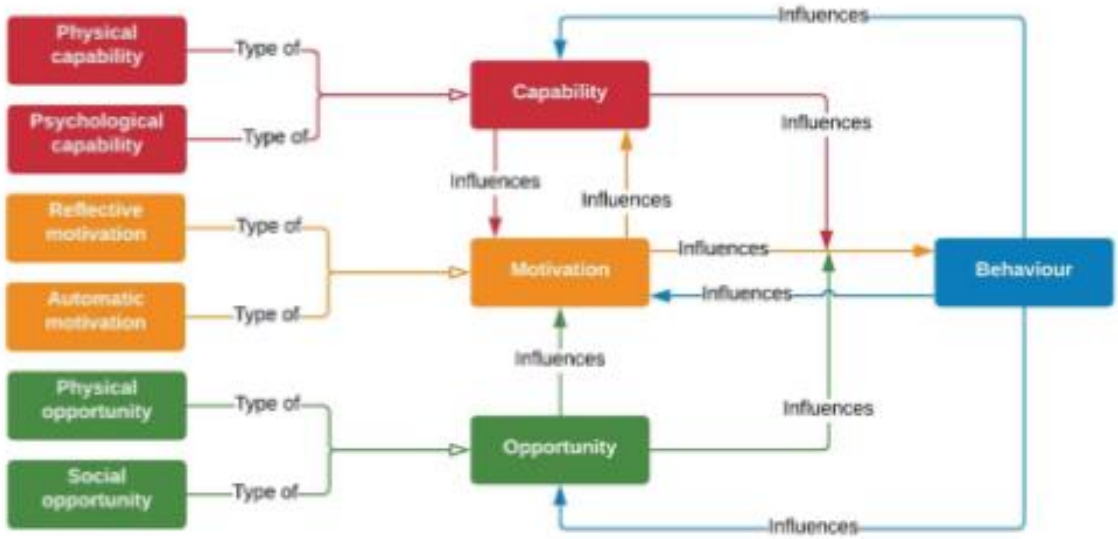

Capability is an attribute of a person that together with opportunity makes a behaviour possible or facilitates it.

Opportunity is an attribute of an environmental system that together with capability makes a behaviour possible or facilitates it.

Motivation is an aggregate of mental processes that energise and direct behaviour

Behaviour is individual human activity that involves co-ordinated contraction of striated muscles controlled by the brain.

Physical capability is capability that involves a person's physique, and musculoskeletal functioning (e.g. balance and dexterity).

Psychological capability is capability that involves a person's mental functioning (e.g. understanding and memory).

Reflective motivation is motivation that involves conscious thought processes (e.g. plans and evaluations).

Automatic motivation is motivation that involves habitual, instinctive, drive-related, and affective processes (e.g. desires and habits).

Physical opportunity is opportunity that involves inanimate parts of the environmental system and time (e.g. financial and mterial resources).

Social opportunity is opportunity that involves other people and organisations (e.g. culture and social norms).

Further reading:

- https://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-6-42
- https://social-change.co.uk/files/02.09.19_COM-B_and_changing_behaviour_.pdf

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