Physical activity for the healthy over 65s
Donna Tootell

Despite the accepted benefits of exercise, approximately 1.8 million deaths per year can be attributed to physical inactivity (World Health Organisation 2009). The World Health Organisation (2009) has recognised that without the necessary action being taken this figure could increase by as much as 17% by the year 2015. In England alone, the Department of Health (DoH) (2004a) estimated that the annual cost of physical inactivity amounted to £8.2 billion. Increasing physical activity is fundamental in lowering these figures and achieving the targets set out in a number of government documents. As an ageing society, a high proportion of these rising costs are incurred through the treatment of older people (DoH 2004a). Evidence has shown that there is a causal connection between inactivity and long-term conditions, such as cardiovascular disease, stroke and diabetes (Kohl 2001), all of which have been shown to have a greater incidence in the older person. The National Service Frameworks for Coronary Heart Disease (DoH 2000) and Diabetes (DoH 2007) were introduced to set standards of care to reduce the risk of developing such diseases. However, rather than promoting disease prevention, most of the targets set for increasing physical activity appear to be treatment orientated and focus on disease management. The introduction of the National Service Framework for Older People (DoH 2001b) appears to try and resolve this. Standard eight of this paper concentrates on seeking ways to extend the life expectancy of the healthy older person. Although dated, Munro et al. (1997) support this aim and believe that physical activity for the over 65s could be a cost effective way forward in realising this. Understanding the potential role physical activity may have on the ageing process is therefore crucial in developing an exercise programme for this client group.

Ageing has been associated with a decrease in muscle mass and strength, both of which can have a significant impact on the carrying out of everyday activities. Many studies have discussed the positive effect of physical activity in these areas (Keysor and Jette 2001; Chodzko-Zajko et al. 2009). However the diversity of the programmes reviewed makes it difficult to understand which type of exercise has the most effect on them. Despite this, there is sufficient evidence to evaluate the most promising areas of benefit for the healthy older adult.
Sedentary people may lose up to 40% of their muscle mass over their lifetime; age related sarcopenia normally begins in the 5th decade of life (Deschenes 2004). Simultaneous losses in muscle strength may also be seen as a result. But this deterioration has numerous consequences, not only relating to muscle strength. Skeletal muscle is the largest disposal site of ingested glucose, a large site of lipid oxidation and one of the largest contributors to resting metabolic rate. This means a possible decrease in the ability to lift loads and a decrease in the ability to perform the activities of daily living (Sahlin et al. 2007). Sarcopenia has the potential to greatly lower the quality of life of the older person and the prevention of this progressive decline in muscle wasting is crucial. Consequently, the development of strength and hypertrophy in the elderly is of great importance. One way this can be achieved is through resistance training.

Phillips (2007) concurs with this and goes on to say that resistance exercise involving the main muscle groups, although proven to promote strength and endurance, may also impart some of the metabolic benefits connected to aerobic exercise. Improved glucose transport, increase in oxidative potential and increased efficiency between energy demand and oxidative ATP (adenosine triphosphate) supply may, additionally, be seen as a result of resistance training. One particular study carried out by Chilibeck et al. (1999) contradicts the findings in this paper and indicates that an adaptation to resistance training may actually include a dilution of muscle mitochondria or reduction in oxidative potential. However, the majority of studies carried out support the initial findings and report an increase in muscle oxidative capacity (Tang et al. 2006). This means that skeletal muscle’s aerobic function during muscular contractions may significantly improve, ultimately having the potential to increase the older person’s ability to perform activities of daily living.

The resistance programme used by Henwood and Taaffe (2005) strengthens this theory. These sessions consisted of a 10 minute warm up, as used in Appendix 1, followed by 3 sets of 7 different exercises, such as bench press and shoulder press. A 10 minute cool down, as seen in Appendix 1, was also undertaken. Targeting of specific muscle groups, though, was seen in a gym environment and may not be appropriate for an elderly population who possibly need to focus more on functional activities. Indeed, Whitehurst et al. (2005) explore the beneficial adaptations gained by the older adult after completing a functional task resistance exercise programme. Significant improvements were seen in the assessment of daily activity performance, indicating that functional task strength exercises may have an
important role in helping older adults maintain an independent healthy lifestyle. Fiatarone Singh et al. (1999) agree that even though neural control of muscle and the number of motor units may remain unchanged, the adaptation to this ‘overloading’ of muscle causes metabolic and structural changes which may compensate for the strength losses and atrophy seen in ageing. They argue that a resistance exercise programme, lasting 2-3 months, may increase muscle strength by as much as 150%. This indicates the huge potential of strengthening programmes may have for the elderly population. More research is needed however as smaller gains in muscle strength were seen in women, which could suggest a possible hormonal or nutritional influence on the results. In contrast Roth et al. (2001) found no differences between men and women, though variations in measurement techniques and training programmes may account for the disparity seen in this paper.

The American College of Sports Medicine (ACSM) (Chodzko-Zajko et al. 2009) recommend that, to achieve the most beneficial results, correct loading during resistance training must take place. This can be achieved in several ways: i.e. increasing load based on a percentage of 1 repetition maximum (RM); increasing load on a targeted repetition number or increasing loading within a particular zone. Exercises in Appendix 1 refer to the older person training by increasing loads between 8-12 repetitions. This has been shown to be most effective in maximising muscular strength in the older ‘novice’ individual (Candow and Burke 2007). The main principle behind this is to provide an overload stimulus which will evoke hypertrophy. The external resistance is normally of a sufficiently high enough load, so that muscle repetitions are reduced. Once RM has been reached, muscular fatigue becomes evident and contraction of the muscle is no longer possible. For the older adult carrying out resistance exercise, rest periods of 2-3 minutes are therefore encouraged. This allows the body time to recover from this fatigue (see Appendix 1). Behm et al. (2002) support this and conclude that muscle activation and temporal twitch properties did not recover within this period of time and for optimal benefits to be seen this needs to occur. Even though the mean age of the 46 subjects used in this study was only 32 years, a very high reliability and validity was shown with the tibial nerve and femoral nerve stimulations.

Healthy older adults have also shown the ability to adapt to low -moderate intensity cardiovascular training and results reveal that many health outcomes can be achieved with moderate levels of this type of exercise (Chodzko- Zajko et al. 2009). Aerobic training appears to have an impact on the body’s ability to control multiple metabolic activities. These
include insulin resistance and the preferential use of fat as a muscular fuel during sub-maximal exercise. These changes, though, seem to depend on the intensity of training. Unfortunately the lack of research describing high intensity aerobic training in the elderly population made comparisons difficult to make. Seals et al. (2008), however, recommend that three to four months of moderate intensity aerobic exercise can show beneficial cardiovascular adaptations in the older adult which are evident both at rest and in response to sub maximal exercise (see Appendix 1). This was demonstrated with participants having smaller rises in systolic and diastolic blood pressures during exercise and a lower resting heart rate. Cardiovascular training may be seen therefore to offset the arterial stiffness which may occur as a result of resistance training and the natural aging process (Cook et al. 2006). Most of the studies reviewed during this paper were conducted over a 12 week period as in Appendix 1 and results were very encouraging (Vreede et al. 2005; Seals et al. 2008). There was an obvious lack of longer-term studies carried out and this was noted as a gap in research at present.

As recently stated there is substantial evidence to support the importance of physical activity in maintaining good health for the older person. Yet there seems to be little evidence defining the optimal quantity of physical activity needed to produce the improvements necessary to maintain these levels. Objective methods of assessing physical activity would help to address this problem. One particular measurement used regularly is the Borg Scale. This is a simple rating of perceived exertion (RPE) (Borg 1998). In terms of its reliability, studies have examined correlations between RPE and heart rate, lactate concentration, %VO2 max, ventilation and respiration rates. Although there appears to be an overall correlation between the RPE scores and the above mentioned criteria, there does seem to be inconsistency. This was more noticeable when variables such as sex of the subject and exercise type were taken in to account. Ventilation and respiration rates, however, do seem to have a stronger correlation and as a means of assessment can be easily understood by an elderly population (Chen et al. 2002). By using the Borg scale in this way, as shown in Appendix 1, it can be an accurate reflection of assessing exercise effort and consequently the level of intensity needed to achieve health benefits.

The 6 minute walk test (6MWT) which has been chosen in Appendix 1 is another objective evaluation of functional exercise capacity. Rather than relying on a patient’s recollection or inaccurate estimations by asking how far they can walk or how many flights of stairs they can
manage, this is an objective measurement of the distance walked during a defined period of time. Solway et al. (2001) conclude that this test is easy to administer, needs no exercise equipment and is more reflective of the activities performed daily by all people. The 6MWT does not however provide specific details of each particular bodily system involved in the exercise activity, though this is not necessarily needed when evaluating healthy older adults. This test is more concerned with assessing the sub maximal level of functional capacity and since most activities of daily living are performed at this level, the 6MWT may better reflect this. Although the exercise group is for healthy older adults, due to the varying ages of the chosen clients, each person may be at a slightly different fitness level. This test is useful as the client determines the intensity of this test and may slow down or rest as necessary.

Changing the levels of sedentary behaviour in the older person and how to provide the above exercise programmes are further challenges faced by the government and exercise providers. The National Institute for health and Clinical Evidence (NICE) (2006) have produced guidelines which recommend the four most commonly used interventions. These include: brief interventions in primary care, exercise referral schemes, pedometers and community-based exercise programmes for walking and cycling.

‘Brief interventions’ details how practitioners in the primary care setting should identify the inactive individual and give them advice on how to lead a healthier lifestyle. Advantages of using the brief intervention approach are that a qualified person is then able to decipher which individuals are able to participate in exercise, taking in to account other medical conditions and factors which may be present. General practitioners, due to the nature of their profession, have normally been the first point of contact to identify those most in need and offer help and encouragement. This is possibly set to change due to the expanding culture of ‘self referral’ schemes. Physiotherapists, whose aim is to promote health and well being and whose four pillars of practice include ‘exercise and movement’ may be in the best position to do this (The Chartered Society of Physiotherapy 2009). Having the knowledge in exercise provision and clinical practice may increase the confidence of the identified individual. Graham et al. (2005) support this theory and suggest that health advice provided by a health professional could have a positive influence on people in the behaviour change cycle. In addition, the older person is perhaps more likely to seek medical advice for health concerns and so may be in a better position to be identified and referred on to the relevant programmes
such as community based walking/cycling courses, pedometer schemes or exercise referral schemes (Cardol et al. 2005).

Exercise referral is a rapidly increasing intervention which is being used to deliver physical activity to the population. Evidence to show its effectiveness though is sparse (Dugdill et al. 2005). In particular, the trend in exercise referral schemes appears to be to measure their success by the number of people participating in the actual schemes themselves rather than a more critical evaluation of the contents and lasting results (Hillsdon et al. 2004; Hardman and Stensel 2003). This highlights gaps in research such as long-term adherence rates and participants’ experiences of the activity programmes put in place. Further studies using appropriate evaluation measures are required so that programmes are assessed and constantly improved to ensure their effectiveness.

The National Quality Assurance Framework for Exercise Referral Schemes (DoH 2001a) has been developed to assist with this task. The key issues with this document are that although evaluation measures are recommended, the proposals remain quite vague. The health professional may as a result prefer to use physiological related evaluation methods as these may appear to give more tangible results. The more qualitative psychological outcome measures could possibly then be disregarded as not as important. These however are vital when considering behavioural change and adherence rates. This possible omission may become more apparent when dealing with elderly people who have developed their lifestyles over a long period of time and who may struggle to change their behaviour. Quality of life measures allow us to focus on the client’s perspective of the intervention or exercise programme and gain insight in to how to possibly alter their habits (Drewnowski et al. 2003). In particular the SF-36 questionnaire chosen in Appendix 1 is a generic measure and, if used before and after the exercise programme, can tell us whether the sessions have been effective and whether improvements have been seen. Its uses are two-fold both for the clinical setting and for quality improvement. A broad multidimensional quality of life measure such as this may be more effective and responsive in this situation, as specific disease-related outcomes are not necessary in this named client group. Using the questionnaire in this way will help identify the client’s own preferred outcome goals.

One recent government document, ‘Choosing activity: a physical activity action plan’ (DoH 2005) also deals with the possible barriers to exercise that many people put forward and
outlines proposals which could be used to encourage people to lead healthier lifestyles. This publication consolidates all the pledges relating to physical activity set out in the ‘Choosing Health: Making Healthier Choices Easier’ White Paper (DoH 2004b). However, although the document recognises the importance of physical activity for the older population, the reference made to it is small. Targeting more community based activities such as exercise groups, rambling clubs or swimming classes could have been researched. This would not only have tackled the issue of promoting physical activity but also the growing problem of isolation which many older people encounter (Cattan et al. 2005).

Whilst this paper is extremely detailed in its structure, some of the suggestions used in support of these ideas do not take into account other factors which may influence actual physical activity levels. In today’s environment a major concern is the increasing levels of traffic. The associated fear of accidents, pollution and traffic fumes can preclude many people from participating in exercise within the community, especially the more vulnerable such as the elderly. An example put forward was by reducing traffic in one area, this may increase the number of people walking or cycling in that area. This does not consider the possible associated increase in traffic which may occur elsewhere as a result. A reduction in the number of people walking or cycling here may then be seen. Improving public transport may be a solution to this problem (Department for Transport 2008). Government needs to give local authorities the power and funding to ensure increased quality of service. By doing so, more people who would otherwise use their cars, may opt to use buses and trains as their alternative, hopefully creating a safer, more pleasant environment for the older person to be active in.

In conclusion, a community based programme led by a physiotherapist may be the most appropriate way to provide physical activity to this particular population. As stated earlier this could instil confidence and increase adherence rates and compliance as a consequence. Resistance exercise has shown that it can impart not only physiological improvements but also psychological and functional benefits for the older person. Many of the changes seen with resistance exercise correlate strongly with those seen with aerobic type exercise. However, insulin resistance, weight control and arterial stiffness, which may occur as a result of resistance exercise and the natural aging process may better be tackled with cardiovascular exercise. A mixture of these types of exercise may therefore be necessary. Methods of measuring the levels of activity needed to maintain these improvements are crucial and the
outcome measures chosen need to be reflective of the client group indicated. Resistance and aerobic types of exercise may not only help to maintain and improve functional ability for the healthy older person but also demonstrate the added potential for reducing the risk of chronic disease.

References


**APPENDIX I**

**Group / Home Exercise Programme for Healthy over 65s**

The exercises and information below are guidelines only. They are based on a healthy over 65 adult. However, each individual’s fitness level may be slightly different and the ‘ranges’ for frequency / volume / intensity take this in to account.

This is to be an approximately one hour session with a physiotherapist and also a guide to home exercises which can be carried out. The session is held once per week as a class, run over a 12 week period.

Assessment measures used: Borg rate of perception scale, 6m walk test, SF-36 questionnaire. Warm up and cool down - 10 minutes of light aerobic exercise such as walking/ marching on the spot.

- Frequency- 1x week class / 1-2 times at home
- Volume- 1-3 sets of 8-12 repetitions
- Intensity- 14-15 on Borg scale
- 2-3 minutes rest interval between each exercise
- A choice of walking or exercise bike to be used in between the strengthening exercises below. Depending on the individual, this would be 2 minutes of aerobic exercise, working at a moderate intensity (12-13 on Borg scale).
Step ups (on stairs or step) – everyday activity of climbing stairs / steps.
Stand at bottom step and step up with right foot. Bring left foot up next to right foot. Step back down. Carry out all reps initially by leading with right foot and then swap to lead with left. Repeat as above.
Progress above exercise when able by increasing no of repetitions and sets. Frequency of exercise may also be increased. Client may hold hand weights to increase difficulty (1-2lb).

Chair squats – most reaching, lifting and bending movements involve an element of squatting. Also sit to stand is functional activity.
Stand in front of chair with feet and knees shoulder width apart. Sit down and then stand up without using hands as an aid. Place hands on thighs or crossed over chest.
Progress above exercise by holding hand weights (begin with 1 to 2 lb weights), or increasing no of reps/sets or frequency.

Knee lifts holding a ball – as if stretching to place an item on to a high shelf (removing one foot off the floor to do so).
Hold a light-weight ball straight up above your head using both hands. As you bring your arms down, lift one knee up to waist level, touch ball with knee. Repeat with other leg.
Progress by increasing weight of ball used, increasing speed of movement (whilst maintaining control) or increasing no of reps/sets/frequency.

Wall press up (or place hands on kitchen counter, if at home).
Stand at arm’s length away from wall. Place your hands on the wall at chest height, fingers upwards. Keeping your back straight and tummy tight, bend your elbows lowering your body with control towards the wall. Press back to starting position.
Progress by standing further away from wall or increasing no of reps/sets/frequency.

Chest squeeze using ball – as if putting an item in an oven or fridge.
In standing, maintain good posture (back straight, abs in). Hold ball at chest/waist level and squeeze the ball with the palms of your hand. Whilst squeezing the ball, slowly move ball out in front of you remaining at chest level, until elbows are almost straight. Continue squeezing ball and slowly bring ball back to chest.
Progress by increasing reps/sets/frequency or weight of ball used.
Triceps extension – as if throwing an item overhead.
In sitting or standing, hold a weight in your right hand (1-2lb). Bring up above your head, directly above your shoulder. Make sure your palm is facing the front. Bend the elbow, lowering the weight slightly behind your head. Slowly bring the weight back up and continue until completed reps. Repeat with other arm.
Progress by increasing weights used or reps/sets/frequency.

Biceps curl – as if carrying a bag of shopping.
In sitting or standing, hold a weight (1-2lb) in your right hand. Bend your elbow. Bring up towards your shoulder. Make sure your palm is facing upwards. Slowly bring the weight back down, but do not fully straighten the arm. Keep elbows in place during the exercise. Continue until completed reps. Repeat with other arm.
Progress by increasing weights /reps/sets/frequency.