

# A strength training programme health and social care essay



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## **Considerations for a strength training programme for the older adult**

Current research indicates that muscle strength and muscle mass decreases by 20% to 40% between age 20 and age 65 (Astrand, 1968; Fitzgerald, 1985; Heath, 1988). These reductions have been attributed to a reduction in fast twitch muscle fibres (Type II), low levels of creatine excretion and apoptosis of alpha motoneurons within the spinal cord (Astrand & Rodahl, 1986; Stamford, 1988; McComas, 1995). The implications of this loss is an increased vulnerability to certain chronic diseases such as osteoporosis and a concurrent development of functional limitations to activities such as stair climbing, standing up and doing basic task that require a threshold of strength (Seguin & Nelson, 2003). Other factors associated with advanced years (> 70) include; reduced static and dynamic balance, reduced walking speed, poor mobility and gait disorders, reduced reaction time, acute illness and reduced peripheral vision (Rogers et al., 2003; Nevitt et al., 1989).

Interestingly, research in the last decade has revealed that these physiological decrements could be combated with strength training (Topp, Milesky, & Bawel, 1994; Brown, McCartney, & Sale, 1990; Roubenoff & Hughes, 2000). For example, Brown et al. (1990) provided evidence to show that a six-week strength training programme could improve the maximal load capacity and dynamic strength of older adults ( $> 60$ ). Similarly, Frontera and colleagues (1990) also demonstrated that elderly men that partook a 12-week progressive strength-training programme increased their lower limb strength by 100%. According to Brown et al. (1990), the gains in strength observed is similar to that of younger adults that participates in strength training. Furthermore, strength training has been shown to be an effective and safe way of improving quality of life and functional abilities during activities of daily living (ADL) (Nelson et al., 2003). In fact, Singh, Clements and Fiatarone (1997) was able to illustrate that depressed elderly men and women that undertook strength training alone for ten weeks noticed improved quality of sleep, and reduction in all depression measures as measured by the Geriatric depression scale. Thus, all these studies demonstrates the importance of strength training for older adults and have attributed decrease in strength and poor quality of life to a sedentary lifestyle rather than an irreversible sign and symptoms of aging. A critical question when prescribing a training programme for an older adult ( $> 70$ ) is; which strategy is the most appropriate therapeutic intervention that will prevent functional limitations in the long term? Firstly, it has been advocated that strength training programmes for older adults should follow the same training principles of younger adults and athletes (McArdle, Katch, & Katch, 1991). These include the principle of training progression, law of specificity, <https://assignbuster.com/a-strength-training-programme-health-and-social-care-essay/>

overload principle and periodization. However, unlike the younger adults, the older individual is confronted with many barriers such as disability due to chronic conditions, low self-efficacy, negative beliefs about the benefits of strength training, fear of injury, limited access to transport and socio-economic disadvantage and negative attitudes from family and friends (Booth et al., 1997; Bruce, Devine, & Prince, 2002). This means practitioners must be able to identify their readiness to change habits and incorporate interventions that will result in health benefits, increased mobility, long-term exercise maintenance, and better quality of life. Before commencement of an exercise programme, the American College of Sports Medicine (2000) recommends that a thorough medical examination and appropriate stress testing be done. Thus, some form of screening and consultation with the participant must be carried out and chronic conditions critically evaluated to ensure successful exercise programme. Please refer to table 1 for a suggested model.

## **Table 1**

Incorporating all these factors (table 1) when prescribing exercise interventions could result in long-term adherence and strengthen the efficacy of the programme. Logically, the main training goal of an older adult (> 70) may be to improve functionality, muscle strength and prevent acute or chronic diseases. The consequences of training-induced variations on the inter-muscular and intramuscular coordination, determines the efficacy of training adaptations and have the capability to improve or hinder the performance of a related movement task (Caroll, Riek, & Carson, 2001). For example, based on the law of specificity, the more closely an exercise

resembles a movement task, the more the transfer of muscle activation reinforced towards that particular task. On the other hand, the less the resemblance, the lower the transfer of muscle activation to that task (Caroll et al. 2001). This means that the exercise prescribed should be similar in biomechanical requirement to that used in ADL to improve functionality. Furthermore, when observing the gait patterns of the elderly, it will be noted that the elderly exhibit less hip extension with a flexion posture. Therefore, training programmes should focus on increasing strength in the posterior chain if upright gait is to be maintained (Kerrigan et al., 2000). Literature points out that, to achieve any neural or muscular adaptations, strength-training programmes should be gradually increased to create loads that will stress the muscles beyond what it is accustomed to (Fleck & Kraemer, 1987). However, whilst strength training in the adolescent is aimed at increasing bone mass and strength (Chow et al., 1987), in the older adult it is usually aimed at reducing the rate of bone loss (Rikli & McManus, 1990). This implies that training programmes should aim at maximising and maintaining bone strength as well as ensuring the bone is not overloaded. Thus, it is imperative to include activities such as walking and swimming to enhance mobility and coordination concurrently with strength training. Please refer to table 2 for a suggested guideline for joint and tissue loading.

## **Table 2.**

From the above model (table 2) a question still remains as to what the optimal strategy is for the progression of intensity, frequency of training and avoidance of injury? For example, it could be argued that the American College of Sport Medicine (2000) recommendation of two to three days per

week strength training could be burdensome for the older adult and could result in non-compliance. In addition, increased strength levels and high intensity training has been shown to increase risk of knee osteoarthritis and decrease the ability to independently activate the fingers due to increased levels of neural overflow in the muscles (McAlindon et al., 1999; Shinohara et al., 2002). Nevertheless, McGill (1998) in his review of low back injury, encouraged strength coaches to place more emphasis on endurance, rather than strength, when prescribing training programmes. At this point, it must be noted that moderate increases in intensity that stresses the body but do not over load it may still be beneficial in combating functional limitations (Elliot et al., 2004). Another physiological consequence of aging is the disproportionate atrophy in type II muscle fibres and the decreased contractile velocity of single muscle fibre as a result of an aging neuromuscular system (Tomlinson & Irving, 1977). These deficits influence the rate of force development and causes changes in the central nervous system during muscle function (Galganski et al., 1993). Muscle co-activation has been shown as the preferred strategy employed by the elderly when there is uncertainty about a task (Spiegel et al., 1996). This co-activation pattern ensures that the correct muscles are active to maintain stability and produce torque. Therefore, it is important to incorporate recreational and locomotive activities to concurrently enhance strength and coordination. For example, Carolan and Cafarrelli (1992) noticed a reduction in co-contraction of the hamstrings and quadriceps muscles when only leg flexion and extension strength training was adopted. Due to a rather high risk of developing low back pain during advanced age, it is recommended that the training programme focus on improving the endurance and strength of the

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core musculature using various exercises to enhance physical function, reduce joint stiffness and relax elastic structures (McGill, 1998; Pollock et al., 1989). For optimal physical function, the literature suggests a combination of both strength and endurance training to be included in the training programme. This is because endurance training has been advocated as effective in improving aerobic power and cardiovascular function in the older adult (Wood et al., 2001). Similar to young adults, older adults also exhibit gains in myofibre size following strength training (Hunter, McCarthy & Bamman, 2004). However, the amount of muscle mass gained is predetermined by the degree by which each myofibre grows and the number of myofibre present in the muscle. An increase in hypertrophy is largely due to greater adaptation of slow-twitch muscle fibres (Rice et al., 1993). The consequence of this is an increased expression of type I myosin heavy chain and an overall slow muscle contractile properties (Rice et al., 1993). Power output has been reported to decline rapidly than strength with aging (Metter et al., 1997). To increase power, the mode of training has to be specific. Therefore, it is imperative to incorporate low-resistance, high velocity contractions that include free weights, body weights, machines and elastic bands. In addition, the training programme should place an emphasis on a proper exercise form and technique, and avoid complex motor skills until a good threshold of strength and muscle coordination has been established. To encourage adherence, it is recommended that the frequency of sessions to be at least once a week, and include home based exercises that incorporates functional tasks like stair climbing, sitting and standing (Taaffe, 2004).

Furthermore, Hunter and colleagues (2004) also suggested that older women may train twice a week and include a variable intensity exercises to <https://assignbuster.com/a-strength-training-programme-health-and-social-care-essay/>

maximise recuperation between bouts. This frequency can be reduced to once every two weeks after approximately six months of training to maintain muscle function (Taaffe, 2004). Finally the training objectives of the older adult must be identified and the most appropriate exercises chosen for each situation based on individual variations such as genetic predisposition, medical history, prior experience to exercise, and gender. Loading patterns should stress both damaged tissues and healthy tissues to ensure tissue remodelling whilst avoiding excessive loading to other structures. Thus, strength-training programme should make a positive impact and importantly have a balance between the progression of intensity and the utmost concern for safety.