

## **Improving physical abilities and the most efficient methods in adults over 40 years old.**

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### **Abstract**

Only a small percentage of adults engage in regular physical activity, which means a decline in quality of life and a very poor result compared to Europe (Osiński, 2013). The purpose of this literature review is to find the most contemporary methods from the most ranked scientific works on the improvement of physical abilities and the most efficient methods in adults over 40 years old. Digital databases such as Scopus, Medline, JStore, Embase, Cochrane Central, PsycInfo, Scholar, and SPORTDiscus were used in this literature review. Inclusion criteria are: individuals must be healthy and average age at least 40 years old. Many other studies such as (Skelton et al., 1994; Foldvari et al., 2000; Bean et al., 2007) report that physical functions are more related to muscle power than to muscle strength or mass. Strength training has many benefits on physical function in older adults compared to traditional strength training (Tschopp et al., 2011; Da Rosa., 2019). Harmonization or proper use of variables such as exercise selection, breaks, number of sets, number of repetitions, frequency affect the increase in the level of muscular fitness. Strength, muscular endurance, muscular strength and muscular hypertrophy are the characteristics that should be trained (Ratamess et al., 2009). While in an all-inclusive program resistance training improves the cardiovascular system (Fleck. 1988), limits the risk of coronary heart disease (Goldberg. 1989; Hurley & Kokkinos, 1987), helps prevent osteoporosis (Layne & Nelson. 1999), removes the risk of diabetes (Miller et al., 1984), promotes maintaining a healthy weight and losing excess weight (Evans. 1999), reduces the risk of cancer in the spine (Koffler et al., 1992), helps in psychological/mental well-being (Ewart. 1989) as well as improves dynamic stability and maintenance of functional capacity

(Evans, 1999). In conclusion from the study of Balachandran et al. (2022) found that strength training leads to improvements in physical function more than traditional strength training.

*Keywords:* fitness, aging, power, strength, exercises

### **Introduction**

Only a small percentage of adults engage in regular physical activity, which means a decline in quality of life and a very poor result compared to Europe (Osiński, 2013). The ability to perform activities of daily living (ADL) is vital to living independently. Age-related loss in muscle strength can compromise (Hairi et al., 2010) this ability and lead to disability. For example, the progression of muscle weakness limits the ability to grasp an object which further hinders the ability to open a jar. Experiencing difficulty in ADL and relying on others is not only associated with reduced quality of life (Hellstrom et al., 2004) but also increased likelihood (Gaugler et al., 2007) of long-term nursing (staying at home).

As a result, the population of the third age will dominate, which will be a serious problem for the economy of the state due to poor health. Therefore, maximum efforts are needed to improve the quality of health and life of the third-age population. Szukalski (2011) pointed out that the decrease in income as a result of the aging of the population means the need to increase the professional activity of the elderly. But this need has other disadvantages such as low physical performance as a result of involitional structural changes in the internal organs, the respiratory system, the cardiovascular circulation and the passive and active motoric system (English & Paddon-Jones, 2010).

As a result, there is a need for health promoters, the education system and the media to encourage society about regular health education. When encouraging people to work long hours, it should be accompanied by the right physical condition. This requires a good balance of the scope of professional activity and the absence of people at work. The citizens of the Scandinavian countries and the Netherlands are in the best physical condition (KMPG, 2012) stating that 50-70% of them admit that they perform physical activity at least once a week. This percentage also includes people after the age of 50, noticing lower expenses for the treatment of the elderly. Studies show that the citizens of the Scandinavian countries and the Netherlands are in the best physical condition (KMPG, 2012) stating that 50-70% of them admit that they perform physical activity at least once a week. This percentage also includes people after the age of 50, noticing lower expenses for the treatment of the elderly.

The focus on each training component depends on the tasks each training period has. The realization of the performance has a basis which is physical preparation. The higher the

physical preparation, the more effective the technical, tactical and psychological components will be. The insufficient level of PF (physical preparation) reflects in the use of human potential during sports performance, the technique is broken and fatigue appears quickly. In the training components, physical preparation is like a foundation stone on the basis of which the other components "rise". The time required to create a state of higher adaptation depends on the complexity of the skill and on the athlete's physiological and psychological difficulties. The more difficult and complex the sport, the longer the necessary training period will be to promote neuromuscular adaptation.

Regardless of age, a suitable physical activity will bring about the necessary changes in the body (Wernbom et al., 2007). A suitable physical activity is strength and endurance training. According to forecasts, the number of senior citizens is expected to double by 2050 to approximately 1.5 billion (Werner, 2010). However, there are some intervention programs that help slow down the decline in physical functions. One of these programs is strength training to prevent or delay movement limitations in elderly individuals. According to Chmelo et al., (2015) strength training has been recommended to improve physical functions in elderly individuals. However, it is muscle strength that has emerged as a key factor in physical function. Researcher Reid et al., (2014) prove that it is muscle power that decreases at a faster rate compared to muscle strength during the aging period.

The purpose of this literature review is to find the most contemporary methods from the most ranked scientific works on the improvement of physical abilities and the most efficient methods in adults over 40 years old.

### **Methods**

Digital databases such as Scopus, Medline, JStore, Embase, Cochrane Central, PsycInfo, Scholar, and SPORTDiscus were used in this literature review. There was a restriction on the year of publications (last 10-15 years). Inclusion criteria are: individuals must be healthy and average age at least 40 years old. The resistance training intervention program included machine-related exercises, body weight exercises, ergometric bicycles, elastic belts, etc.

### **Results**

Researcher Reid et al. (2014) prove that it is muscle power that decreases at a faster rate compared to muscle strength during the aging period. Many other studies such as (Skelton et al., 1994; Foldvari et al., 2000; Bean et al., 2007) report that physical functions are more related to muscle power than to muscle strength or mass. Strength training has many benefits on physical function in older adults compared to traditional strength training (Tschopp et al., 2011;

Da Rosa., 2019). These studies include plyometric training with exercises such as (CMJ and depth jump) (Miszko et al., 2003; Ramirez-Campillo et al., 2014). According to Vetrovsky et al. (2019) unlike power training which uses slow controlled eccentricity, plyometric training uses fast eccentricity. Previous studies examining the effects of strength training have used different interventions. As an example, standing strength training exercises were used for the experimental group while seated strength training exercises were used for the control group (Bean et al., 2009). The inclusion of many intervention programs makes it difficult to understand the impact that strength training has on physical function.

Some types of strength training require a special methodology (Stefaniak, 2006; Zajac et al., 2010). Before starting a training program you must apply a preparatory cycle to adapt to the subsequent program. This preparatory cycle can last from several weeks to several months and has a health and self-educational value to encourage people to engage in physical activity. Resistance training induces biochemical changes in skeletal muscle and thus improves whole body functions (Wernbom et al., 2007). Resistance training causes an increase in the activity of collagen proteins, which affects the increase in muscle turnover (Burd et al., 2010). The study by Davis et al. (2008) prove that the combination of strength training and aerobic training for 11 weeks improves endurance and strength. The high-intensity training group changed body composition more compared to the low-intensity training group. Many literatures suggest the use of resistance exercises. In conclusion, the study of Davis et al. (2008) proved that the combination of strength training and aerobic training for 11 weeks improves endurance and strength.

In the study of Marques et al. (2011) resistance training produced positive changes in bone density (in women), fat reduction and improved balance. Also the researcher Borer. (2005) confirm changes in the inhibition of osteoporosis after the application of resistance training. Researchers Willis et al. (2012) and Ormsbee et al. (2009) proved that isometric exercise improves resting metabolism.

The aim of the study of Kalwa et al. (2019) is to find a suitable method to inhibit the involutionary processes as well as to improve the physical abilities of people over 40 years old. Also, this work aims to determine the loads and the dose of physical efforts, which must be looked at carefully to avoid injuries and to eliminate the negative effects of resistance training. 178 adults, 92 of whom were women and 86 men aged 40-61, participated in this study. They participated in an 8-month training program. The participants in the study were divided into two groups - group 1 (51-61 years old) and group 2 (40-50 years old). Before applying the strength program, a preparatory training cycle was carried out. The training was carried out 3

times a week. Two exercises were performed for each major body part. 15 minutes of warm-up and 60-80 minutes of strength training as well as 10 minutes of stretching. The final results from this study show that the exercise program provides beneficial effects in the fight against the symptoms of aging. The data showed changes in body composition and physical fitness in both groups but the group where the higher intensity exercise was applied had greater changes. Improved fitness was seen in both women and men. The greatest changes were observed in physical fitness.

The meta-analysis of the study of Balachandran et al. (2022) evaluated the impact of strength training on physical functions in the third age. A small number of findings showed that strength training improved physical function more than traditional strength training. The above study only evaluated meta-analyses or studies related to strength training without using plyometric exercises. Two other studies were not included in this meta-analysis because the experimental group performed standing strength training exercises while the control group used seated strength training exercises (Bean, 2004).

Also, two other studies were not included in the analysis because they performed CMJ (Miszko et al., 2003), and the second study combined circuit training with strength training (Balachandran et al., 2014).

The study by Balachandran et al. (2022) focused only on strength training without the intervention of other types of training. To assess physical functions, most studies used the GUG test and the chair sitting test. These two above mentioned tests are used in a fast rhythm while the I Timed up and go test is used in a regular rhythm. For the GUG test we observed a mean improvement of 1.85 seconds SD 0.62 while for the chair stand test a greater improvement was observed with 4.3 seconds SD 0.56. Strength training produces an increase in strength in type II muscle fibers independent of age and gender (Claflin et al., 1985, 2011). According to Lexell (1995) the fibers of the second type have a loss during the aging period. As seen the improvement of strength and power is responsible for the limitation of movements (Santanasto et al., 2017). Consequently, the improvement of muscular strength provides a biological basis for the improvement of physical functions. While walking speed, strength and muscle mass are not related. In many studies, the same levels of intensity and volume were used for both groups, so we do not expect to have different results of strength and muscle mass. While studies that showed improvements in walking speed applied walking as an exercise program (Pahor et al., 2014). Adverse effects were minimal in both groups.

## Discussion

It should be noted that some forms of physical activity that may be of particular importance to an aging population (eg, balance training) may not fit this standard definition. This activity can be carried out during leisure or working hours, and surveys of older adults (Harada, 2001) should include both paid and unpaid (volunteer) work. Moderate physical activity does not appear to be sufficient in terms of increasing participation in these activities among older adults (Dunn, Anderson, & Jakicic, 1998). In order to effect long-term changes in behavior, it is necessary to identify, examine and begin to provide information on the barriers to physical activity that affect adults so that they do not become obstacles from the transition from a passive to a physically active one (Dishman & Sallis, 1994). Harmonization or proper use of variables such as exercise selection, breaks, number of sets, number of repetitions, frequency affect the increase in the level of muscular fitness. Strength, muscular endurance, muscular strength and muscular hypertrophy are the characteristics that should be trained (Ratamess et al., 2009). While in an all-inclusive program resistance training improves the cardiovascular system (Fleck. 1988), limits the risk of coronary heart disease (Goldberg. 1989; Hurley & Kokkinos, 1987), helps prevent osteoporosis (Layne & Nelson. 1999), removes the risk of diabetes (Miller et al., 1984), promotes maintaining a healthy weight and losing excess weight (Evans. 1999), reduces the risk of cancer in the spine (Koffler et al., 1992), helps in psychological/mental well-being (Ewart. 1989) as well as improves dynamic stability and maintenance of functional capacity (Evans. 1999). In conclusion from the study of Balachandran et al. (2022) found that strength training leads to improvements in physical function more than traditional strength training. The study evaluated only meta-analyses or studies related to strength training without using plyometric exercises. For the GUG test we observed a mean improvement of 1.85 seconds SD 0.62 while for the chair stand test a greater improvement was observed with 4.3 seconds SD 0.56. Strength training produces an increase in strength in type II muscle fibers independent of age and gender (Claflin et al., 1985). According to Lexell (1995) the fibers of the second type have a loss during the aging period. As seen the improvement of strength and power is responsible for the limitation of movements (Santanasto et al., 2017). Consequently, the improvement of muscular strength provides a biological basis for the improvement of physical functions. According to studies (Fried & Guralnik, 1997; Janssen et al., 2002; Bergen et al., 2014) aging is associated with a decrease in physical functions, loss of physical independence as a consequence and a decrease in the quality of life. The study by Katz et al. (1983) emphasize that the extension of life expectancy must necessarily be accompanied by the good preservation of physical functions. According to

forecasts, the number of senior citizens is expected to double by 2050 to approximately 1.5 billion (Werner, 2010). However, there are some intervention programs that help slow down the decline in physical functions. One of these programs is strength training to prevent or delay movement limitations in elderly individuals. According to Chmelo et al. (2015) strength training has been recommended to improve physical functions in elderly individuals. However, it is muscle strength that has emerged as a key factor in physical function.

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