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Investigation of Physical Fitness According to Gender among Older Adults with Similar Physical Activity Levels

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Abstract

This research aimed to investigate the physical fitness of older adults with similar physical activity levels according to gender. The Physical Activity Scale for the Elderly (PASE) (Turkish version) was used to assess their physical activity levels, and the Senior Fitness Test was used to measure physical fitness based on performance. The Mann Whitney U test was used to compare the non-parametric data between the genders, and the t-test was used for the parametric data. No significant difference was found in age, height and weight between older women and older men ($p>0.05$). There were significant differences in the chair stand test, arm curl test, get-up-and-go test and two-minute step test between older women and older men ($p<0.05$). There were no significant differences in the back-scratch test and the chair sit-and-reach test between older women and men ($p>0.05$). There is a gender-related difference between physical fitness components of men and women with similar levels of physical activity, except flexibility. Older men had stronger arms and legs, better dynamic balance, and better agility and aerobic capacities compared to older women in this research.

Keywords: *older adult, physical activity level, physical fitness*

Introduction

Physical activity level reduces with advancing age, which is linked to a reduction in work activities, the progression of biological age, and a reduction in movement amount inside or outside the house. It is also known that activity levels and exercise habits do not increase maximum life expectancy but do increase functional performance in older adults and contribute to their quality of life (Toraman & Şahin, 2004). Physical activity in older adults is necessary for reducing health problems, making daily activities easier, and for improving the quality of life (Nelson et al., 2007). Physical activity levels display individual differences among older adults (Notthoff, Reisch, & Gerstorf, 2017). According to some research, among the factors affecting the physical activity levels of older adults are previous exercise experience, health status, the presence of situations preventing physical activity, motivation, environment, and relatives and/or neighbours (Lee, 2005).

Physical fitness comprises the necessary physical fitness components (strength, power, flexibility, balance and aerobic capacity) to perform daily activities safely, independently, and without excessive tiredness. Physical fitness appears to have similar correlations with morbidity and mortality as physical activity; however, it provides a stronger estimation related to health (Wannamethee, Shaper, & Walker, 1998; Blair, Cheng, & Holder, 2001; Williams, 2001). Additionally, the risk of death is lower among women and men with high physical activity level and fitness, as well as a weekly energy expenditure of 1000 kilocalories on physical activity or 1 MET (metabolic value); increased physical fitness is reported to reduce mor-

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tality by nearly 20%. An increase in physical fitness reduces early death risk, while a reduction increases the early death risk (Warburton, Nicol, & Bredin, 2006). Globally, women live four to ten years longer than men. Researchers have stated that increased fitness is effective to explain this difference between men and women, along with other social behaviour differences (Spirduso, Francis, & MacRae, 2005). Clear differences between women and men are revealed by physical activity levels (Lee, 2005; Sun, Norman, & While, 2013; Şahin, 2017).

Assessments of physical fitness are not applicable or practical for large population-based research. However, it is possible to perform a more objective assessment, as it is a better determinant. The difference of this research from the other research that this research aims to investigate the physical fitness of older adults with similar physical activity levels according to gender.

Methods

The research was conducted from October 2017 to June 2018 at the Canakkale Golden Years Living Center. The research included a total of 112 older adults: 74 older women and 38 men (65-69 years: n=55, 70-74 years: n=44, 75 years and older: n=13). The study was approved by the Review Board of Committee of the Golden Years Living Center. This research was conducted according to the Declaration of Helsinki recommendations: after the study design was described to the participants, signed informed consent to participate in the study was obtained. The research included individuals attending the centre, without health problems or chronic pain, who independently completed daily living activities without requiring support, who volunteered, were retired or did not have regular work, who participated, for the previous year in breathing exercises, posture training, muscle resistance, balance, flexibility and fall-prevention exercises and who participated in regular activities, such as handiwork, painting, choir, chess or computer courses. To assess physical activity levels, the Physical Activity Scale for the Elderly (PASE) (Turkish Version) was used (Washburn, Smith, Jette, & Janney, 1993; Ayvat, Kılınç, & Kırdı, 2017). To measure physical fitness, the Senior Fitness test battery (including get-up-and-go test, the chair sit-stand test, the back-scratch test, the sit-and-reach test, the arm curl test, and the two-minute step test) was used (Rikli & Jones, 2001). Statistical analysis was performed using IBM SPSS 20.0. An independent samples t-test was applied to the between-gender differences for parametric physical fitness parameters, while the Mann Whitney U test was applied to the non-parametric physical fitness parameters. For all the analyses, 95% confidence intervals are presented, and $p<0.05$ was considered statistically significant.

Results

The research included 74 older women (mean age = 70.34±4.27 years, mean height = 157.88±6.38 cm, mean weight = 72.26±11.83 kg) and 38 older men (mean age = 70.39±4.46 years, mean height = 168.82±6.60 cm, mean weight = 76.45±8.42 kg). There was no significant difference between the mean age, height and weight between the genders ($p>0.05$). The physical activity level in older men was higher than women; however, the difference was not significant (Female = 115.65±42.82, Male = 129.98±67.72, z=-0.793, $p>0.05$, Figures 1, 2).

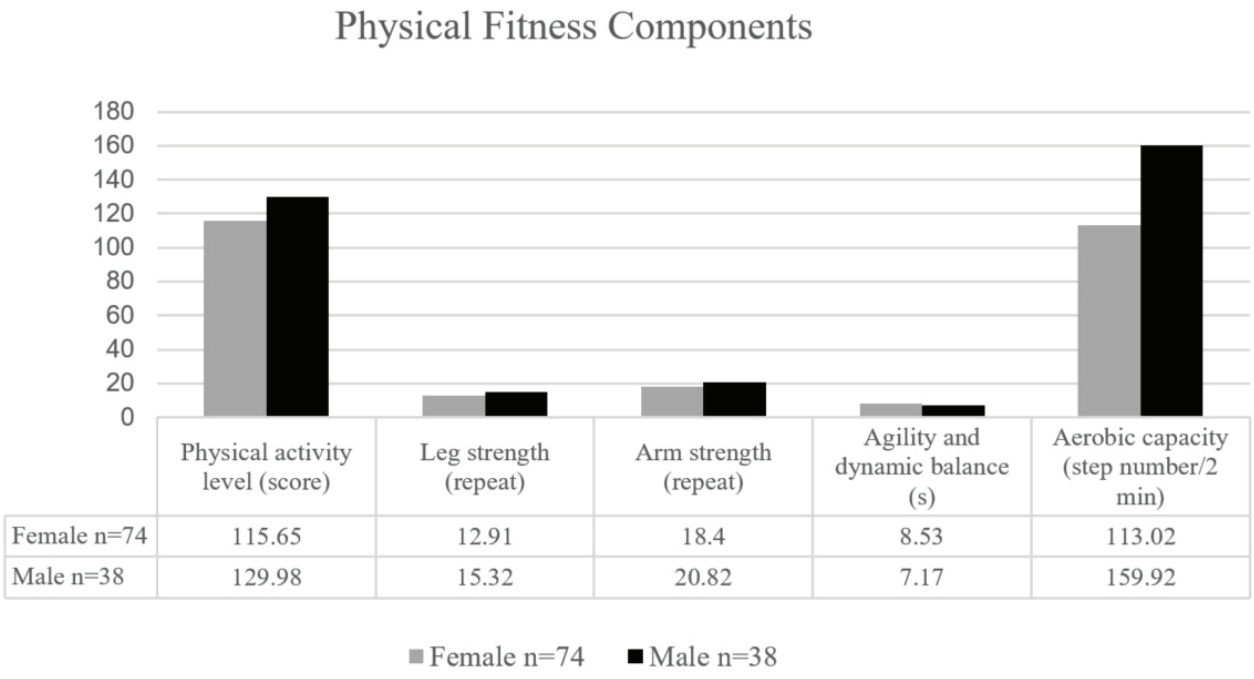
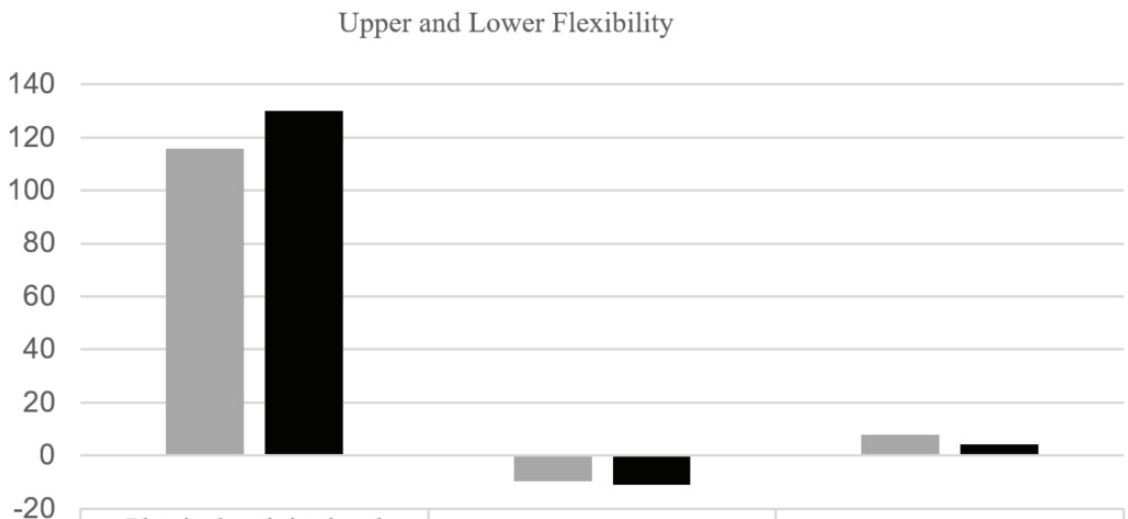


FIGURE 1. Physical fitness components statistically significant between genders

The leg strength (Female = 12.91±3.09, Male =15.32±5.31, p=0.004)*, arm strength (Female =18.40±3.18, Male = 20.82±4.47, p=0.003)*, agility and dynamic balance (Female = 8.53±2.00, Male = 7.17±1.51, p=0.002)* and aerobic capacity (Female = 113.02±54.23, Male = 159.92±50.67, p=0.000)* were higher in men. The differences between means were statistically significant ($p<0.05$, Figure 1).

Upper (Female = -9.79±11.42, Male = -10.85±14.84) and



	Physical activity level (score)	Upper flexibility(cm)	Lower flexibility(cm)
Female n=74	115.65	-9.79	7.98
Male n=38	129.98	-10.85	4.35

FIGURE 2. Physical fitness components and physical activity level with no statistical significance between genders

lower (Female = 7.98±7.61, Male = 4.35±10.69) body flexibility were better in older women; however, there was no significant difference between the means (p=0.702, p=0.059, p>0.05, Figure 2).

Discussion

First, some research shows that older men have significantly higher physical activity levels than older women do (Washburn & Ficker, 1999a) and that older women have higher PASE scores than men do (Schuit, Schouten, Westerterp, & Saris, 1997; Ku, Sun, Chang, & Chen, 2013). In our research, although the mean was in favour of men, the difference between the genders may have been reduced by men engaging with activities outside the home, women engaging with activities within the home and both genders participating in regular physical activities at the centre. When the physical activity total score of older women and men in this research is compared to the other research (Ayvat et al., 2017; Washburn, McAuley, Katula, Mihalko, & Boileau, 1999b; Vaughan & Miller, 2013; Bean et al., 2002; Hagiwara, Ito, Sawai, & Kazuma, 2008), it is similar to some studies but shows lower physical activity levels when compared to others. In their research on cultural validity and reliability, Ayvat et al. (2017) identified the mean PASE score of individuals from 65 to 80 years of age as 121.79±54.71 (Ayvat et al., 2017). The results from their research group of 80 older women and older men are similar to the results of the present paper. However, the limited amount of research using the same physical activity scale in the elderly Turkish population prevents a broad comparison from being made.

The correlation of physical fitness to disease and death rates appears similar to physical activity; however, the assessment of physical fitness ensures a stronger estimation related to health (Wannamethee et al., 1998; Blair et al., 2001; Williams, 2001). The basic aim of our research was to investigate physical fitness according to gender. Accordingly, the leg strength, arm strength, agility and dynamic balance and aerobic capacity between older men and older women were statistically different (p<0.05). Upper and lower body flexibility were better in favour of older women; however, the difference between the means was not statistically significant (p>0.05).

Individuals who preserve their physical mobility by participating in a sport or working in strength-based jobs are better compared to inactive individuals, which supports the view that age-linked reductions in muscle strength are linked to activity amounts and type (Aniansson, Sperling, Rundgren, & Lehnberg, 1983; Frontera, Meredith, O'Reilly, Knuttgen, & Evans, 1988). However, with ageing, strength begins to decline. The changes in strength caused by ageing are affected by the measurement type of strength, the location of the measured muscle groups, physical activity status and diseases. Generally, as the muscle mass of individuals is different, there are differences in strength. As a result, as men have more muscle mass, men are 50% stronger in the upper body and 30% stronger in the lower body compared to women (Spirduso et al., 2005). When physical activity levels are assessed by a survey, though there are no differences between the genders, there are differences in some performance-based physical fitness components. Similar to the literature results, the arm and leg strength of older men was better compared to older women, and the difference between these means was statistically significant (p<0.05). In other words, the difference in leg and arm strength between women and men exists despite women being active.

In their study researching the effect of exercise and detraining on young-older and older individuals, Toraman and Ayçeman (2005) obtained similar results to our study for the arm curl, the chair sit-stand, the back-scratch test, and the chair sit-and-reach test. Positive comparisons may be made

between this research performed on the elderly Turkish group and our research results (Toraman & Ayçeman, 2005). In research investigating the correlation between the income levels and physical fitness of elderly Korean individuals with a mean age of 71.81 years, Ahn and So (2018) stated the sit-stand result for men was 16.94, while it was 15.54 for women. In our research, though the mean age of men and women was 70 years, these values appear to be slightly low (Figure 1).

The duration required to complete the agility and dynamic balance test is significantly correlated with limitations of activities common to daily life and the fear of falling. The get-up-and-go test is used to assess agility and dynamic balance, which are important for activities such as making rapid manoeuvres, getting on buses, working in the kitchen, going to the bathroom or answering the telephone (Rikli & Jones, 2001). This parameter of physical fitness was identified as being higher in older men. This situation may indicate that older women have less capacity to stand rapidly from sitting and make rapid and balanced movements compared to older men. Accordingly, it is possible to say that even though they are physically active, the older women in this group are not as fast as their male peers. In other research, the identified values for older men were 60-69 years (6.41±1.44) and 70-80 years (7.46±1.62) and for older women were 60-69 years (6.67±1.48) and 70-80 years (7.27±1.42). Compared with our older subjects, agility and dynamic balance appear to have similar values, especially for men (Milanovic et al., 2013).

Aerobic capacity reduces with ageing (Şahin, Toraman, & Muratlı, 2002). In this research, the two-minute step test was used to determine aerobic capacity. The aerobic capacity was higher in older men compared to older women; this difference was also statistically significant ($p<0.05$). Although older women were active, their aerobic capacities were significantly lower compared to older men. In an American study, it was found that the two-minute step test for older make golfers with a mean age of 70.7±7.1 years was 103.2±23.4, while it was 159.92±50.67 steps in our research (Thompson, Cobb, & Blackwell, 2007). This situation appears to show that our older women and men displayed better performance than their golfing peers. However, it can be said that agility and dynamic balance were weaker in our subjects.

In contrast, upper and lower body flexibility was better for women though no statistically significant difference was determined ($p>0.05$), although it is known that flexibility is less in men compared to women. This difference did not appear to be significant. Research by Ahn and So (2018), stated that the lower body flexibility was 5.36±9.02 for older Korean men and 11.64±8.76 cm for women, with upper body flexibility of -12.83±13.71 cm for men and -5.51±12.69 cm for women. According to these results, the lower body flexibility of our older women and older men was less compared to Korean women and men, while for upper body flexibility, our older women were worse while our older men were better (Figure 2).

Apart from flexibility, there were differences in the physical fitness of older females and males with similar physical activity levels and mean age of 70 years. Older men had stronger arms and legs, better dynamic balance, and better agility and aerobic capacities compared to older women in this research.

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Conflict of Interest
The authors declare the absence of conflict of interest.

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