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ORIGINAL RESEARCH

Age-related decrease in physical activity and functional fitness among elderly men and women

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Aim: To determine differences in physical activity level and functional fitness between young elderly (60–69 years) and old elderly (70–80 years) people with the hypothesis that an age-related decline would be found.

Methods: A total of 1288 participants' level of physical activity was evaluated using the International Physical Activity Questionnaire: 594 were male (mean ± standard deviation: body height 175.62 ± 9.78 cm; body weight 82.26 ± 31.33 kg) and 694 female (mean ± standard deviation: body height 165.17 ± 23.12 cm; body weight 69.74 ± 12.44 kg). Functional fitness was also estimated using the Senior Fitness Test: back scratch, chair sit and reach, 8-foot up and go, chair stand up for 30 seconds, arm curl, and 2-minute step test.

Results: Significant differences ($P < 0.05$) were found for all Senior Fitness tests between young elderly (60–69 years) and old elderly (70–80) men. Similar results were found for the women, except no significant differences were found for the chair sit and reach and the 2-minute step test. From the viewpoint of energy consumption estimated by the International Physical Activity Questionnaire, moderate physical activity is dominant. In addition, with aging, among men and women older than 60 years, the value of the Metabolic Equivalent of Task in total physical activity significantly reduces ($P < 0.05$).

Conclusions: This study found that the reduction in physical activity level and functional fitness was equal for both men and women and was due to the aging process. These differences between young and old elderly people were due to the reduction of muscle strength in both upper and lower limbs and changes in body-fat percentage, flexibility, agility, and endurance.

Keywords: older adult, functional capacity, strength, aging

Introduction

According to the UN, the number of people older than 60 years increased by 2% between 1950 and 2000 (from 8% to 10% of the total population). It is also expected that the number of elderly people will increase to 22% of the total population by 2050,[1] primarily due to increasing life expectancy. The average terminal age for men and women in 1980 was 69.8 and 77.5 years, respectively, whilst in 2040 it is expected to be 75.0 years for men and 83.1 for women.[2] Effective approaches to help older people maintain a healthy and active life are urgently needed, as the elderly have twice as many disabilities and four times as many physical limitations as people less than 60 years of age.[3] In respect to the implications for maintaining independence and quality of life, functional fitness as a function of age and physical activity (PA) was investigated.

Conceptually, functional fitness represents the physical capacity that is needed to undertake normal everyday activities, independently and without the early onset

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of fatigue.[4] However the aging process tends to reduce physical fitness (strength, endurance, agility, and flexibility), and results in difficulties in daily life activities and normal functioning of the elderly.[5,6] The level of daily activities of elderly persons decreases with aging, although it is well known that PA is important for independent living,[7] prevention of chronic health problems,[8] and quality of life.[9] Brach et al[10] demonstrated a significant relationship between PA during a 14-year period and current functional status in older women. Therefore, PA has a significant role in maintaining functional fitness. If elderly individuals do not take part in physically active lifestyles, they expose themselves to the risk of their muscle mass and joint motion reducing by 40% and 10%–40%, depending on body part, respectively, while loss of muscle strength (~30%) is related to a decrease in muscle mass.[4]

Muscle mass and strength tend to reduce by 30%–50% between the ages of 30 and 80 years,[2] with the main cause the reduction in the number of muscle fibers and atrophy of type II muscle fiber.[11] Furthermore, losses in muscular strength occur at an approximate rate of 12%–14% per decade after age 50 years.[12] However, resistance training is generally thought to be a promising intervention for reversing the loss of muscle function and deterioration of muscle structure associated with the aging process.[12] Muscular function is not the only deterioration associated with the aging process if PA is not maintained. The cardiorespiratory system is also susceptible to change, and significant decreases in aerobic capacity have been found after the age of 40 years, such that at the age of 65 years it has approximately 30% less capacity.[4] This means that the capacity for elderly people to undertake aerobic activities such as walking and running is adversely affected by advancing age, due to the decline in maximal oxygen uptake of about 0.5%–1.0% per year.[13] Studies have also shown that the number of falls increases by 35%–40% after 60 years of age,[14–16] which is a consequence of reduced muscle strength, balance, and flexibility.

Whilst research is prevalent regarding the functioning of older people generally, there are no published data regarding either functional fitness or PA levels (intensity, duration, and frequency) of elderly people in Serbia. Like many countries, Serbia has seen an increase in the age of its population, suggesting the need for this information. Additionally, a study with a large sample size will be both representative of the population and have high statistical power with the influence of outliers or extreme observations limited.

The primary aim of this study was to determine differences in PA level and functional fitness between young elderly (60–69 years) and old elderly (70–80 years) people with the hypothesis that an age-related expected. Cross-sectional data from a large sample representative of the general population of men and women aged between 60 and 80 years was used.

Methods

Participants

A sample of 1288 participants, of which 594 were male (46%) and 694 female (54%), was recruited from Southern and Eastern Serbia, one of the five Serbian regions. A total of 349 (27%) of the male participants were aged 60–69 years and 245 (19%) aged 70–80 years, whilst 354 (28%) females were aged 60–69 years and 340 (26%) aged 70–80 years. General descriptive parameters are presented in Table 1. The criteria for selecting participants were: age between 60 and 80 years; physically independent person, ie, able to walk 20 feet without assistance or rest; and lack of cognitive impairment and dementia, ie, achieved 24 points for the educated or 18 points for the unqualified on the mini-mental state evaluation.[17] The pharmacological regime of the participants was also considered, and those who were in the recovery phase of an acute illness and the deaf or blind were excluded. Similarly, those with cardiovascular system disorders identified through their medical history or when completing the questionnaire were excluded from participation, due to potential health risks associated with the functional fitness tests. Participation in the study was voluntary, and each of the participants could withdraw from the study at any time. The study was approved by the Research Ethics Committee of the Faculty of Physical Education and Sport, University of Niš and according to the Declaration of Helsinki. All participants were fully informed of the potential risks and benefits of this research.

Procedure

Each participant provided general demographic information, the level of their PA using the International Physical Activity Questionnaire (IPAQ), anthropometric measures, and completed the Senior Fitness Test. Testing of all participants took place between August and December 2011 by trained researchers. Interviews with potential participants were undertaken individually or in small groups at their homes or in activity centers for the elderly. Participants underwent functional fitness tests between 9 am and 1 pm at an indoor centre where the air temperature ranged from 22°C to 25°C.

Table 1 Basic descriptive parameters (means ± standard deviation)

	Men			Women		
	60–69 n = 349	70–80 n = 245	Total n = 594	60–69 n = 354	70–80 n = 340	Total n = 694
Age (years)	63.9 ± 2.8	74.3 ± 3.1	67.7 ± 6.6	63.7 ± 2.9	73.9 ± 2.9	69.2 ± 7.8
Body height (cm)	176.3 ± 8.8*	174.5 ± 11.8	175.6 ± 9.8	164.7 ± 6.5	166.5 ± 37.3	165.2 ± 23.1
Body weight (kg)	82.3 ± 12.0*	82.6 ± 15.1	82.3 ± 31.3	70.6 ± 12.8	68.8 ± 11.7	69.7 ± 12.4
BMI (kg/m²)	26.6 ± 6.3	27.9 ± 2.7	27.0 ± 13.9	26.1 ± 4.9	25.5 ± 4.5	25.8 ± 4.7
Percentage of body fat (%)	30.1 ± 4.0*	31.9 ± 4.1	30.7 ± 4.1	40.2 ± 4.8*	41.8 ± 5.0	40.9 ± 4.9

Note: $*P < 0.05$.
Abbreviation: BMI, body mass index.

Anthropometric measures

Anthropometric variables were measured according to the guidelines of the International Biological Program. Body height was measured to the nearest 0.1 cm by a metric measuring tape. Body weight was measured to the nearest 0.01 kg using a digital scale. Body mass index (BMI) was calculated using the formula BMI = body mass (kg)/(body height [m])^2. Percentage of body fat was calculated using the formula: adult body fat % = (1.20 × BMI) + (0.23 × age) – (10.8 × sex) – 5.4.[18]

Senior Fitness Test

The Senior Fitness Test is a battery of tests for the assessment of the functional fitness of older persons. This test assesses the physiological capacity for carrying out normal daily activities independently and safely without the appearance of fatigue. Participants first undertook 10 minutes warm-up with instructions given by a trained physical educator before the test was completed in the designated order.[19] Test validity has been published by Rikli and Jones.[20] The test consists of six measures of functional fitness, as follows. (1) Back scratch, to assess upper-body (shoulder) flexibility. Participants placed one hand behind the same side shoulder with the forearm pronated and fingers extended and the other hand behind the back, fingers extended. After demonstration by the tester, participants were asked to determine the preferred hand placement and were given two practice trials, followed by two test trials. The score was the number of centimeters the middle fingers were short of touching (minus score) or overlapping each other (plus score). The best score of the two test trials was used to evaluate performance. (2) Chair sit and reach, to assess the flexibility of the lower extremities. Participants sat on the edge of a chair, with one leg bent and the other leg extended straight in front with the heel on the floor. Without bending the knee, participants slowly reached forward, sliding the hands down the extended leg in an attempt to touch the toes. After demonstration by the tester, participants were asked to determine the preferred leg and were given two practice trials on that leg, followed by two test trials. The score was the number of centimeters short of reaching the toes (minus score) or reached beyond the toes (plus score). The best score of two test trials was used to evaluate performance. (3) Eight-foot up and go, to assess agility/dynamic balance. To perform this test, participants were fully seated in a chair, hands on thighs and feet flat on the floor. On a signal, participants stood from the chair, walked as quickly as possible around a cone that was placed 8 feet (2.44 m) ahead of the chair, and returned to a fully seated position on the chair. Participants were told that this was a timed test and that the objective was to walk as quickly as possible (without running) around the cone and back to the chair. The result is the number of seconds required to get up from a seated position, walk, and return to a seated position. (4) Chair stand up for 30 seconds, to assess lower-body strength. On a signal, participants rose to a full standing position from a chair and then returned to a fully seated position; they continued to complete as many full stands as possible in 30 seconds. After demonstration by the tester, a practice trial of one to three repetitions was given, followed by one 30-second test trial. The score was the total number of stands executed correctly within 30 seconds. (5) Arm curl, to assess upper-body strength. On a signal, participants were instructed to flex and extend the elbow of their dominant hand, lifting a weight (men, 8 lb [3629 g] dumbbell; women, 5 lb dumbell [2268 g]) through the complete range of motion, as many times as possible in 30 seconds. After demonstration by the tester, a practice trial of one or two repetitions was given, followed by one 30-second test trial. The score was the number of repetitions completed within 30 seconds. (6) Two-minute step is an alternative aerobic endurance test used when space limitations or weather prohibits taking the 6-minute walk test. The result is the number of full steps completed in 2 minutes, raising each knee to a point midway between the patella (kneecap) and iliac crest (top hip bone).

The intraclass correlation coefficients for test–retest reliability for back scratch, chair sit and reach, and 8-foot up and go were 0.90, 0.97, and 0.92 respectively.

International Physical Activity Questionnaire

Self-evaluation of each participant's PA level was ascertained using the Serbian version of the IPAQ, the reliability of which has been measured on the general Serbian population aged over 60 years.[21] The long version of the IPAQ was used, which contains four domains of PA: work-related, transportation, housework/gardening, and leisure-time activity. Questions related to sitting and sedentary habits, which were not pertinent to this research, were excluded from analysis. For each domain, participants recorded the number of days and time spent each day undertaking vigorous and moderate-intensity activities separately along with the time spent walking. These values (vigorous activity, moderate activity, and walking) were used to calculate the PA levels, as specified in the official IPAQ instruction manual. Similarly, the Metabolic Equivalent of Task (MET) was calculated for each domain separately (work-related, transportation, housework/gardening, and leisure-time activity). Total weekly PA level (MET minutes/week) was calculated using separate MET values for each item using the following coefficients: vigorous PA = 8.0 METs, moderate PA = 4.0 METs, and walking PA = 3.3 METs.

Vigorous activities are defined as activities in which participants breathe more deeply than usual. These can be activities such as lifting heavy things, digging, heavy construction work, or climbing stairs. Moderate PAs are those in which a person is breathing a little harder than usual and may include activities such as carrying light loads. Walking is not considered moderate PA. Vigorous and moderate activities are those lasting for at least 10 minutes continuously.

Statistical analysis

SPSS version 18.0 (IBM, Armonk, NY, USA) was used for the statistical analysis. Descriptive statistics were calculated for all experimental data. Kolmogorov–Smirnov tests were used to assess if data were normally distributed. Differences in PA level and functional fitness between young elderly and old elderly men and women were determined using one-way univariate analysis of variance. Bivariate correlations were computed using Pearson's r for continuous variables and Spearman's ρ for categorical variables to examine the relationship between functional fitness and PA level. Multiple linear regression was used to examine any relationship between PA and functional fitness. Two models were examined for each statistical analysis. Model A was adjusted for work-related PA, transportation PA, housework PA, leisure-time PA, walking PA, moderate PA, vigorous PA, and total PA. Model B was additionally adjusted for age and sex. A Bonferroni correction was used to adjust P-values for multiple comparisons. Statistical significance was set at $P < 0.05$.

Results

The Kolmogorov–Smirnov tests showed that data were normally distributed. Participants in this study were 46% male and 54% female, which is similar to the ratio of elderly men and women in Serbia. Statistically significant differences between young elderly and old elderly men were evident for body height and weight and percentage of body fat (Table 1), whereas women did not display these differences except for percentage of body fat, which had increased significantly in the old elderly compared to young elderly. Average values of BMI showed that both men and women were overweight (BMI > 25), regardless of age (60–69 or 70–80 years).

Senior Fitness Test

Eight-foot up and go, chair stand up for 30 seconds, arm curl, and 2-minute step showed a statistically significant difference ($P < 0.05$) between young elderly (60–69 years) and old elderly men (70–80 years). Similar results were found in women, except for the back scratch, chair sit and reach, and 2-minute step, where there were no statistically significant differences (Table 2). These results suggest that upper-body strength, as measured by the arm curl, had decreased by 8% in men and 10% in women from age 60–69 to 70–80 years. Similarly, lower-body strength (30-second chair stand) had significantly decreased by 12% in men and 14% in women. Agility (8-foot up and go) was also significantly lower in men by 16% and women by 9%, whilst aerobic endurance (2-minute step test) had decreased by only 1% ($P = 0.66$) in women compared to 10% ($P < 0.05$) in men. Significant decreases in functional abilities between the age categories were found for flexibility of the upper limbs (back scratch) for men and women, but for flexibility in the lower limbs (chair sit and reach) men had significantly increased ($P < 0.05$) their range of motion, whereas women had not changed within this time frame.

International Physical Activity Questionnaire

Men and women from both age categories reported total PA levels that classified them as still being physically

Table 2 Difference in the Senior Fitness Test parameters in men and women within age categories of 60–69 and 70–80 years (means ± standard deviation)

	Men			Women		
	60–69 n = 349	70–80 n = 245	%	60–69 n = 354	70–80 n = 340	%
Back scratch (cm)	–3.84 ± 5.26*	–4.99 ± 6.04*	–29	–2.41 ± 4.58*	–3.66 ± 4.93*	–51
Chair sit and reach (cm)	–0.11 ± 9.86*	1.98 ± 11.57*	19	1.87 ± 10.95	2.05 ± 14.40	–9
8-foot up and go (seconds)	6.41 ± 1.44	7.46 ± 1.62*	–16	6.67 ± 1.48	7.27 ± 1.42*	–9
Chair stand up for 30 seconds (repetitions)	14.26 ± 5.53	12.51 ± 5.77*	12	13.75 ± 5.25	11.70 ± 5.15*	14
Arm curl (repetitions)	17.24 ± 6.27	15.76 ± 6.88*	8	13.67 ± 5.69	12.18 ± 6.51*	10
2-minute step test (repetitions)	95.06 ± 21.64	84.73 ± 24.24*	10	82.48 ± 26.19	81.68 ± 23.27	1

Note: *$P < 0.05$.

active (Table 3). In terms of energy consumption, estimated by the IPAQ, moderate PA was dominant compared to walking and heavy PA, and accounted for almost half the energy consumed in both men and women, regardless of age category. A significant difference ($P < 0.05$) between young elderly and old elderly men was found for the domain of PA at work, while other domains showed little difference. However, in terms of total PA, the results indicated that there was a significant decline ($P < 0.05$) in men from young to old elderly in total walking MET. Women reported similar patterns for their activity profiles to men, although their MET values for total PA as well as work-time activity also significantly ($P < 0.05$) reduced with age (Table 3).

Reported PA levels had weak correlations with the fitness test results (range –0.14 to 0.24, Table 4). Multiple linear regression analysis with PA in different domains as independent variables showed that PA was associated with 8-foot up and go ($\beta = 7.020$, $P = 0.001$), chair stand up for 30 seconds ($\beta = 12.503$, $P < 0.001$), and arm curl ($\beta = 13.570$, $P < 0.001$) (Table 5, Model A). Similarly, PA was associated with back scratch ($\beta = 0.207$, $P < 0.001$), 8-foot up and go ($\beta = 0.812$, $P < 0.001$), chair stand up for 30 seconds ($\beta = 28.233$, $P < 0.001$), arm curl ($\beta = 30.456$, $P < 0.001$) and 2-minute step ($\beta = 130.957$, $P < 0.001$) when adjusted for all covariates in Model A plus age and sex (Table 5, Model B). Results showed an inverse relationship that was not statistically significant between PA and upper-body flexibility (Model A: $\beta = -4.181$, $P = 0.20$) or lower-body flexibility (Model B: $\beta = -5.728$, $P = 0.180$).

Discussion

The level of PA typically decreased with age and was associated with a decline in functional fitness. This research confirms the assumption that the level of PA decreases with the aging process, which in turn decreases men's and women's functional fitness. These results tend to confirm the observation that the level of PA is associated with the maintenance or increase of physical fitness,[5,22] and that any kind of PA is better than inactivity.[23,24]

Generally, the results from this study have been in accordance with previous research.[25–29] For example, it has been shown that upper-limb strength decreases with the aging

Table 3 Difference in International Physical Activity Questionnaire parameters in men and women within age categories of 60–69 and 70–80 years (means ± standard deviation)

	Men		Women	
	60–69 n = 349	70–80 n = 245	60–69 n = 354	70–80 n = 340
Total work-related (MET)	1184.39 ± 2827.13	472.85 ± 2021.24*	640.40 ± 2110.20	186.74 ± 965.63*
Total transportation (MET)	946.72 ± 2076.55	770.58 ± 1509.59	624.73 ± 1086.92	556.11 ± 1540.05
Total housework (MET)	1694.78 ± 2575.22	1704.87 ± 2689.73	2341.98 ± 2669.64	1998.57 ± 2813.38
Total leisure time (MET)	942.59 ± 1817.12	924.01 ± 2242.33	911.56 ± 2485.20	590.70 ± 1447.71
Total walking (MET)	1562.80 ± 2358.83	1036.21 ± 1971.33*	1200.37 ± 2075.23	895.25 ± 1995.18
Total moderate (MET)	2961.37 ± 4095.04	2599.64 ± 3708.18	3161.78 ± 3767.97	2346.77 ± 3341.84
Total vigorous (MET)	609.29 ± 1654.19	295.94 ± 1175.20	280.02 ± 1240.66	100.31 ± 575.91
Total physical activity (MET)	4503.43 ± 5583.49	3836.83 ± 5413.94	4327.81 ± 4922.84	3160.56 ± 4430.99*

Note: *$P < 0.05$.
Abbreviation: MET, Metabolic Equivalent of Task.

Table 4 Bivariate correlations between physical activity level in different domains and functional fitness

	Back scratch	Chair sit and reach	8-foot up and go	Chair stand up for 30 seconds	Arm curl	2-minute step test
Total work-related (MET)	0.028	–0.041	–0.019	0.016	0.079*	0.039
Total transportation (MET)	0.113*	–0.002	–0.053	0.085*	0.108*	0.009
Total housework (MET)	0.041	0.038	–0.134*	0.106*	0.125*	–0.026
Total leisure-time (MET)	0.020	–0.019	–0.100*	0.125*	0.192*	0.021
Total walking (MET)	0.097*	–0.006	–0.093*	0.109*	0.177*	0.038
Total moderate (MET)	0.060	0.010	–0.139*	0.140*	0.188*	–0.003
Total vigorous (MET)	0.002	–0.064*	–0.003	0.033	0.094*	0.013
Total physical activity (MET)	0.098*	–0.008	–0.123*	0.145*	0.235*	0.016

Note: $^{*}P < 0.05$.
Abbreviation: MET, Metabolic Equivalent of Task.

process for both elderly men[29] and women.[28] This study found the average reduction in muscle strength to be approximately 1% annually for both men and women, which is the same as that found by Rantanen et al,[26] whereas Bassey[25] reported an average loss of upper-arm strength of 2% per year for 221 British women aged 65 years and older. The consensus opinion, therefore, for muscle-strength loss in elderly people's upper limbs seems to be between 1%–2% annually, for both cross-sectional and longitudinal studies.[28,29] However, after the age of 75 years, muscle-strength decreases are likely to be at an average of 3.4% annually unless this process is slowed down through PA. Based on these findings, older men and women could lose between one-quarter and one-third of muscle strength over a 10-year period, which would make a considerable impact on quality of life and ability to remain independent from other people.

Muscle-strength loss has been shown to be greater for lower limbs in comparison to upper limbs,[30] a finding of this research also. Male participants were shown to have lost 12% of muscle strength for lower limbs and 8% for upper limbs at ages 60–69 and 70–80 years. Similarly, elderly women lost 4% more strength in lower (14%) compared to upper limbs (10%). Whilst this decrease in strength seems to be related to increasing age and muscle-mass loss, it is also likely to be a consequence of more physical inactivity.[31] This was confirmed by the IPAQ results, which showed that older (70–80 years) people were less physically active in all segments (work-related, transportation, housework/gardening, and leisure-time activity) compared to the younger (60–69) ones, which would have an impact on muscle-strength loss. The combination of muscle-strength loss, lower levels of PA, and increased body fat as a result of the aging process represents the potential risk for decreased mobility,[32] a situation of relevance to the men and women involved in this study.

The rate of decrease of maximal oxygen consumption (VO_{2max}) is not constant throughout life, but has been shown to accelerate significantly with each decade, and this decline is greater in men than women.[33–35] Hawkins and Wiswell[36] suggested that aerobic ability loss is nearly 10% per decade, which is similar to the results for the males in this study, whereas the women had almost identical aerobic abilities. Stathokostas et al[35] found that men had higher initial VO_{2max} values than women, and their percentage decrease over 10 years was 14.7% compared to 7% for women between 55 and 84 years of age. The explanation given for this loss in aerobic ability was the decrease in PA with age, seen in both men and women, although the change in aerobic ability was not the same between the sexes. Weiss et al[37] suggested the

Table 5 Multiple linear regression models between physical activity and functional fitness

Dependent variable	Model A[a]			Model B[b]		
	β	*P*-value	Adjusted R^2	β	*P*-value	Adjusted R^2
Back scratch (cm)	–4.181	0.020	0.012	0.207	<0.000	0.048
Chair sit and reach (cm)	1.229	0.308	0.001	–5.728	0.180	0.003
8-foot up and go (seconds)	7.020	0.001	0.015	0.812	<0.000	0.121
Chair stand up for 30 seconds (repetitions)	12.503	<0.000	0.019	28.233	<0.000	0.073
Arm curl (repetitions)	13.570	<0.000	0.061	30.456	<0.000	0.158
2-minute step test (repetitions)	86.871	0.952	0.003	130.957	<0.000	0.054

Notes: [a]Adjusted for total work-related (MET), total transportation (MET), total housework (MET), total leisure time (MET), total walking (MET), total moderate (MET), total vigorous (MET), and total physical activity (MET); [b]adjusted for all covariates in Model A plus age and sex.
Abbreviation: MET, Metabolic Equivalent of Task.

decrease in VO_{2max} after 60 years of age was due to a drop in maximum cardiac output, as well as a reduction in the arterial/venous oxygen difference. These reductions take place more rapidly in men than women, although sex differences tend to vanish in the last decades of life.

In general terms, older elderly people (men and women) tend to be less flexible than their younger counterparts, with the greatest changes seen in this study for this ability with women tending to be more flexible than men. After the age of 60 years, women are 20%–40% more flexible than men,[38] which was also found in this study.

Whilst aging is associated with a decrease in PA and functional fitness, particularly after age 60 years, regular PA can slow the rate of decline in both aerobic and musculoskeletal systems and hence improve work ability.[39,40] Additionally, high levels of functional fitness and PA were shown to reduce the risk of falling and suffering injuries, whereas an increase in sedentary behavior results in significant muscle-strength loss and an increase in subcutaneous fat tissue. This study has shown that both men and women become less and less active with the increase of age, and hence this negatively affects their muscle strength, endurance, and body structure.

This study involved a large number of participants aged 60–80 years and had consequently high external validity. However, cross-sectional design, the indirect estimation of PA levels via the IPAQ rather than pedometers or accelerometers, and estimates of percentage body fat and BMI using prediction equations instead of more accurate measures, such as bioelectrical impedance, tend to lower the study's reliability and present study limitations. In future, research studies should use direct methods for calculating PA levels and body composition, as well as assessing the influence of various types of PAs on the maintenance of functional fitness of elderly people. Consideration should also be given to longitudinal studies with several points of measurement, as this would allow tracking and correction for changes in PA and also allow more insight into the relationship between PA, age, and physical fitness.

This study concluded that the reduction of PA and functional fitness found in both men and women is due to the aging process. Moreover, it was determined that aging results in an increase in body fat, reduction of muscle strength in both upper and lower limbs, and lower levels of flexibility, agility, and endurance. These factors mean that the ability to work and remain physically fit are compromised, particularly in older compared to younger elderly people. Even though the process of aging is natural and inevitable, an adequate level of PA should slow down the loss of functional and physical abilities and help maintain a healthy way of life for elderly people.

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Disclosure

The authors report no conflicts of interest in this work.

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