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Original Article

ASSOCIATION BETWEEN FUNCTIONAL FITNESS AND QUALITY OF LIFE OF ELDERLY PARTICIPANTS OF A PROGRAM OF PHYSICAL ACTIVITY OF CURITIBA, BRAZIL

ASSOCIAÇÃO ENTRE APTIDÃO FUNCIONAL E QUALIDADE DE VIDA DE IDOSAS PARTICIPANTES DE UM PROGRAMA DE ATIVIDADE FÍSICA DE CURITIBA, BRASIL

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RESUMO

Com o crescimento constante da população idosa torna-se necessário a discussão sobre os aspectos relacionados a aptidão funcional, uma vez que essa pode interferir no envelhecimento saudável. O objetivo desse estudo foi verificar a associação entre aptidão funcional e qualidade de vida em 1737 idosas participantes de um programa de atividade física de Curitiba, Paraná, Brasil. Foi aplicado o Questionário sociodemográfico, a versão curta do International Physical Activity Questionnaire (IPAQ), e os questionários de qualidade de vida WHOQOL-BREF e WHOQOL-OLD. Também foi aplicado a bateria de testes de aptidão funcional "Senior Fitness Test" (SFT). Foi utilizado a análise descritiva das variáveis e o Modelo de regressão logística ordinal para verificar as associações entre as variáveis de aptidão funcional e os domínios da qualidade de vida por meio do software STATA 13.0 MP, com significância de $p<0,05$. Os resultados indicaram que idosas com aptidão funcional adequada apresentaram mais chances de estarem no tercil mais alto da qualidade de vida e domínios na avaliação do WHOQOL-BREF (variando entre 1,21 a 1,49) e WHOQOL-OLD (variando de 1,18 até 1,60). Os resultados apontaram que uma melhor aptidão funcional apresenta-se positivamente associada a percepção positiva da qualidade de vida e de seus domínios em idosas.

Palavras-chave: Idoso. Qualidade de Vida. Aptidão Física. Atividade Física.

ABSTRACT

With the constant increase of the elderly population becomes necessary the discussion about the aspects related to the functional fitness, once this can interfere in the healthy aging. The objective of this paper was verifying the association of functional fitness with a quality of life in 1737 elderly women participating in a program of physical activity in Curitiba, Paraná, Brazil; was applied the Sociodemographic Questionnaire, the short version of International Physical Activity Questionnaire (IPAQ), and the questionnaires of quality of life WHOQOL-BREF and OLD. Also, was applied the battery of tests of functional fitness Senior Fitness Test. Descriptive analysis of the variables and the ordinal logistic regression model was used to verify the associations between the variables of functional fitness and the domains of quality of life by means of software STATA 13.0 MP, with the significance of $p<0,05$. The results indicated that elderly with adequate functional fitness showed more likely to be in the higher third of quality of life variables and their domains in the assessment of WHOQOL-BREF (ranging between 1,21 to 1,49) and WHOQOL-OLD (ranging between 1,18 to 1,49). The results pointed out that better functional fitness presents is positively associated with a perception positive of quality of life and their domains in the elderly women.

Keywords: Aged. Quality of Life. Physical Fitness. Physical Activity.

Introduction

Population aging, insufficient physical activity and degenerative diseases arise as major problems for public health[1]. Considering the increasing elderly population and its projection into the future[2], discussing the aspects related to functional fitness of older adults is needed, since this can interfere with healthy aging[3].

Functional fitness is shown to be a significant factor for the autonomy and independence of the elderly[4]. In this regard, studies report that good physical fitness can promote successful aging, in addition to providing the elderly with emotional and social well-

being[5,6]. Positive evaluations on the elderly's physical capacity have shown that flexibility, strength, aerobic capacity and balance are directly correlated to the willingness to perform daily life activities, which could impact on a good self-perceived quality of life[7-9].

Quality of life is multidimensional; it is self-perceived and subjective, sensitive to extrinsic and intrinsic factors. Therefore, a good perception on this construct by the older adults is quite meaningful in view of the specificities of this life phase, whether physical, social or emotional ones, such as walking ability, marital status, dependence on medications, and chronic diseases[10-12].

Some studies on the elderly self-perceived quality of life have searched a relationship between this variable and psychological and emotional factors. Regarding those that emphasize a relationship with regular physical activity, some have attempted to understand this relationship with the elderly physical capacity and functional fitness[5,6,8,10-14].

Several studies have shown that some physical capacities in isolation, such as strength, flexibility, and aerobic capacity might be correlated to this population self-perceived quality of life[6,7-9,15,16]. However, considering older people samples, it is seen that the relationship between functional fitness and quality of life is well explored in contexts of long-term institutions, care centers or hospitals, which shows that assessing this relationship in a healthy elderly population is significant[17,18].

Therefore, understanding the relationship between functional fitness and general self-perceived quality of life and its domains is significant with regard to the healthy elderly who participate in physical activity programs. Thus, this study aimed at verifying the association between functional fitness and quality of life (and its domains) in a sample of elderly women undergoing a physical activity program in the city of Curitiba, Paraná, Brazil.

Methods

Design

This is a cross-sectional study carried out in the city of Curitiba, southern Brazil.

Subjects

The Municipal Secretary for Sport and Recreation (*Secretaria Municipal de Esporte e Lazer* - SMEL) of Curitiba-PR, Brazil, has a special care network for the elderly population, a program referred to as *Idoso em Movimento* (the elderly in movement). In 2010, this program served 4.346 women and 110 men, distributed in 29 Sports and Leisure Centers (SLCs) in the nine administrative regions of the municipality. Due to the low number of men served in this program, only female individuals were assessed in the present study. Therefore, women aged ≥ 60 years, undergoing the *Idoso em Movimento* program in Curitiba, were considered the population of this study.

In order to compute the sample needed, the following statistical parameters were considered: (i) a population of 4.346 individuals; (ii) a prevalence of low physical activity level of 50%, which considers a maximum variance[19]; (iii) the confidence level of 95%; (iv) the sampling error of 3 percentage points; (v) a design effect of 2.0 to correct bias in a cluster sampling selection; and (vi) a 20% margin for possible losses and refusals. Therefore, the initial sample was estimated at 1.886 elderly women.

The sample selection was carried out by using the random cluster sampling in two stages. In the first, the SLCs (primary sampling units) were selected in each of the nine administrative regions of the city. All the SLCs in the city were eligible. In the second stage, the physical activity groups (secondary sampling units) of each SLC were drawn. The number of groups per region was determined so as to reach a number of elderly women proportional to the administrative region size. All the subjects selected were invited to participate in the

present study. In the end, 17 care centers were part of the study, with 59 groups (an average of ~ 30 elderly women per group) distributed in the nine administrative regions of the municipality. The study excluded the elderly with serious musculoskeletal, neurological and cardiac problems that could compromise the tests or even become an impediment so that they could be carried out. Out of the 1.895 elderly women who participated in data collection, 158 were excluded for not having met all the requirements of this study. No refusal was recorded. Therefore, the final sample of the present study consisted of 1.737 elderly women. Table 1 shows the sample selection process.

Table 1. Description of the distribution and selection of the sample, the program referred to as *Idosos em Movimento*, according to the administrative region of the city of Curitiba-PR

	The study design			**Sample collected**	
Administrative Region	Population (N)[1]	% of the population	N of SLCs[2] (N of groups)	Elderly women with valid data (Sample %)	N of SLCs (N of groups)
Bairro Novo	841	19.4	04 (20)	263 (14.6)	02 (08)
Boa Vista	754	17.3	06 (31)	281 (16.7)	03 (10)
Boqueirão	482	11.1	03(11)	276 (16.4)	02 (07)
Cajuru	166	3.8	04 (04)	76 (4.2)	02 (02)
Matriz	1194	27.5	03 (43)	455 (25.7)	02 (18)
Portão	482	11.1	02 (08)	198 (11.5)	02 (05)
Pinheirinho	241	5.5	03 (09)	69 (3.8)	01 (03)
Santa Felicidade	170	3.9	03 (09)	111 (6.6)	02 (05)
CIC	16	0.4	01 (01)	08 (0.4)	01 (01)
Total	4.346	100.0	29 (136)	1.737 (100.0)	17 (59)

Note: N[1] – Total population of elderly women (SMEL, 2010). SLCs[2] - Sport and Leisure Centers of SMEL
Source: The authors

Procedures

The questionnaires were applied in the form of a face-to-face interview. The interview and functional fitness tests were carried out by previously trained professionals linked to the Center for Studies in Physical Activity and Health (*Centro de Estudos em Atividade Física e Saúde* - CEAFS) of a federal university of Paraná state referred to as *Universidade Federal do Paraná*. A pilot study was performed under the same conditions as the main study.

Instruments

By applying a questionnaire[20], the present study assessed the sociodemographic variables referring to age group, race/ethnicity, marital status, occupational situation and education level of the elderly.

Information on health condition was reported by the elderly during the interview by answering the following questions: 'Do you have any health problem?' (no or yes), and 'Do you take any medication regularly?' (no or yes). In order to assess the overall self-perceived health, this question was asked: 'In general, would you say your health is…?'. Its classification was performed by using the Likert scale, with the scores ranging from 1 to 4 (1 = bad, 2 = regular, 3 = good, 4 = excellent), which were dichotomized for the present analysis as: no (bad and regular) and yes (good and excellent). Then, for the economic classification, the questionnaire of a Brazilian research companies association referred to as *Associação Brasileira de Empresas de Pesquisa* (ABEP - Economic Classification Criterion)[21] was used. The purpose of this questionnaire is to estimate the family's purchasing power and the

education level of the head of the family, generating a score that estimates economic classes from A to E.

The physical activity practice was assessed by using the International Physical Activity Questionnaire – Short Form (IPAQ-SF), an instrument previously validated in Brazil[22]. The elderly women answered six questions about attendance and duration of physical activities of different intensities over the seven days prior to the survey. These parameters were used to estimate the weekly time spent in physical activities (minutes per week). The time spent on vigorous intensity activities was multiplied by two, since physical activity at this intensity has a different weighting in current recommendations[23]. Thus, each elderly woman was classified according to the time spent in physical activity, considering the WHO recommendations of 2010[23] for the practice of physical activity with regard to the elderly general health (0 to 149.9 min/week; 150-299.9 min/week; ≥300 min/week).

In order to assess functional fitness, the Senior Fitness Test (SFT)[24] was used. Table 2 shows this battery of tests, which were performed in a circuit so as to minimize the effects of localized fatigue. The elderly performance in such tests was individually recorded.

Before beginning the tests, all the elderly women performed a 10-minute warm-up. The recovery interval between tests was approximately 2 minutes. In order to become familiar with the battery of tests, the subjects had a moment for explanation and experimentation[24].

Table 2. Brief description of the tests included in the Senior Fitness Test (SFT) according to Rikli & Jones[24]

Name	Purpose	Description
Body Mass Index (BMI)	Assessing the body mass index	Ratio between weight and height (kg/m^2), classified as normal (18.5-24.9 kg/m²), overweight (25-29.9 kg/m²) and obese (≥30 kg/m²) according to WHO (2000)
6-minute walk	Assessing aerobic endurance	Maximum distance (meters) that the subject walks during 6 minutes on a 50-meter rectangular circuit
30-s arm curl	Assessing strength and endurance of the upper extremities	Number of repetitions of arm curls executed in 30 seconds while holding a 2.5 kg dumbbell
30-s chair stand	Assessing strength and endurance of the lower extremities	Number of repetitions that the subject stands up and returns to the initial (seated) position in 30s
Chair sit-and-reach	Assessing flexibility of the lower extremities	With the subject in seated position and legs extended, measuring the maximum distance (cm) to reach the feet with the torso pressing towards toes
Back scratch	Assessing flexibility of the upper extremities	The subject must reach the shoulder with the dominant hand and the other up middle of back towards the same shoulder trying to reach both hands; the distance between them is measured (cm)
8-foot up-and-go	Assessing physical mobility (speed, agility and dynamic balance)	Time (seconds) the subject takes to get up from the seated position, walk 2,44 m (8 feet) and return to the same position

Source: The authors

The elderly women had their test results exposed and categorized as appropriate when obtaining a classification superior to regular, according to the SFT cut-off points. Table 3 shows the cut-off point values according to age groups.

Table 3. Cut-off points for physical fitness tests, adopted according to the SFT classification and age group

Physical Fitness	60-64 years of age	65-69 years of age	70-74 years of age	75-79 years of age	80-84 years of age	85-89 years of age	90-94 years of age
6-minutes walk (meters)	> 624	> 593	> 572	> 538	> 491	> 458	> 388
30-s arm curl (repetitions)	> 17	> 16	> 16	> 15	> 13	> 12	>11
30-s chair stand (repetitions)	> 17	> 16	> 16	> 15	> 14	> 13	>12
Back scratch (cm)	< 1.5	< 2.0	< 2.5	< 3.0	< 3.6	< 4.9	< 5.7
8-foot up-and-go (seconds)	< 5.4	< 5.8	< 6.3	< 6.6	< 7.7	< 8.4	< 10.1

Souce: The authours

The elderly quality of life was assessed by using two instruments: WHOQOL-BREF and WHOQOL-OLD. The first consists of 26 questions, whose scores on the Likert scale range from 1 to 5. The final scores for each domain were computed by using a syntax that classifies the general quality of life and its domains (Physical, Environment, Social Relations and Psychological). The WHOQOL-BREF was previously validated and showed satisfactory psychometric properties in Brazilian individuals[24].

In order to assess the elderly specific quality of life domains, the WHOQOL-OLD instrument was used, which includes six domains [Sensory Functioning, Autonomy, PPF Activities (past, present and future), Social Participation, Death and Dying and Intimacy], with four items each (total: 24 questions), also evaluated according to the Likert scale. Considering the general estimate of the elderly quality of life, the WHOQOL Group also suggests estimating a general domain based on all 24 items of the questionnaire (WHOQOL-OLD General Score). All WHOQOL-OLD domains have percentage scores ranging from 0 to 100. The WHOQOL-OLD has been validated for the elderly Brazilian population[25]. The results of the scores of self-perceived quality of life, obtained by WHOQOL-BREF or WHOQOL-OLD were categorized in the form of terciles, in which tercile 1 was classified as 'low' and tercile 3 as 'high'.

Ethical aspects

The present study followed the ethical principles included in Resolution No. 196/1996 of the National Health Council, approved by the Research Ethics Committee of the Health Sciences Sector of the Brazilian university referred to as *Universidade Federal do Paraná* (registration No. 1040.165.10.11). All the elderly women who participated in the study signed a Free and Informed Consent Form.

Statistical analysis

Descriptions of the demographic variables, functional fitness and quality of life were performed by using distributions related to absolute and relative frequency. Spearman correlations were used to verify the associations between functional fitness and quality of life.

Ordinal logistic regression models were used to ascertain the independent associations between the functional fitness variables and the quality of life domains. The models were adjusted for age group, ethnicity, marital status, education level, economic classification, current occupational situation, health problems, medication use, nutritional status, high blood pressure (equal to 140 mmHg systolic or above, or 90 mmHg diastolic, after five-minute rest on a seated position) and physical activity levels. The proportionality assumption of the odds ratio was tested using the Brant test and, in case of violating this assumption, the odds ratio was shown for all association possibilities. All analyzes were performed by using the STATA 13.0 MP software with the telephone survey sample selection strategy (sample unit) using the 'svy' command. Significance values of $p < 0.05$ were adopted.

Results

Table 4 shows the descriptive analysis of the sociodemographic characteristics of the elderly women included in the study.

Table 4. Sociodemographic characteristics of the elderly women undergoing the study in the city of Curitiba, Paraná, Brazil

	Variables	**N (%)**
Age group (years of age)	60-64	593 (34.1%)
	65-69	415 (23.9%)
	70-74	395 (22.7%)
	75-79	191 (11.0%)
	80-84	143 (8.3%)
Race/ethnicity	White	1401 (80.7%)
	Brown/black	207 (11.9%)
	Others	129 (7.4%)
Economical Class	A+B (better condition)	572 (32.9%)
	C	998 (57.4%)
	D+E (worse condition)	167 (9.7%)
Education Level	Incomplete primary school	555 (31.9%)
	Complete primary school	770 (44.3%)
	Complete High school	266 (15.3%)
	Complete Higher education	146 (8.5%)
Occupational Situation	Retired	1026 (59.1%)
	Survivor's pension	350 (20.1%)
	Not working/housewife	361 (20.8%)
Marital Status	Single	140 (8.0%)
	Married	696 (40.1%)
	Divorced	191 (11.0%)
	Widow	710 (40.9%)
Health Problems	No	390 (22.5%)
	Yes	1346 (77.5%)
Use of medications	No	400 (23.0%)
	Yes	1337 (77.0%)
Nutritional Status	Eutrophic	423 (24.4%)
	Overweight	753 (43.3%)
	Obesity	561 (32.3%)
High Blood Pressure	No	529 (30.5%)
	Yes	1208 (69.5%)
MVPA	0-149 min/week	892 (51.3%)
	150-299 min/ week	730 (42.1%)
	≥300 min/ week	115 (6.6%)

Note: MVPA = moderate to vigorous physical activity
Source: The authors

The proportion of the elderly women who showed appropriate functional fitness in the capacity tests varied between 32.2% (8-foot up-and-go) and 75.8% (30-s chair stand). The proportion of the elderly who showed high values for the quality of life domains (tercile 3) varied between 14.8% (social domain) and 32.9% (physical domain), when the quality of life was assessed by using the WHOQOL- BREF. On the other hand, when the quality of life was assessed by WHOQOL-OLD, the proportion of elderly women who had high values for the quality of life domains (tercile 3) ranged from 6.6% (Sensory functioning - SF) to 32.5% (General Quality of Life – GQoL).

Table 5 shows the descriptive analysis of the proportion of the elderly women with low and appropriate values in the functional fitness tests, in addition to the distribution of the proportions among the quality of life terciles, evaluated according to WHOQOL-BREF and WHOQOL-OLD.

Table 5. Functional fitness and quality of life of the elderly women from the city of Curitiba, Paraná, Brazil

Variables	**N (%)**		
Functional Fitness	**Low**	**Appropriate**	
6-minute walk	1017 (58.5%)	720 (41.5%)	
30-s arm curl	487 (28.1%)	1250 (71.9%)	
30-s chair stand	421 (24.2%)	1316 (75.8%)	
Chair sit-and-reach	877 (50.5%)	860 (49.5%)	
Back scratch	1129 (65.0%)	608 (35.0%)	
8-foot u-and-go	1177 (67.8%)	560 (32.2%)	
Quality of life – WHOQOL-BREF	**Tercile 1 (baixa)**	**Tercile 2**	**Tercile 3 (high)**
GQoL	580 (33.4%)	891 (51.3%)	266 (15.3%)
Physical	711 (40.9%)	455 (26.2%)	571 (32.9%)
Psyschological	624 (35.9%)	615 (35.4%)	498 (28.7%)
Social relations	649 (37.4%)	831 (47.8%)	257 (14.8%)
Environment	582 (33.5%)	661 (38.1%)	494 (28.4%)
Quality of life – WHOQOL-OLD			
GQoL	607 (34.9%)	567 (32.6%)	563 (32.5%)
QoL SP	654 (37.6%)	767 (44.2%)	316 (18.2%)
QoL AUT	587 (33.8%)	855 (49.2%)	295 (17,0%)
QoL SF	699 (40.2%)	924 (53.2%)	114 (6.6%)
QoL DaD	721 (41.5%)	546 (31.4%)	470 (27.1%)
QoL INT	645 (37.1%)	847 (48.8%)	245 (14.1%)

Note: GQoL: General quality of life; SP: Social participation; AUT: Autonomy; SF: Sensory functioning; DaD: Death and dying; INT: Intimacy
Source: The authors

The correlation matrix between the quality of life domains and the functional fitness measures showed significant but little correlation coefficients. In general, several QoL perception domains correlated positively with the scores obtained in the physical fitness tests: 6-minute walk, 30-s arm curl, 30-s chair stand and back scratch. In such analyzes, the correlation coefficient ranged from 0.05 to 0.16. However, an inverse correlation was seen between some QoL perception domains with the 8-foot up-and-go test, in which the correlation coefficient ranged from -0.08 to -0.15. Table 6 shows the correlation analyzes between the quality of life domains assessed by WHOQOL-BREF and WHOQOL-OLD with functional fitness measures.

Table 6. Correlations between the functional fitness measures and quality of life domains of the elderly women, assessed by WHOQOL-BREF and WHOQOL-OLD in the city of Curitiba, Paraná, Brazil (N = 1737)

	6-minute walk	30-s arm curl	30-s chair stand	Chair sit-and-reach	Back scratch	8-foot up-and-go
WHOQOL-BREF						
GQoL	0.09**	0.11**	0.07**	0.07**	0.05*	-0.08**
Physical QoL	0.14**	0.12**	0.11**	0.13**	0.06*	-0.13**
Psychological QoL	0.03	0.05*	0.04	0.06*	0.05*	-0.04
Social QoL	0.08**	0.01	0.02	0.04	0.00	-0.04
Environmental QoL	0.01	0.01	0.02	0.02	0.01	-0.06*
WHOQOL-OLD						
GQoL	0.09**	0.10**	0.08**	0.09**	0.01	-0.08**
QoL SP	0.04	0.07**	0.07**	0.05*	0.00	-0.03
QoL AUT	0.05*	0.06*	0.06*	0.04	-0.02	-0.03
QoL SF	0.13**	0.13**	0.10**	0.16**	0.05*	-0.15**
QoL PPF	0.05*	0.10**	0.07*	0.02	0.00	-0.03
QoL DaD	0.02	0.03	0.02	0.08**	-0.01	-0.02
QoL INT	0.07**	0.03	0.05*	0.03	0.04	-0.05*

Note: GQL: General quality of life; SP: Social participation ; QoL – quality of life. AUT: Autonomy; SF: Sensory functioning; PPF: Past, present, future. DaD: Death and dying; INT: Intimacy; *p<0,05; **p<0,01
Source: The authors

Regarding the association between physical fitness and self-perceived quality of life obtained through the WHOQOL-BREF, it was seen that in most physical fitness tests the elderly women who showed appropriate values were more likely to be included in terciles 2 and 3 of the General QoL domain, with odds ratio between 1.21 (30-s chair stand) and 1.38 (6-minute walk); in the Physical QoL domain, with odds ratio from 1.22 (chair sit-and-reach) to 1.49 (30-s arm curl), and in the Psychological QoL domain only for the back scratch test with an odds ratio of 1.21.

The social QoF domains showed a protective association of the elderly who had appropriate values in the back scratch test to be included in terciles 2 and 3, with an odds ratio of 0.82. Similarly, this occurred with the same test for environmental QoL with an odds ratio of 0.89. Table 7 shows the values related to the result of the ordinal logistic regression, considering the association between physical fitness and self-perceived quality of life, and measured by WHOQOL-BREF.

Table 7. Adjusted ordinal logistic regression and 95% confidence intervals for the association between the elderly women functional fitness and the quality of life domains with WHOQOL-BREF in the city of Curitiba, Paraná, Brazil (N = 1737)

WHOQOL-BREF	**General QoL**		**Physical QoL**		**Psychological QoL**		**Social QoL**		**Environmental QoL**	
	RC (CI 95%)		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**	
	T1 vs. T2+T3	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**
Functional Fitness										
6-minute walk	**1.38 (1.01 – 1.98)**	-	**1.32 (1.16 - 1.51)**	-	1.30 (0.97 - 1.73)	1.18[b] (0.90 1.54)	1.10 (0.91 – 1.33)	-	1.22 (0.99 – 1.51)	1.12[b] (0.97 – 1.30)
30-s arm curl	**1.41 (1.26 - 1.58)**	-	**1.49 (1.38 - 1.62)**	-	1.16 (0. 93 - 1.44)	1.19[b] (0.97 – 1.47)	1.06 (0.70 – 1.60)	**0.81**[b] **(0.67 – 0.98)**	1.06 (0.97 – 1.19)	**0.85**[b] **(0.80 – 0.91)**
30-s chair stand	**1.21 (1.12 - 1.31)**	-	**1.26 (1.07- 1.49)**	-	1.07 (0.82 - 1.40)	1.01[b] (0.83 1.24)	1.05 (0.82 – 1.33)	1.21[b] (0.75 – 1.94)	1.02 (0.95 – 1.11)	-
Chair sit-and-reach	**1.25 (1.06 - 1.48)**	0.84[b] (0.61 - 1.16)	**1.22 (1.08 - 1.37)**	-	**1.21 (1.03 - 1.42)**	1.22[b] (0.97 – 1.53)	1.10 (0.95 – 1.29)	0.82[b] (0.54 – 1.24)	1.09 (0.97 – 1.22)	-
Back scratch	1.06 (0.89 - 1.25)	-	0.87 (0.72 - 1.06)	-	0.94 (0.77 – 1.15)	**1,21**[b] **(1.01 – 1.47)**	**0.82 (0.68 – 0.99)**	0.97[b] (0.67 – 1.41)	**0.89 (0.84 – 0.95)**	-
8-foot up-and-go	**1.26 (1,01 – 1,58)**	-	1.22 (0.94 – 1.58)	-	1.14 (0.78 – 1.66)	1.06[b] (0.85 – 1.31)	0.90 (0.76 - .07)	0.85[b] (0.61 - 1.17)	1.28 (0.97 – 1.70)	1.08[b] (0.78 – 1.50)

Note: [a]=analysis adjusted for the age group, ethnicity, marital status, education level, economic classification, current occupational situation, health problems, use of medications, nutritional status, high blood pressure and physical activity levels. QoL= quality of life. OR= odds ratio. CI 95%= confidence interval of 95%. T1= Tercile 1; T2= Tercile 2; T3= Tercile 3. [b]= it shows the variables whose proportional assumption of the odds ratio was violated
Source: The authors

Regarding the association between physical fitness and self-perceived quality of life obtained through the WHOQOL-OLD, it was seen that in some of the physical fitness tests, the elderly women who showed appropriate values were more likely to be included in terciles 2 and 3 for the General QoL domain, with odds ratio between 1.18 (chair sit-and-reach) and 1.30 (30-s arm curl); considering the QoL SP domain, the odds ratio ranged from 1.20 (30-s arm curl) to 1.34 (8-foot up-and-go); in the QoL AUT domain with regard to the 6-minute walk test with odds ratio of 1.28 and 1.31 with the 30-s arm curl test; regarding QoL SF domain, the odds ratio ranged from 1.30 (6-minute walk) to 1.60 (30-s arm curl); and finally, the QoL PPF domain showed a correlation with the 30-s arm curl test, odds ratio of 1.46, and 30-s chair stand an odds ratio of 1.32.

Table 8 shows the values regarding the result of the ordinal logistic regression, related to the association between physical fitness and self-perceived quality of life measured by WHOQOL-OLD.

Table 8. Adjusted ordinal logistic regression and 95% confidence intervals for the association between the elderly women functional fitness and the WHOQOL-OLD quality of life domains in the city of Curitiba, Paraná, Brazil. (N = 1737)

WHOQOL-OLD	**General QoL**		**QoL SP**		**QoL AUT**		**QoL SF**		**QoL PPF**		**QoL DaD**		**QoL INT**	
	OR (CI 95%)		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**		**OR (CI 95%)**	
	T1 vs. T2+T3	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**	**T1 vs. T2+T3**	**T1 vs. T2+T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**	**T1+T2 vs. T3**
Functional Fitness														
6-minute walk	**1.27 (1.16 – 1.60)**	-	1.16 (0.90 – 1.49)	-	**1.28 (1.10 – 1.50)**	-	**1.30 (1.05 – 1.57)**	-	1.20 (0.94 – 1.54)	-	1.13 (0.97 – 1.31)	-	1.03 (0.89 – 1.19)	-
30-s arm curl	**1.30 (1.05 – 1.60)**	-	**1.20 (1.10 – 1.30)**	-	**1.31 (1.18 – 1.47)**	-	**1.60 (1.10 – 2.32)**	-	**1.46 (1.25 – 1.71)**	-	1.18 (0.99 – 1.42)	-	0.88 (0.70 – 1.09)	-
30-s chair stand	1.20 (0.98 – 1.47)	-	**1.23 (1.17** – 1.28)	-	1.09 (0.92 – 1.29)	-	1.25 (0.95 – 1.65)	-	**1.32 (1.12 – 1.56)**	-	1.09 (0.90 – 1.32)	-	0.98 (0.80 – 1.20)	-
Chair sit-and-reach	**1.18 (1.05 – 1.33)**	-	0.99 (0.76 – 1.29)	-	1.10 (0.98 -1.23)	-	**1.38 (1.18 – 1.63)**	-	1.02 (0.88 – 1.19)	0.81[b] (0.62 – 1.06)	1.15 (0.97 - 1.38)	-	0.95 (0.83 – 1.09)	-
Back scratch	0.79 (0.65 – 0.95)	-	0.88 (0.69 – 1.11)	0.90[b] (0.57 – 1.40)	0.73 (0.51 – 1.04)	1.10[b] (0.80 – 1.52)	1.12 (0.84 – 1.50)	-	0.82 (0.73 – 0.92)	1.22[b] (0.90 – 1.66)	0.91 (0.82 – 1.00)	-	0.93 (0.77 – 1.12)	-
8-foot up-and-go	1.25 (0.92 – 1.17)	-	**1.34 (1.05 – 1.72)**	**0.85**[b] **(0.80 – 0.89)**	1.13 (0.94 – 1.35)	-	**1.53 (1.18 – 1.93)**	0.87[b] (0.58 – 1.32)	1.02 (0.76 – 1.38)	-	1.09 (0.89 – 1.34)	-	0.98 (0.83 – 1.16)	-

Note: [a]=analysis adjusted for group age, ethnicity, marital status, education level, economical classification, current occupational situation, health problems, use of medications, nutritional status, high blood pressure and physical activity levels. QoL= quality of life; SP: Social participation ; AUT: Autonomy; SF: Sensory functioning ; DaD: death and dying ; INT: Intimacy. OR= odds ratios. CI 95%= Confidence interval of 95%. T1= Tercile 1; T2= Tercile 2; T3= Tercile 3. [b]= It shows the variables whose proportional assumption of the odds ratio was violated

Source: The authors.

Discussion

The present study consisted of a sample of healthy elderly women undergoing a weekly physical activity program offered by the Municipal Secretary for Sport and Recreation in city of Curitiba, Paraná, Brazil. It is possible to suggest, then, that these subjects, besides attending frequent physical activities, they had social relationship through which they might have exchanged personal life history experiences, positive and negative emotions and feelings. Self-perceived quality of life is a multidimensional and complex construction, in which physical, psychological, and emotional domains are involved. It is surprising that among the results shown in Table 2, more than a third of the subjects were classified in the lower tercile of all the domains in both instruments used to measure self-perceived quality of life. Given this, it can be assumed that a high self-perceived quality of life depends on a series of other factors that the context described cannot supply, for example, economic condition, marital status, and education level[26].

Based on Neri et al.[27], the participation of the elderly considering the type of activity in the group they were inserted in the present study is in accordance with the intermediate level of daily life advanced activities, characterized in this case by the fact of gathering together with friends in public places, squares or park for leisure activities. In addition to this type of involvement, the authors showed that individuals with better instrumental support from their partner or spouse, better emotional support from family members, and younger age showed better values of self-perceived quality of life. Such a study showed the mobility variable with an inverse association with self-perceived quality of life, which suggests that good physical fitness might be associated with this perception. A similar result was seen in the study by Gonçalves et al.[28], carried out with a sample of regular physical exercise practitioners, which resembles the sample of the present study. These authors showed that swimmers with more strength in the upper extremities had better self-perceived quality of life in different domains.

In this regard, it is worth mentioning that a routine of physical activities improves maximum oxygen consumption, recovery of heart rate and improvement in functional mobility, which directly benefits the elderly's physical functioning and social participation[29]. These factors can justify the benefits of functional fitness for the self-perceived quality of life in the sample investigated.

In addition to some positive correlations between the elderly different physical fitness and self-perceived quality of life based on the regression analyzes, associations between different physical fitness and the general quality of life and different domains were identified. The elderly women in the lowest tercile had lower quality of life, not only those classified in the highest tercile, but also when grouping the highest one with the intermediate tercile. The different physical capacities measured in this study are related to the elderly functional physical fitness[30]. Several studies have already shown a significant relationship between functional fitness of the elderly and quality of life, since functional fitness is correlated to good performance of daily life activities and the elderly autonomy[28-31,32].

According to the aforementioned studies, part of the research that correlates functional fitness with quality of life focused on the aspect of autonomy and performance of daily life activities[6]. However, the sample of the present study consisted of a group of elderly women undergoing regular physical exercises, thus, physically independent autonomous individuals with regard to their daily life activities. Therefore, in this case, the associations identified between physical fitness and self-perceived quality of life can be considered under the perspective of emotional and psychological aspects. According to Ramirez-Campillo et al.[33], physical training can increase the elderly functional performance and quality of life, also in other domains other than physical parameters.

It is worth mentioning that the regression tables show that most of the associations occurred not only in the physical domain of quality of life, but also in psychological, social and environmental domains, both according to the WHOQOOL-BREF and WHOQOOL-OLD instruments. Under this perspective, better physical fitness values could impact on self-esteem and satisfaction, which in turn would be correlated to the psychological and emotional domains of quality of life[34]. Gonçalves et al.[28] showed that elderly women with better strength performance in the upper extremities had better quality of life values concerning the psychological dimension with a higher interquartile range of 3.33 in this domain score, compared to those who showed worse strength performance of the lower extremities. Similarly, Silva et al.[35] stated that the elderly women with advanced functional fitness had a better score in the environment domain, with an average of 16.3, than those who showed low functional fitness, with a mean score of 14.3.

This study showed the association between physical fitness and the general quality of life of elderly women and its dimensions, regardless of the physical activity level of the subjects. However, when assessing the results, it is necessary to take into account the well-known effect of regular physical activity on physical, social and emotional fitness[13,36]. Therefore, even if statistically controlling this variable during research, controlling the practice effects on physical, psychological or emotional conditions just before data collection was not possible. This is a limitation of this study. In addition, although the instruments used to estimate self-perceived quality of life are widely used and internationally recognized, they are rather complex with regard to interpretation, given their multidimensional nature.

Despite some limitations, the present study had significant findings. The first refers to the fact that despite the known effect of physical activity practice on the elderly self-perceived quality of life, a positive relationship between physical fitness was seen regardless of the physical activity level of the elderly women included the sample. In this regard, further research should direct its purposes towards improving functional fitness and not necessarily towards meeting a cut-off point for the physical activity practice, in order to assess the effect on self-perceived quality of life.

Another significant aspect was the possibility of carrying out the research with a large sample of elderly women, which favors the consistency of the results and reinforces the need for a more accurate look at the elderly functional fitness development. Finally, this study can be considered as a parameter so that health policies encourage the older population to develop physical and functional fitness, which shall reflect in a better self-perceived quality of life.

Conclusions

In general, the findings of the present study showed that better functional fitness is positively associated with a better self-perceived quality of life regarding elderly women, whether this is a general perception or it inserted in its different domains.

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