Original Research Article

Evaluation of health-related quality of life in a physically active senior population

Ana Paula Fontes[1,2]*, Natércia Joaquim[3], Tânia Pereira[1]

[1]Higher School of Health, Algarve University, Portugal
[2]Interdisciplinary Centre of Social Sciences, Nova University, Portugal
[3]Faculty of Medicine and Biomedical Sciences, Algarve University, Portugal

*Correspondence:
Dr. Ana Paula Fontes,
E-mail: anapaulafontes@gmail.com

ABSTRACT

Background: Physical activity (PA) is a strong determinant of health and one of the most important predictors of healthy aging and health-related quality of life (HRQoL). The aim of the study was to understand the HRQoL of a senior population practicing PA and its association with some socio-demographic characteristics, the levels of PA, and functional independence.
Methods: This is a correlational study with a sample of 376 individuals of both sexes. The data collection instruments were a socio-demographic and health questionnaire, the international PA questionnaire (IPAQ)-short version, the Katz index, the Lawton and Brody index, and the WHOQOL-OLD and WHOQOL-BREF questionnaires.
Results: The sample revealed a good perception of HRQoL, especially in the "psychological" and "social relations" domains. Sex showed a greater association with quality of life (QoL) than age. Multiple linear regression revealed that the variables with the most significant influence on the individuals' QoL were related to health ("Presence of chronic disease" and "habitual use of medication"). The QoL related to "social relationships" is the domain with more predictors, with a markedly socio-demographic focus.
Conclusions: Practicing PA proved to be a HRQoL predictor, where "sensory function" and HRQoL related to "social relations" are included. Despite PA practice and socio-demographic characteristics being able to predict some HRQoL domains, health-related variables showed a more robust presence in this prediction.

Keywords: QoL, HRQoL, PA, Exercise, Elderly

INTRODUCTION

Health-related quality of life (HRQoL) is defined as the perception of the physical, mental, and social effects of the disease on the individual's well-being;[1] it is considered an important outcome of population health and an essential public health tool to assess physical and social functioning, mental health, and well-being, as well as to evaluate the effectiveness of the intervention programs.[2]

PA is a strong determinant of health related to lifestyle and one of the most important predictors of healthy aging. Regular and moderate PA promotes mental, physical, and social well-being, helping to prevent diseases and disabilities, consequently affecting the HRQoL of individuals and populations, albeit there are still some doubts about how this relationship is established.[3,4]

Most studies have agreed on the positive association between PA and HRQoL perception, especially in the domains "physical function," "vitality," and "mental health," even though the values of the appropriate level of PA or the dose-response that more positively influence the different dimensions of HRQoL vary greatly.[4-6]

The concept of PA is broader than the terms exercise or sport and encompasses any movement produced by the skeletal muscles with energy expenditure above basal levels.[7] The term, when applied to older populations, is usually related to benefits in functional capacity and health, which may include structured and systematized sports activities and activities such as walking, cycling, dancing, or gardening.[8]

The aim of the study was to know the HRQoL of a senior population practicing PA and its association with socio-demographic characteristics, the level of PA and functional independence as variables of health or health-related states, and to establish a model that enables a better understanding of which variables predict the level of HRQoL observed.

METHODS

This is an observational and correlational study (level III) whose sample includes individuals of both sex, who attended the senior sports program of the municipality of Silves (Algarve, Portugal). Data were collected during the months of January and April 2012.

The exclusion criteria were: individuals under 65 years of age and those who did not give their informed consent.

The sample consisted of 376 individuals from a population of 701, whose selection was made by convenience, considering the presence of the participants during the time period of data collection.

The data were collected, at the beginning of the exercise session, by students who were in the 1st year of the degree in physiotherapy, nursing and pharmacy at the Jean Piaget de Algarve school of health, in the academic year 2011/2012, within the scope of the curricular unit of anthropological fieldwork.

This senior sports program includes gym or pool activities twice a week, for one hour, and whose training protocols consider the American college of sports medicine (ACSM) guidelines for this type of population, where skills related to strength, balance, postural stability, flexibility, endurance, among others, are developed.

The data collection instruments were a questionnaire for socio-demographic and health characterization (the variables are listed in Table 1), the IPAQ-short version, the Katz Index to assess the basic activities of daily living (BADL), the Lawton and Brody Index to assess instrumental activities of daily living (IADL), and the WHOQOL-OLD and WHOQOL-BREF questionnaires to assess QoL.

All subjects gave their informed consent in writing and study previously approved by scientific and pedagogical committees of Jean Piaget School of Health of Algarve.

Univariate statistics were used for data analysis, frequency distribution for categorical variables, and measures of central tendency and dispersion for numerical variables. The correlation between the independent variables and QoL was verified using Pearson's correlation coefficients for the numerical variables and Spearman's correlation for the ordinal and categorical variables. The Kolmogorov-Smirnov test was applied to verify the normality of the sample distribution and Levene's test to assess the homogeneity of variances. Since some variables did not meet the assumptions for applying parametric tests, we used the Mann-Whitney test for two independent samples and the Kruskal-Wallis test for three or more samples. The multiple linear regression with stepwise variable selection was used to obtain a model that would predict each domain of QoL as a function of the independent variables. The model's assumptions were analyzed, namely normal distribution, homogeneity, and independence of errors. The statistical analysis took into account a significance level of 0.05.

RESULTS

The sample was composed of 376 individuals from a population of 701. The individuals were selected by convenience, considering the presence of the participants during the data collection period. The mean age was 70.3 ± 7.3 years, and 82.7% of the participants were female. The results regarding socio-demographic and health variables are listed in Table 1. Most individuals were married (62.1%) and lived with relatives (77.1%), had low academic qualifications, and were retired (86.1%). Smoking habits were almost nonexistent, although the presence of chronic diseases (43.2%) and habitual use of medication (82.9%) were high. Besides the activities included in the IPAQ (52.0% individuals reported high levels and 23.7% moderate levels), 59.3% of the individuals also reported "participating in organized collective activities involving PA." When we analyzed the association of PA with sex and the correlation with age, we did not find any statistical significance. The functional independence in IADL revealed that 76.9% of the participants were completely independent, and the activity where they reported the greatest difficulty was "using the telephone" (13.8%). In the BADL, there were lower values of independence: only 48.7% of the individuals revealed to be completely independent, and activity pointed out as the most limiting was "bathing" (31.9%). Basic and instrumental activities showed no significant correlation with age ($p>0.05$).

The values of HRQoL perception, presented in Table 2, were as follows: in the WHOQOL-OLD, all domains were above 57 points, and the most favorable results occurred in the domains of "social participation" (71.8 ± 16.6), "autonomy" (70.5 ± 19.7), and "sensory functions" (69.8 ± 21.3). In the WHOQOL-BREF, this behavior was verified in the domains "psychological" (68.5 ± 13.9) and "social relationships" (67.2 ± 17.7). In the question "How do you rate your QoL," 51.3% responded

as "very good/good," and in the question about health satisfaction, 48.1% revealed to be "very satisfied/satisfied." The HRQoL components, where individuals feel less satisfied, include the aspects related to "death and dying" and "the environment."

The relationship between the different HRQoL domains, age and sex are listed in Table 3. Younger individuals showed better QoL in the domains "social relationships" (r_P= -0.118; p=0.022), "sensory functions" (r_P=-0.114; p=0.027), "past, present, and future activities" (r_P=0.144; p=0.005), and "intimacy" (r_P=-0.103; p=0.045). We also observed differences in sex, with males scoring more positively in the "death and dying," "intimacy," "psychological," and "social relationships" domains and whose most significant value occurred in the "death and dying" domain (Z=-3.690; p<0.001).

The relationships between the different domains of QoL and social variables are presented in Table 4. We found no relationship with the variable "employment situation." There were significant differences in the domains "intimacy" (X^2= 47.743; p<0.001), "social relationships" (X^2=18.943; p<0.001), and "psychological" (X^2=11.566; p=0.009) according to marital status, with married individuals showing better QoL in the first two domains and single people in the last one. An identical behavior was observed in the variable "With whom you live" regarding the domains "intimacy" (X^2=28.109; p<0.001) and "social relationships" (X^2=21.720; p<0.001). The academic qualifications were only significantly correlated with QoL in the domains "sensory functions" (r_S=0.128; p=0.015), "past, present, and future activities" (r_S=-0.147; p=0.005), and "social participation" (r_S=0.043; p=0.009).

The relationship between the different HRQoL domains and the health-related variables is presented in Table 5.

No significant differences were found in any of the QoL domains according to smoking habits and for the variable "participation in other organized collective activities involving PA," this was only observed in the domain "past, present, and future activities" (Z=-2.660; p=0.008). In turn, the variables "presence of chronic disease" and "habitual use of medication" had the most significant influence on QoL, with the highest significance being in health satisfaction and the domains "physical," "psychological," and "the environment."

The correlations between QoL and PA and physical and instrumental autonomy are shown in Table 6. The PA showed a positive and weak correlation with the domains "sensory functions" (r_S=0.116; p=0.024), "physical" (r_S=0.102; p=0.047), and "social relationships" (r_S=0.135; p=0.009). Physical autonomy showed correlation with perceived QoL (r_S=0.102; p=0.049) and the domains "autonomy" (r_S=0.131; p=0.011) and "the environment" (r_S=0.106; p=0.039). In turn, instrumental autonomy correlated with "sensory functions" (r_S=0.151; p=0.003) and "autonomy" (r_S=0.170; p<0.001).

The statistical data from the multiple linear regression models obtained for each HRQOL domain are listed in Tables 7 and 8. Although significant, the models only explain a low proportion of QoL variability. The model with the highest predictive power was one for "physical domain" with 13.7% and for "social participation" with 1.8%. Considering the set of independent variables, the "presence of chronic disease" was the one with the highest predictive power, and it was present in the models of all domains of QoL of the WHOQOL-BREF and three of the six domains of the WHOQOL-OLD. Additionally, PA only showed prediction with the domains "social relationships" (β=2.71; t=2.45; p=0.015) and "sensory function" (β=2.92; t=1.34; p=0.030).

Table 1: Sample characteristics, (n=376).

Socio-demographic variables	Mean (±SD), N (%)
Age (years)	70.3 (±7.3)
Sex	
Female	311 (82.7)
Male	65 (17.3)
Marital status	
Married	233 (62.1)
Widower	112 (29.9)
Single	10 (2.7)
Divorced/separated	20 (5.3)
With whom you live	
Family members	289 (77.1)
Alone	81 (21.6)
With another person	5 (1.3)
Academic qualifications	
Illiterate	41 (11.2)
4 years	225 (61.6)
6 years	55 (15.1)
≥7 years	38 (10.4)
Higher education	6 (1.6)

Continued.

Socio-demographic variables	Mean (±SD), n (%)
Employment situation	
Retired	323 (86.1)
Active	15 (4.0)
Unemployed	14 (3.7)
Other situation	23 (6.1)
Health variables	
Smoking habits	
Yes	12 (3.2)
No	363 (96.8)
Presence of chronic illness	
Yes	162 (43.2)
No	212 (56.8)
Habitual medication consumption	
Yes	311 (82.9)
No	64 (17.1)
Other organized collective activities	
Involving PA	
Yes	223 (59.5)
No	152 (40.5)
Level of PA	
Low	88 (23.4)
Moderate	89 (23.7)
High	199 (52.9)
BADL independence level	
Independent	183(48.7)
Dependent =1 activity	120 (31.9)
Dependent ≥2 activity	73 (19.4)
IADL independence level	
Independent	289 (76.9)
Dependent =1 activity	52 (13.8)
Dependent ≥2 activity	35 (9.3)

Table 2: Scores of the different domains of WHOQoL-OLD and WHOQoL-BREF.

Variables	Mean (±SD), N (%)
WHOQoL-OLD/domains	
Sensory functions	69.81 (±21.27)
Autonomy	70.45 (±19.69)
Past, present, and future activities	63.32 (±17.21)
Social participation	71.79 (±16.64)
Death and dying	57.21 (±28.22)
Intimacy	68.00 (±24.21)
Total score	400.60 (±70.98)
WHOQoL-BREF/domains	
How do you rate your QoL?	
Very bad/bad	13 (3.5)
Neither good nor bad	170 (45.2)
Good/very good	193 (51.3)
How satisfied are you with your health?	
Very dissatisfied/unhappy	56 (14.9)
Neither satisfied nor dissatisfied	139 (37.0)
Satisfied/very satisfied	181 (48.1)
Physical	66.20 (±16.72)
Psychological	68.54 (±13.99)
Social relations	67.20 (±17.74)
Environment	64.36 (±13.24)

Table 3: Relationship between the different domains of QoL, age, and sex.

Variables	Age (years)	Sex
WHOQoL-OLD/domains	**Pearson's correlation**	**Mann-Whitney test**
Sensory functions	r=-0.114, p=0.027	Z=-0.813, p=0.416
Autonomy	r=-0.025, p=0.622	Z=-1.050, p=0.294
Past, present, and future activities	r=0.144, p=0.005	Z=-0.953, p=0.340
Social participation	r=0.079, p=0.126	Z=-0.029, p=0.977
Death and dying	r=0.010, p=0.846	Z=-3.690, p<0.001
Intimacy	r=-0.103, p=0.045	Z=-2.021, p=0.043
WHOQo-BREF/domains		
"How do you rate your QoL?"	r=-0.070, p=0.178	Z=-1.737, p=0.082
"How satisfied are you with your health?"	r=0.052, p=0.315	Z=-2.976, p=0.003
Physical	r=-0.049, p=0.341	Z=-1.722, p=0.085
Psychological	r=0.041, p=0.424	Z=-2.568, p=0.010
Social relations	r=-0.118, p=0.022	Z=-2.181, p=0.029
The environment	r=0.064, p=0.218	Z=-1.579, p=0.114

Table 4: Relationship between the different domains of QoL and the social variables.

Variables	MS[1]	WWL[2]	ES[3]	AQ[4]
WHOQoL-OLD/domains	**Kruskal Wallis test**	**Kruskal Wallis test**	**Kruskal Wallis test**	**Speraman's corr.**
Sensory functions	X^2=7.158, p=0.067	X^2=2.943, p=0.230	X^2=1.134, p=0.769	r=0.128, p=0.015
Autonomy	X^2=0.364, p=0.948	X^2=0.992, p=0.609	X^2=6.037, p=0.110	r=-0.064, p=0.22
Past, present, and future activities	X^2=0.871, p=0.832	X^2=0.510, p=0.775	X^2=2.180, p=0.536	r=-0.147, p=0.005
Social participation	X^2=0.884, p=0.829	X^2=0.165, p=0.921	X^2=2.708, p=0.439	r=-0.137, p=0.009
Death and dying	X^2=3.224, p=0.358	X^2=3.604, p=0.165	X^2=5.514, p=0.138	r=0.043, p=0.415
Intimacy	X^2=47.743, p<0.001	X^2=28.109, p<0.001	X^2=7.312, p=0.063	r=-0.010, p=0.857
WHOQoL-BREF/domains				
How do you rate QoL?	X^2=2.559, p=0.465	X^2=2.584, p=0.275	X^2=2.988, p=0.393	r=0.060, p=0.258
How satisfied are you with your health?	X^2=4.755, p=0.191	X^2=2.215, p=0.330	X^2=1.157, p=0.763	r=0.091, p=0.084
Physical	X^2=2.112, p=0.550	X^2=2.353, p=0.308	X^2=5.385, p=0.146	r=0.036, p=0.500
Psychological	X^2=11.566, p=0.009	X^2=2.796, p=0.247	X^2=2.660, p=0.447	r=-0.034, p=0.524
Social relations	X^2=18.943, p<0.001	X^2=21.720, p<0.001	X^2=4.879, p=0.181	r=-0.026, p=0.616
The environment	X^2=0.345, p=0.951	X^2=1.458, p=0.482	X^2=0.443, p=0.931	r=-0.091, p=0.085

[1]Marital status; [2]"With whom you live"; [3] employment situation; [4] academic qualifications.

Table 5: Relationship between the different domains of QoL and health-related variables.

Variables	SH[1]	PCD[2]	HUM[3]	PAGOIPAF[4]
WHOQoL-OLD/domains	**Mann-Whitney test**	**Mann-Whitney test**	**Mann-Whitney test**	**Mann-Whitney**
Sensory functions	Z=-0.097, p=0.923	Z=-2.842, p=0.004	Z=-2.282, p=0.022	Z=-0.642, p=0.521
Autonomy	Z=-0.395, p=0.693	Z=-1.782, p=0.075	Z=-1.203, p=0.229	Z=-1.770, p=0.077
Past, present, and future activities	Z=-0.67, p=0.537	Z=-2.696, p=0.007	Z=-0.030, p=0.976	Z=-2.660, p=0.008
Social participation	Z=-0.205, p=0.837	Z=-2.809, p=0.005	Z=-1.143, p=0.253	Z=-1.872, p=0.061
Death and dying	Z=-1.824, p=0.068	Z=-1.296, p=0.195	Z=-1.932, p=0.053	Z=-1.076, p=0.282
Intimacy	Z=-1.752, p=0.080	Z=-1.694, p=0.090	Z=-1.346, p=0.178	Z=-0.455, p=0.649
WHOQo-BREF/domains				
How do you rate QoL?	Z=-0.665, p=0.506	Z=-2.502, p=0.012	Z=-0.482, p=0.630	Z=-1.356, p=0.175
How satisfied are you with your health?	Z=-1.184, p=0.237	Z=-6.195, p<0.001	Z=-4.103, p<0.001	Z=-0.036, p=0.971
Physical	Z=-0.293, p=0.770	Z=-5.700, p<0.001	Z=-4.062, p<0.001	Z=-0.195, p=0.845
Psychological	Z=-0.609, p=0.542	Z=-2.792, p=0.005	Z=-2.683, p=0.007	Z=-0.681, p=0.496
Social relations	Z=-0.839, p=0.401	Z=-1.594, p=0.111	Z=-2.539, p=0.011	Z=-0.558, p=0.577
Environment	Z=-0.247, p=0.805	Z=-3.833, p<0.001	Z=-2.092, p=0.036	Z=-1.766, p=0.077

[1]Smoking habits; [2]Presence of chronic disease; [3]Habitual use of medication; [4]Participation in organized group activities involving PA.

Table 6: Correlation between the different domains of QoL and the indices of PA and physical and instrumental autonomy.

Variables	PAIPAQ[1]	PAKI[2]	IALBI[3]
WHOQoL-OLD/domains	Spearman's correlation		
Sensory functions	r=0.116, p=0.024	r=0.031, p=0.552	r=-0.151, p=0.003
Autonomy	r=0.006, p=0.901	r=-0.131, p=0.011	r=-0.170, p<0.001
Past, present, and future activities	r=-0.053, p=0.306	r=-0.068, p=0.187	r=-0.029, p=0.570
Social participation	r=0.050, p=0.332	r=-0.095, p=0.067	r=-0.073, p=0.156
Death and dying	r=-0.007, p=0.892	r=0.020, p=0.700	r=0.065, p=0.205
Intimacy	r=-0.033, p=0.526	r = 0.026, p=0.614	r=-0.018, p=0.729
WHOQoL-BREF/domains			
"How do you rate your QoL?"	r=0.047, p=0.368	r=0.102, p=0.049	r=0.015, p=0.776
"How satisfied are you with your health?"	r=0.038, p=0.465	r=0.031, p=0.545	r=0.045, p=0.385
Physical	r=0.102, p=0.047	r=-0.081, p=0.118	r=-0.057, p=0.274
Psychological	r=0.033, p=0.527	r=-0.070, p=0.177	r=-0.009, p=0.867
Social relations	r=0.135, p=0.009	r=0.026, p=0.618	r=-0.002, p=0.969
Environment	r=0.020, p=0.693	r=-0.106, p=0.039	r=-0.088, p=0.089

PA (IPAQ); [2]Physical autonomy (Katz index); [3]Instrumental autonomy (Lawton and Brody index).

Table 7: Results of the multiple linear regression with WHOQoL-BREF as the dependent variable.

Dependent variables	Independent variables included in model	Regression coefficient (β)	Standard error	T value	P value	Model statistics
PD[1]	Constant	91.14	-	-	-	$F_{(5, 349)}=12.258$, p<0.001, r^2 adjusted=0.137
	Chronic disease	-9.64	1.73	-5.58	<0.001	
	Medication	-5.34	2.25	-2.37	0.018	
	Employment situation	3.77	1.49	2.52	0.012	
	Lawton index	-2.12	0.79	-2.695	0.008	
	Sex	-4.57	2.24	-2.05	0.041	
PSD[2]	Constant	81.11	-	-	-	$F_{(2,352)}=8.862$, p<0.001, r^2 adjusted=0.043
	Marital status	-2.41	0.78	-3.09	0.002	
	Chronic disease	-4.24	1.48	-2.86	0.004	
SRD[3]	Constant	78.05				$F_{(3, 351)}=10.650$, p<0.001, r^2 adjusted=0.076
	Marital status	-4.43	0.97	-4.58	<0.001	
	PA	2.71	1.11	2.45	0.015	
	Chronic disease	-3.69	1.84	-2.01	0.045	
ED[4]	Constant	72.53				$F_{(1,353)}=15.826$, p<0.001, r^2 adjusted=0.040
	Chronic disease	-5.58	1.40	-3.978	<0.001	
General QoL[5]	Constant	3.74				$F_{(2, 353)}=5.243$, p=0.006, R^2 adjusted=0.023
	Chronic disease	-0.18	0.070	-2.60	0.010	
	Katz index	0.05	0.026	1.99	0.047	
Health satisfaction[6]	Constant	5.03				$F_{(3,351)}=18.278$, p=0.006, r^2 adjusted=0.128
	Chronic disease	-0.50	0.088	-5.72	<0.001	
	Sex	-0.26	0.11	-2.38	0.018	
	Medication	-0.26	0.12	-2.26	0.024	

[1]Physical domain; [2]Psychological domain; [3]Social relations domain; [4]Environmental domain; [5]How do you rate your QoL; [6]How satisfied are you with your health.

Table 8: Results of the multiple linear regression with WHOQoL-OLD as the dependent variables.

Dependent variables	Independent variables included in model	Regression coefficient (β)	Standard error	T value	P value	Model statistics
SF[1]	Constant	80.86	-	-	-	$F_{(4,350)}=7.098$, p<0.001, r^2 adjusted=0.064
	Chronic disease	-6.38	2.23	-2.87	0.004	
	Lawton index	-2.95	1.02	-2.897	0.004	
	Marital status	-2.88	1.17	-2.46	0.015	
	PA	2.92	1.34	2.18	0.030	

Continued.

Dependent variables	Independent variables included in model	Regression coefficient (β)	Standard error	T value	P value	Model statistics
Autonomy	Constant	62.87				F (2. 352)=8.238, p<0.001, r^2 adjusted=0.039
	Lawton index	-3.22	0.94	-3.44	0.001	
	Employment situation	4.30	1.82	2.36	0.019	
PPFA[2]	Constant	48.27				F (2.352)=7.314, p=0.001, r^2 adjusted=0.034
	Chronic disease	-4.78	1.84	-2.60	0.010	
	Age (Years)	0.32	0.13	2.52	0.012	
SP[3]	Constant	79.04				F (1.353)=7.413, p=0.007, r^2 adjusted=0.018
	Chronic disease	-4.83	1.78	-2.72	0.007	
Death	Constant	114.87				F (3.351)=7.676, p<0.001, r^2 adjusted=0.054
	Sex	-14.13	3.82	-3.70	<0.001	
	Smoker	-19.73	8.15	-2.42	0.016	
	Employment situation	-5.43	2.64	-2.06	0.040	
Intimacy	Constant	90.37				F (1.353)=41.756, p<0.001, r^2 adjusted=0.103
	Marital status	-8.37	1.30	-0.33	<0.001	

[1]Sensory function; [2]Past present, and future activities; [3]Social participation.

DISCUSSION

Considering the stipulated objectives, we explored the association of HRQoL with the socio-demographic variables, the level of PA, and functional independence. It was also possible to present a multiple linear regression model that allows each QoL domain to be predicted as a function of the independent variables, which met the model's assumptions.

Quality of life and demographic variables

The perception of QoL reported by the study sample was positive as the participants always scored above 50 points in all domains, with the best scores in the "social participation" and "psychological" domains.

Younger individuals had a better perception of their QoL in most domains, which is also the conclusion of most studies.[9-11] Nonetheless, we found that this association was not established in some dimensions, specifically in "social relationships," "sensory functions," "intimacy," and "past, present, and future activities." Aging in itself may not negatively influence QoL, and if individuals have good adaptation and resilience strategies, this quality may be maintained throughout life.[12,13] Aspects related to relationships, social participation, and autonomy in activities are decisive in the perception of QoL, and these were domains where participants scored very positively and may be the justification for this association.

The sample was mainly composed of women (82.7%), although men scored more positively in the domains "psychological," "social relationships," "death and dying," and "intimacy," as well as feeling more satisfied with their health. Despite the greater longevity of women, they usually manifested greater biological disability and a worse perception of health and QoL.[9-11,14]

Quality of life and social variables

Regarding marital status, the sample was basically divided between married individuals (62%) and widowers (29.8%), who reported worse QoL in the domains "psychological," "social relationships," and "intimacy." Nevertheless, married people were the ones who perceived better QoL in the "social relationships" and "intimacy" domains, while single people had this perception in the "psychological" domain. Research has suggested that the presence of a partner may be a factor for health-related well-being and even for reduced mortality rates in the elderly, and therefore, it may be considered a predictor of QoL.[15,16]

Most individuals (76.9%) living with relatives reported better QoL in the domains "social relationships" and "intimacy." The support of a good social network, which includes conjugality, socializing, and regular relationships with family members, is referred to by several studies as an essential determinant of elderly people's QoL.[14,17,18] Having relationships with family and friends and playing social roles are aspects highly valued by older people when assessing QoL.[14,17,18]

The data regarding marital status, living with family members, and participating in collective activities may also, as a whole, have positively influenced the results we obtained. Although the level of education attained by the population in Portugal has increased significantly in the last two decades, the educational resources of the Portuguese elderly population remain low, and the same status was observed in the study sample. Individuals with more significant cultural and academic differentiation reported higher HRQoL levels in the domains of "sensory function," "past, present, and future activities," and "social participation." Some studies point in the same direction,[9,19–21] and these results may reflect better skills to manage their health through greater knowledge and ability to solve occasional pathological episodes.

Quality of life and health variables

The number of individuals who reported having one or more chronic diseases was high (43.1%), and overall, they perceived a worse QoL in most of the domains assessed. In addition, individuals who reported habitually taking medication obtained lower scores in the perception of HRQoL. Chronic disease conditions are a risk factor for a negative perception of QoL,[9,10,22,23] and this was the dependent variable with the highest predictive value. The literature has shown that this situation occurs mainly regarding the variables related to physical health and when we are in the presence of some specific conditions, including hypertension, diabetes, lower back pain, knee osteoarthritis, stroke and mental disorders or when there is multimorbidity.[9,23-25] It seems important to emphasize the fact that the presence of chronic disease does not seem to inhibit individuals from practicing PA.

The number of individuals who reported habitually taking medication was quite high (82.7%), and they reported a worse QoL in almost all domains of the WHOQOL-BREF and the "sensory functions" of the WHOQOL-OLD. We can assume that this high number of medications is associated with a high number of chronic diseases, albeit we are also facing an overuse of medication, aspects that affect the perception of QoL of individuals.[26,27] The prescription of medication in the elderly presents some difficulties, including comorbidities, limited evidence regarding its effectiveness, increased risk of adverse reactions, polypharmacy or overdose.[28,29] For Olsson and colleagues, the most appropriate medication is the one that promotes the QoL of individuals, and its prescription must be seen as a contemporary gesture where physicians and patients are involved.[30] Some aspects can help reduce inappropriate prescriptions, such as regular medication review, electronic prescribing, frequent audits, and limiting the number of prescribers.[28,31]

In addition to being integrated into the senior sports program, 59.3% of the individuals reported being integrated into collective activities that involved PA, and they were more satisfied with their QoL regarding "past, present, and future activities."

The elderly individuals who maintain leisure activities whose component is PA usually show better HRQoL scores, which can be attributed to the direct effects of PA and those related to participation and social interaction.[13,32-34] The rural environment where most sample individuals live may have contributed to this result.

Quality of life and PA

There is evidence that PA improves many but not all domains of overall QoL, which is better observed in self-efficacy and HRQoL.[4,35] Taking into account the level of PA demonstrated by individuals, the results may also

reflect the different benefits associated with this practice, including promoting social relationships and psychological and cognitive well-being.[4,36,37] In our study, this variable was predictive regarding "social relationships" and "sensory function," although with a weak value. Our sample has an important level of PA practice; 86.6% of the individuals have moderate/high PA levels. We believe that these values are associated with rural activities, in which individuals are inserted, corresponding to activities related to agriculture, gardening, or animal breeding. Another aspect that we can add to justify this result is the environment; most sampled individuals come from rural areas, where accessibility is mainly on foot. This way of getting around is more rooted in rural environments and where means of transportation are also scarcer. These behaviors have positively influenced the HRQoL of individuals in the "physical" and "social relations" domains, which is where the best results are usually found, which seems to corroborate the grounds of our justification. [38-40]

Quality of life and physical and instrumental autonomy

Less than half of the sample (48.7%) reported being completely independent in basic activities, and those who reported being dependent in one activity (31.9%) pointed out bathing as their major limitation, despite most of them being independent in their hygiene. Among the daily activities, bathing is recurrently mentioned as the one that produces the greatest limitation and usually precedes other basic difficulties.[41,42] The difference between the levels of independence in these activities and the perception of QoL was related to the domains "the environment" and "sensory functions." In fact, bathrooms are usually environments poorly adapted to the difficulties of movement and balance of the elderly population, and if we add to this barrier some sensory and sensitivity deficits, we may have the justification for this association. Thus, it is pivotal to develop strategies that establish early signaling processes and compensatory interventions through assistive technologies or environmental modifications.

Contrary to what is usually described in the literature, the behavior regarding instrumental activities was more positive, with most individuals (76.9%) reporting complete autonomy or independence, with the most limiting activity being using the telephone.[41,43] The activities included in this domain demand a more elaborate ability of the associated functions (strength of limbs, mobility, balance, coordination, sensory functions, and cognition) and adequate interaction with an external environment, with multiple requests and demands and not always familiar. The differences found in our study reside in the fact that our sample was composed of individuals who were not only active but also practiced high levels of PA. These aspects predispose them to levels of autonomy and independence in these activities, despite the ACSM stating that the effects of PA on the capacity and

performance of DLAs are still not well understood or linear.[44]

Nonetheless, resistance training has shown evidence to improve the performance of some more basic activities, including walking or getting up and sitting down.[44] The literature has reported that the use of the telephone is usually pointed out as the one that elderly individuals feel more independent, although our findings also contradicted this trend.[41,43] We believe that our results may be related to the rurality of the sample. The most independent respondents reported higher levels of QoL in the "sensory functions" and "autonomy" domains, aspects that corroborate what we described concerning the functionality of the components of functions and activities or participation.

Despite the promising findings, the authors admit that the study has some limitations: the results cannot be generalized given the context and the specific characteristics of the sample; the collection of PA values was self-reported; IPAQ is a questionnaire that implies knowledge about the intensity of the effort to distinguish between moderate or vigorous activity, and this differentiation is not always completely objective or clear.

CONCLUSION

The study sample showed a good perception of HRQoL, especially in the "psychological" and "social relationships" domains, resulting from some predisposing factors, which may include the regular practice of PA. Sex showed a greater association with QoL than age. The variables with greater influence on the QoL of individuals are health-related ("Presence of chronic disease" and "habitual use of medication"). The QoL related to "social relationships" is the domain with more predictors, with a markedly socio-demographic focus.

PA practice is a predictor of physical HRQoL, where "sensory functions" are included, and HRQoL is related to "social relationships." Although PA practice and socio-demographic characteristics can predict some HRQoL domains, health-related variables showed a more robust presence in this prediction.

ACKNOWLEDGMENTS

The authors thank all the seniors who participated in the study and the students who collected the data.

REFERENCES

1. Urzua, MA. Calidad de vida relacionada con la salud: Elementos conceptuales. Revista Medica de Chile 2010;138(3):358-65.
2. Romero M, Vivas-Consuelo D, Alvis-Guzman N. Is Health Related Quality of Life (HRQoL) a valid indicator for health systems evaluation? Springerplus. 2013;2(1):664.
3. WHO Regional Office for Europe 1. Policies and Priority Interventions for Healthy Ageing, 2012. Available at http://www.euro.who.int/data/assets/pdf_file/0006/161637/WHD-Policies-and-Priority-Interventions-for-Healthy-Ageing.pdf. Accessed 1 april 2022.
4. American College of Sports Medicine. Quantity and Quality of Exercise for Developing and Maintaining Cardiorespiratory, Musculoskeletal, and Neuromotor Fitness in Apparently Healthy Adults: Guidance for Prescribing Exercise. Position Stand. 2013.
5. Puciato D, Borysiuk Z, Rozpara M. Quality of life and physical activity in an older working-age population. Clin Interv Aging. 2017;12:1627-34.
6. Koolhaas CM, Dhana K, van Rooij FJA, Schoufour JD, Hofman A, Franco OH. Physical Activity Types and Health-Related Quality of Life among Middle-Aged and Elderly Adults: The Rotterdam Study. J Nutr Health Aging. 2018;22(2):246-53.
7. Dasso NA. How is exercise different from physical activity? A concept analysis. Nurs Forum. 2019;54(1):45-52.
8. Martin BW, Kahlmeier S, Racioppi F, Berggren F, Miettinen M, Oppert JM et al. Evidence-based physical activity promotion - HEPA Europe, the European Network for the Promotion of Health-Enhancing Physical Activity. J Public Health. 2006;14:53-7.
9. Arrospide A, Machón M, Ramos-Goñi JM, Ibarrondo O, Mar J. Inequalities in health-related quality of life according to age, gender, educational level, social class, body mass index and chronic diseases using the Spanish value set for Euroquol 5D-5L questionnaire. Health Qual Life Outcomes. 2019;;17(1):69.
10. Maniscalco L, Miceli S, Bono F, Matranga D. Self-Perceived Health, Objective Health, and Quality of Life among People Aged 50 and Over: Interrelationship among Health Indicators in Italy, Spain, and Greece. Int J Environ Res Public Health. 2020;17(7):2414.
11. Pereira-de-Sousa AM, López-Rodríguez JA. Self-perceived health in Spanish and Portuguese young seniors after the great recession according to the European Health Survey: A cross-sectional study. Aten Primaria. 2021;53(7):102064.
12. Wrosch C, Scheier MF. Personality and quality of life: the importance of optimism and goal adjustment. Qual Life Res. 2003;12(1):59-72.
13. Netuveli G, Blane D. Quality of life in older ages. Br Med Bull. 2008;85:113-2.

14. Lee KH, Xu H, Wu B. Gender differences in quality of life among community-dwelling older adults in low- and middle-income countries: results from the Study on global AGEing and adult health (SAGE). BMC Public Health. 2020;20(1):114.
15. Manzoli L, Villari PM, Pirone G, Boccia A. Marital status and mortality in the elderly: a systematic review and meta-analysis. Soc Sci Med. 2007;64:77-94.
16. Luanaigh CO, Lawlor BA. Loneliness and the health of older people. Int J Geriatr Psychiatry. 2008;23(12):1213-21.
17. Meyer OL, Castro-Schilo L, Aguilar-Gaxiola S. Determinants of mental health and self-rated health: a model of socioeconomic status, neighborhood safety, and physical activity. Am J Public Health. 2014;104(9):1734-41.
18. Morgan KJ, Eastwood JG. Social determinants of maternal self-rated health in South Western Sydney, Australia. BMC Res Notes. 2014;7:51.
19. Ross NA, Garner R, Bernier J, Feeny DH, Kaplan MS, McFarland B, Orpana HM, Oderkirk J. Trajectories of health-related quality of life by socio-economic status in a nationally representative Canadian cohort. J Epidemiol Community Health. 2012;66(7):593-8.
20. Pappa E, Kontodimopoulos N, Papadopoulos AA, Niakas D. Assessing the socio-economic and demographic impact on health-related quality of life: evidence from Greece. Int J Public Health. 2009;54(4):241-9.
21. Szeles MR. Comparative Examination of Self-Perceived Health and Other Measures of the Quality of Life Across the EU-27. Soc Indic Res. 2018;137:391-411.
22. Delgado-Sanz MC, Prieto-Flores ME, Forjaz MJ, Ayala A, Rojo-Perez F, Fernandez-Mayoralas G et al. Influence of chronic health problems in dimensions of EQ-5D: study of institutionalized and non-institutionalized elderly. Rev Esp Salud Publica. 2011;85(6):555-68.
23. Van Wilder L, Devleesschauwer B, Clays E, De Buyser S, Van der Heyden J, Charafeddine R, Boeckxstaens P, De Bacquer D, Vandepitte S, De Smedt D. The impact of multimorbidity patterns on health-related quality of life in the general population: results of the Belgian Health Interview Survey. Qual Life Res. 2022;31(2):551-65.
24. Wang HM, Beyer M, Gensichen J, Gerlach FM. Health-related quality of life among general practice patients with differing chronic diseases in Germany: cross sectional survey. BMC Public Health. 2008;8:246.
25. Hunger M, Thorand B, Schunk M, Döring A, Menn P, Peters A, Holle R. Multimorbidity and health-related quality of life in the older population: results from the German KORA-age study. Health Qual Life Outcomes 2011;9:53.
26. Kuijpers MA, van Marum RJ, Egberts AC, Jansen PA; OLDY (OLd people Drugs and dYsregulations) Study Group. Relationship between polypharmacy and underprescribing. Br J Clin Pharmacol. 2008;65:130-3.
27. Montiel-Luque A, Núñez-Montenegro AJ, Martín-Aurioles E, Canca-Sánchez JC, Toro-Toro MC, González-Correa JA; Polipresact Research Group. Medication-related factors associated with health-related quality of life in patients older than 65 years with polypharmacy. PLoS One. 2017;12(2):e0171320.
28. Milton JC, Hill-Smith I, Jackson SHD. Prescribing for older people. BMJ. 2008;336(7644):606-9.
29. Alagiakrishnan K, Mah D, Padwal R. Classic challenges and emerging approaches to medication therapy in older adults. Discov Med. 2018;26(143):137-46.
30. Olsson IN, Runnamo R, Engfeldt P. Medication quality and quality of life in the elderly, a cohort study. Health Qual Life Outcomes.2011;9:95
31. Salahudeen MS. Deprescribing medications in older people: a narrative review. Drugs Today (Barc). 2018;54(8):489-98.
32. Balboa-Castillo T, León-Muñoz LM, Graciani A, Rodríguez-Artalejo F, Guallar-Castillón P. Longitudinal association of physical activity and sedentary behavior during leisure time with health-related quality of life in community-dwelling older adults. Health Qual Life Outcomes. 2011;9:47.
33. Sanchez-Villegas A, Ara I, Dierssen T, de la Fuente C, Ruano C, Martínez-González MA. Physical activity during leisure time and quality of life in a Spanish cohort: SUN (Seguimiento Universidad de Navarra) project. Br J Sports Med. 2012;46(6):443-8.
34. Niedermeier M, Herzog S, Kopp-Wilfling P, Burtscher M, Kopp M. Is the Effect of Physical Activity on Quality of Life in Older Adults Mediated by Social Support? Gerontology. 2019;65(4):375-82.
35. Wendel-Vos GC, Schuit AJ, Tijhuis MA, Kromhout D. Leisure time physical activity and health-related quality of life: cross-sectional and longitudinal associations. Qual Life Res. 2004;13(3):667-77.
36. An HY, Chen W, Wang CW, Yang HF, Huang WT, Fan SY. The Relationships between Physical Activity and Life Satisfaction and Happiness among Young, Middle-Aged, and Older Adults. Int J Environ Res Public Health. 2020;17(13):4817.
37. Gheysen F, Poppe L, DeSmet A, Swinnen S, Cardon G, De Bourdeaudhuij I et al. Physical activity to improve cognition in older adults: can physical activity programs enriched with cognitive challenges enhance the effects? A systematic review and meta-analysis. Int J Behav Nutr Phys Act. 2018;15(1):63.
38. Wanderley FA, Silva G, Marques E, Oliveira J, Mota J, Carvalho J. Associations between objectively assessed physical activity levels and fitness and self-reported health-related quality of life in community-dwelling older adults. Qual Life Res. 2011;20(9):1371-8.
39. Olivares PR, Gusi N, Prieto J, Hernandez-Mocholi MA. Fitness and health-related quality of life

dimensions in community-dwelling middle aged and older adults. Health Qual Life Outcomes. 2011;9:117.

40. Acree LS, Longfors J, Fjeldstad AS, Fjeldstad C, Schank B, Nickel KJ et al. Physical activity is related to quality of life in older adults. Health Qual Life Outcomes. 2006;4:37.

41. Carmona-Torres JM, Rodríguez-Borrego MA, Laredo-Aguilera JA, López-Soto PJ, Santacruz-Salas E, Cobo-Cuenca AI. Disability for basic and instrumental activities of daily living in older individuals. PLoS One 2019;14(7):e0220157.

42. Naik AD, Concato J, Gill TM. Bathing disability in municipality-living older persons: Common, consequential, and complex. J Am Geriatr Soc. 2004;52(11):1805-10.

43. Portela D, Almada M, Midão L, Costa E. Instrumental Activities of Daily Living (iADL) Limitations in Europe: An Assessment of SHARE Data. Int J Environ Res Public Health. 2020;17(20):7387.

44. American College of Sports Medicine. Exercise and Physical Activity for Older adults. Position Stand. 2009.