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Physical activity and physical fitness according to loneliness levels in adults 50+

Caraterização da atividade física e aptidão física de acordo com os níveis de solidão em adultos 50+

AUTHOR'S

Simão Pedro-Costa[1,2]
Aoife Hiney[3,4]
Arnaldina Sampaio[1,2]
José Pedro Guimarães[2]
Lucimére Bohn[1,2]
Inês Marques-Aleixo[1,2]

1 Research Centre in Physical Activity, Health and Leisure, Laboratory for Integrative and Translational Research in Population Health, Faculty of Sport, University of Porto, Porto, Portugal.

2 Faculty of Psychology, Education and Sports, Lusófona University of Porto, Porto, Portugal.

3 INET- md, University of Aveiro; Higher School of Education, Polytechnic Institute of Porto.

4 Higher School of Education, Polytechnic Institute of Porto.

CORRESPONDING

Simão Pedro Ferreira Costa
By.scosta@gmail.com
Faculdade de Desporto da Universidade do Porto. R. Dr. Plácido da Costa 91, Porto, Portugal. CEP: 4200-450.

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ABSTRACT

Loneliness is a perception of dissatisfaction that seems to be the result of a lack of significant relationships, with multiple potential causal factors. The current body of research is not conclusive in relation to the link between loneliness and physical activity (PA) and physical fitness (PF) in adults and seniors. The aim of this cross-sectional study is to characterize PA and PF according to levels of loneliness (Social Isolation versus Affinities). The 62 Portuguese individuals (64.68 ± 6.85 years; 68% women) were assessed for loneliness (University of California Los Angeles 16-item Loneliness Scale - UCLA-16). and classified in Social Isolation or Affinities, i.e., presence of significant social relationships. PA was estimated using a questionnaire (International PA Questionnaire - Short Version - IPAQ-SV) and PF was evaluated using the Senior Fitness Test (upper and lower body strength, upper and lower body flexibility, cardiorespiratory fitness, agility and dynamic balance). Descriptive statistics were used. The comparison between groups was performed using parametric (t-test, ANCOVA adjusted to sex and chi-square) and non-parametric tests (Mann-Whitney). The prevalence of social isolation was 53%. The individuals of the Affinities group spent more minutes per day on moderate and vigorous physical activity (MVPA) than the individuals of the Social Isolation group (0.00 [0.00 – 12.86] versus 11.43 [0.00 – 17.14] minutes, respectively; p = 0.041). After adjusting for sex, the differences were no longer significant. Loneliness groups were not different in relation to PF. PA appears to contribute to a better mental profile in adults and seniors. The results should be confirmed through studies with larger samples.

Keywords: Loneliness scale; Sedentary lifestyle; International physical activity questionnaire; Senior fitness test.

RESUMO

A solidão é uma percepção de insatisfação que parece resultar da carência de relacionamentos significativos, sendo múltiplos os seus potenciais fatores causais. A atual evidência não é robusta no que diz respeito à associação da solidão com a atividade física (AF) e aptidão física (ApF) em adultos 50+. O objetivo deste estudo transversal é caracterizar a AF e ApF de acordo com a solidão. Os 62 indivíduos portugueses (64,68 ± 6,85 anos; 68% mulheres) foram avaliados para solidão (Escala de Solidão de 16 itens da Universidade da Califórnia em Los Angeles - UCLA-16) e classificados como Isolamento Social ou Afinidades, i.e., presença de relações socias significativas. A AF foi estimada por questionário (Questionário Internacional de AF - Versão Curta - IPAQ-SV) e a ApF medida pela bateria Senior Fitness Test (força de membros superiores e inferiores, flexibilidade de membros superiores e membros inferiores, aptidão cardiorrespiratória e agilidade e equilíbrio dinâmico. Foram utilizadas estatísticas descritivas. A comparação entre grupos foi realizada através de testes paramétricos (teste-t, ANCOVA ajustada ao sexo e qui-quadrado) e não paramétricos (Mann-Whitney). A prevalência de isolamento social foi de 53%. O grupo Afinidades apresentou mais AF moderada a vigorosa comparativamente ao grupo Isolamento Social (11,43 [0,00 – 17,14] vs (0,00 [0,00 – 12,86], respetivamente; p = 0,041). Após ajuste para o sexo, as diferenças deixaram de ser significativas. Os grupos de solidão não foram diferentes relativamente à ApF. A AF parece contribuir para um melhor perfil mental de adultos e idosos, contudo, os resultados devem ser confirmados em estudos com amostras maiores.

Palavras-chave: *Escala de solidão; Sedentarismo; Questionário internacional de atividade física; Sénior fitness teste.*

Introduction

Loneliness is a condition in which an individual self-perceives being socially isolated, even when they are with other people[1]. In the case of older people, the prevalence of loneliness is approximately 25%[2]. The causal origin of loneliness is complex and may be associated with psychological, environmental, and social factors[2]. According to recent evidence, older people with the

greatest risk of loneliness and social isolation are those that experience less social support, that live alone, that lost family members or friends, or have chronic diseases[2].

The importance of loneliness to the population in general and to older people in particular centres on the relationship established between negative health outcomes such as depression[3], anxiety[3], dementia[2], and mortality[4], and is therefore relevant to public health.

Regular physical activity (PA) has emerged as a strategy capable of mitigating against loneliness[5]. Although some studies have demonstrated that superior levels of PA are inversely related to loneliness[5,6], others were not able to achieve this result[7,8]. The discordance between studies may be justified by multiple factors relating to the characteristics of PA, including the contexts (for pleasure or for work, for example), the objectives and whether it is performed in a group or individually[5]. Together, these factors may or may not facilitate interpersonal relationships that can be more or less significant, in addition to altering the perception of social support and of loneliness[9]. Thus, the perception of each individual in relation to the effects of practicing PA on loneliness and on social and individual (intrinsic)[5] support may also explain why the results between research on correlations between PA and loneliness are not always concordant[2]. For example, compared to men, women tend to have a greater propensity towards feeling lonely and thus may perceive a superior positive effect from the perspective of loneliness and social support coming from practicing PA compared to men[2]. Furthermore, practicing PA also increases and/or preserves levels of physical fitness (PF) and promotes better functionality, physical independence and quality of life[10,11]. In fact, adjusted levels of PF allow frequent, independent outings from the home, with the subsequent involvement in different social activities[12]. However, there is still a scarcity of studies that examine possible links between levels of loneliness and PF, and thus a need to further explore this area[13].

Therefore, this study aims to describe and compare PA and PF in accordance with the categories of loneliness (Social Isolation versus Affinities) in people aged 50 and over.

Methods

This study is designed as a transversal observational study with a convenience sample. Participants from two university outreach programmes (a choral programme and a dance programme, based in the Aveiro region of Portugal) were invited to participate in the study. Each programme has one coordinator. The study's flowchart is presented in Figure 1.

Following approval from the Ethics Committee of Lusófona University of Porto, the coordinators of each outreach programme were invited to participate in the study, with both accepting.

A meeting then took place between the research team and the coordinators in order to explain the study's objectives and procedures. Subsequent to this meeting, the programme coordinators invited their respective participants to hear about the study's objectives and the risks involved. The participants that chose to be involved in the study signed informed consent forms and before the coordinators evaluated them according to the eligibility criteria. The participants then provided the coordinators with their telephone numbers in order for them to be communicated to the researcher responsible for scheduling face-to-face evaluations and telephone interviews.

After these steps had been taken, the researcher contacted the participants to conduct a telephone interview and to schedule the face-to-face evaluation. All telephone interviews were conducted by the same researcher during the first week of October 2020 and aimed to evaluate loneliness and PA. The face-to-face data collection served for the evaluation of PF and anthropometry. This took place between October and November of 2020, with COVID-19 sanitary guidelines strictly adhered to. The inclusion criteria were: i). aged 50 or over; ii) physical independence and autonomy to perform activities of daily living. The exclusion criteria were: i) presenting with any contraindication for OA; ii) a medical diagnosis of dementia; iii) living in/attending an institution that supports older people (care home). All procedures followed the Helsinki Declaration. At the end of the study, all the participants that manifested interest had access to their individual results.

Socio-demographic information (sex, civil status, living alone and level of education) was collected and gathered via telephone interviews.

The anthropometric data, weight (kg) (BC-418, TANITA scales) and height (cm) (stadiometer affixed to the wall with a measuring tape) were collected by one researcher. Based on the weight and height measurements, body mass index (BMI) (kg/ m^2) was calculated, which was subsequently classified according to the nutritional status normoponderal, overweight and obese[14].

Loneliness was assessed using the Loneliness Scale of 16 Items of the University of California in Los An-

geles UCLA-16 – version validated for Portugal[15]. The results of the validation of this instrument for the Portuguese population showed high internal consistency (0.905)[15]. The scale is comprised of 16 questions for which four Likert scale responses options are given [Never (1), Rarely (2), Sometimes (3) and Frequently (4)][15]. The results of the UCLA-16 are obtained through adding the results for the 16 items. The highest possible score is 64 points, while the lowest is 16. The higher the score, the greater the possibility that the personal evaluated is presenting with loneliness. A score of (>32 points) characterizes the presence of negative feelings of loneliness (Social Isolation)[15]. In contrast, scores between 16 and 32 points characterize the presence of significant social relationships (Affinities) [15].

For physical activity, the short version of the International Physical Activity Questionnaire (IPAQ-SV) was applied[16]. Craig et al. [16] determined the validity of the IPAQ in various countries, including Portugal. For the IPAQ-SV, repeatable data were produced (Spearman rho grouped around 0.8) and a reasonable to moderate correlation was found between the data from the self-reported IPAQ-SV and the accelerometers (rho = 0.30, IC 95% 0.23 – 0.36) [16].

The participants were asked to provide information about the frequency (days per week) and duration (hours or minutes per day) in light, moderate or vigorous PA. A question about the time per day spent in a seated position was also included. The daily duration of each intensity of PA was calculated by multiplying the number of days per week by the time spent per day at each intensity. These results were then divided by 7 to obtain the daily averages.

The participants were classified according to PA guidelines as physically inactive (<150 minutes/week of moderate to vigorous PA) or physically active (≥150 minutes/week of moderate to vigorous PA)[14].

The Senior Fitness Test (SFT) is a test battery that aims to evaluate the different components of PF evaluation. The SFT battery is easy to conduct, does not require expensive equipment or highly specialized technological know-how, and can be employed in a variety of contexts[17]. The SFT features a strength test of the upper (arm-curl test – ACT) and lower members (30 seconds getting up and sitting down on a chair - 30-second chair stand - 30CS), cardiorespiratory aptitude (6 minute walk test - 6MWT), flexibility test for the lower (sit-and-reach test - SRT) and upper members (back scratch test - BST) and agility and dynamic balance (8-foot up-and-go test – 8-ft up and Go). Detailed descriptions of each procedure can be found in Rikli & Jones[17].

The flexibility tests of the lower and upper members and the agility and dynamic balance test were conducted in triplicate and the best result was used as the final score.

The statistical procedures were conducted using the programme Statistical Package for the Social Sciences (SPSS, IBM, USA). The normality of the variables was verified through the Kolmogorov-Smirnov (sample size >50 individuals) and Shapiro Wilk (sample size <50 individuals) tests[18]. The results of the descriptive statistic (mean standard deviation and mean (interquartile amplitude) are presented by variables with normative and non-normative distribution, respectively. The comparison between groups (Affinity versus Social Isolation) was calculated with a t-test of independent samples (for the continual variables with normal distribution) chi-square test (categoric variables) and non-parametric tests (Mann-Whitney U test for variables with non-normative distribution). Finally, an ANCOVA was used to compare Affinity groups versus Social Isolation groups, adjusting for sex. The level of significance used was 5%.

Results

As demonstrated on the study flowchart (Figure 1), the initial sample was comprised of 68 individuals. Of these, six did not fit the inclusion criteria, as they were aged younger than 50 years. Therefore, the final sample was of 62 individuals (68% women; 64.68 ± 6.85 years).

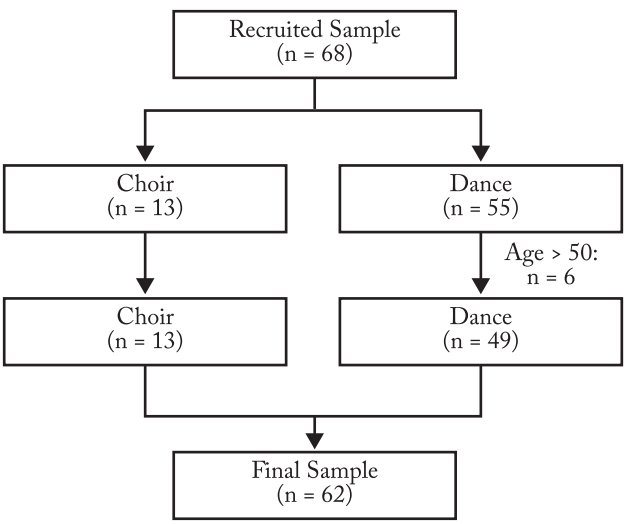

Figure 1 – Study's flowchart

Table 1 presents the results of the descriptive statistic

of the entire sample and the comparison between the groups (without adjusting variables) for the studied variables. Of the total sample, 64% were married, 23% lived alone and approximately 55% of the individuals had 12 or more years of schooling. The average BMI of the total sample was 26.54 ± 4.15 kg/m^2 and 63% of the sample were overweight or obese (Table 1). On average, the participants spent 360.00 [300.00 – 480.00] minutes per day on activities that take place in a seated position.

In relation to light and moderate to vigorous PA, the participants spent 12.86 [4.29 – 20.00] e 6.79 [0.00 – 15.54] minutes per day, respectively (Table 1). The average result of the loneliness scale was 32.03 ± 7.33 points and 53% of the participants presented with Social Isolation.

The Social Isolation group presented a mean score of 37.63 ± 4.17 points in the loneliness test, whereas the Affinities group scored 25.66 ± 4.29 points [t(60) = 11.45 (p < 0.01)] (Table 1). Although a level of statistical significance was not reached, 30% of the participants

Table 1 – Descriptive Statistics of the Total Sample and Comparison Between Groups (Social Isolation VS Affinities).

	Total Sample n = 62	Social Isolation n = 33	Affinities n = 29	Statistical Inference
Sociodemographic Variables				
Age (Years)	64.68 ± 6.85	63.73 ± 7.20	65.75 ± 6.39	$t_{(60)}$ = -1.17 (p = 0.282)
Sex (N, %)				
Women's	42 (68)	26 (79)	16 (55)	$X^2(1)$ = 3.94 (p = 0.473)
Men's	20 (32)	7 (21)	13 (45)	
Living Alone (N, %)				
Yes	14 (23)	10 (30)	4 (14)	$X^2_{(1)}$ = 3.94 (p = 0.061)
No	48 (76)	23 (70)	25 (86)	
Scholarity (N, %)				
< 6 years	21 (27)	9 (27)	12 (41)	
6 to 12 years	10 (18)	6 (18)	4 (14)	$X^2_{(2)}$ = 1.94 (p = 0.382)
> 12 years	29 (55)	18 (55)	11 (38)	
Body composition				
Body Mass Index (kg/m^2)	26.54 ± 4.15	25.84 ± 3.96	27.33 ± 4.29	$t_{(60)}$ = -1.43 (p = 0.743)
Body Mass Index Classification (N, %)				
Normoponderal	23 (37)	14 (42)	9 (31)	
Overweight	29 (47)	16 (49)	13 (45)	$X^2_{(2)}$ = 2.75 (p = 0.252)
Obesity	10 (16)	3 (9)	7 (24)	
Loneliness				
Loneliness (arbitrary units, %)	32.0 3± 7.33 (100)	37.63 ± 4.17 (47)	25.66 ± 4.29 (53)	$t_{(60)}$ = 11.45 (p < 0.001)
Physical Fitness				
ACT (rep.)	25.08 ± 3.81	25.88 ± 3.64	24.37 ± 3.90	$t_{(34)}$ = 1.20 (p = 0.889)
30CS (rep.)	19.89 ± 4.77	19.12 ± 4.32	20.58 ± 5.17	$t_{(34)}$ = -0.92 (p = 0.511)
BST (cm)	-4.00 [-11.75 – 0.75]	- 3.00 [-9.50 – 1.50]	- 6.00 [-15.00 – 0.00]	$U_{(1)}$ = 1.78 (p = 0.180)
SRT (cm)	1.50 [-12.75 – 7.00]	2.00 [-8.50 – 7.00]	1.00 [-15.00 – 8.00]	$U_{(1)}$ = 0.00 (p = 1.000)
6MWT (m)	638.14 ± 84.73	620.53 ± 55.45	653.89 ± 103.30	$t_{(34)}$ =-1.19 (p = 0.111)
8-ft up and go (s)	4.31 [3.95 – 4.50]	4.36 [4.05 – 4.50]	4.29 [3.80 – 4.54]	$U_{(1)}$ =0.00 (p = 1.000)
Physical Activity				
MVPA (minutes/day)	6.79 [0.00 – 15.54]	0.00 [0.00 – 12.86]	11.43 [0.00 – 17.14]	$U_{(1)}$ = 4.15 (p = 0.041)
Fulfills PA Recommendations (N, %)	9 (14)	5 (15)	4 (14)	$X^2_{(1)}$ = 0.23 (p = 0.879)
Sitting Time (minutes/day)	360.00 [300.00 – 480.00]	360.00 [300.00 – 480.00]	360.00 [240.00 – 510.00]	$U_{(1)}$ = 0.38 (p = 0.542)
Light (minutes/day)	12.86 [4.29 – 20.00]	8.57 [2.86 – 19.64]	15.00 [4.29 – 22.50]	$U_{(1)}$ = 1.46 (p = 0.231)

ACT = upper limb strength test, arm curl test; 30CS = lower limb strength test, 30-second chair stand; BST = upper limb flexibility test, back scratch test; SRT = lower limb flexibility test, sit-and-reach test; 6MWT = cardiorespiratory fitness test, 6 minutes walk test; 8-ft up and go = Agility and dynamic balance test, 8-foot up-and-go test; MVPA = Moderate to Vigorous Physical Activity.

classified within the category of Loneliness live alone, compared to 14% (p = 0.06). of the Affinity group. The individuals in the Affinities group engaged in moderate to vigorous PA for more minutes per day that the individuals in the Social Isolation group (0.00 [0.00 – 12.86] versus 11.43 [0.00 – 17.14] minutes, respectively; p = 0.04) - Table 1. These differences are no longer significant upon being adjusted for the comparison with sex (difference in averages: 15.77 ± 35.07; p = 0.66).

Discussion

The core objective of this study was to describe and compare PA and PF according to the categories of loneliness (Social Isolation versus Affinities) in adults aged 50 and over. The main results demonstrate that the Affinities group presents a tendency toward spending more time on moderate to vigorous PA compared to the Social Isolation group. Furthermore, no differences were observed between the categories of loneliness for any of the PF variables.

Some studies report that living alone and widowhood are risk factors for the occurrence of Social Isolation[19]. Within our sample, 70% of the participants from the Social Isolation group live with someone. This fact corroborates the very definition of loneliness, as it may not be related to objective isolation but rather with the perceived quality of the relationships[1].

Regarding PF, no differences were observed between components in relation to the loneliness categories. Our initial hypothesis was that the people classified as Affinities would present better PF indicators that those classified as Social Isolation, as the former should not have difficulty in performing activities of daily living and have greater ease in leaving the house and having positive relationships from a social perspective. This hypothesis was not proven. However, another study does suggest that better PF may contribute to a more favorable score in relation to loneliness[12].

Despite the correlation between higher levels of PA and PF having been previously established[10,11], the association between specific dimensions of PF and the capacity to perform daily living activities is still unclear. The deterioration of functional aptitude represents a higher risk of fragility, loss of independence and physical incapacity[20]. Physical incapacity itself may contribute to higher levels of loneliness[12] and is largely determined by the loss of lean muscle and muscle strength[21]. The participants in our study presented superior scores of strength to those reported for similar older populations[17]. Other elements of PF that are potentially related to loneliness are agility and dynamic balance. Agility and dynamic balance are related to greater autonomy and better interaction with the environment, which may be important for the maintenance of cognitive function and for the maintenance and creation of social relationships[22], which in turn impact on levels of loneliness. However, our study did not reveal differences between these components of PF between participants with different levels of loneliness.

The amplitude of the movement of the articulations of the upper limb is imperative for the capacity to perform activities of daily living[23]. Furthermore, a reduction in flexibility of the lower limb has been associated with a risk of wounds, cramps and alterations to gait[24]. However, our study did not find differences in the levels of flexibility of the upper and lower members between the Affinities group and the Social Isolation group. Finally, aerobic resistance is the most frequently studied component of PF across all age groups. Aerobic resistance is inversely related to the capacity of older adults to perform activities of daily living[25] and may impact levels of loneliness. Nevertheless, the plausibility of a relationship between this PF variable and levels of loneliness, as suggested in other studies, was not found in this study.

We observe that people classified as Social Isolation present a lesser volume of moderate to vigorous PA than the people in the Affinities category, although this result lost its robustness after the introduction of the sex variable. In our study, although the distribution of men and women in the groups Social Isolation and Affinities is no different, we understand that adjusting for sex was necessary, as women comprise 68% of the sample, which may result in bias and lead to biased interpretations. Additionally, the size of the sample did not allow for running separate statistic procedures for men and women, which means that the results must be carefully interpreted. In sum, the removal of the sex variable in the comparison between the Loneliness and the Affinity groups demonstrated that moderate to vigorous PA does not differ between the two groups. However, some studies have suggested that female participants may practice more moderate to vigorous PA (particularly in formal physical exercise programmes) as there are additional benefits in terms of social support from these programmes, which tend to attenuate the perception of loneliness[5]. Kobayashi & Steptoe[26] report that adults (aged 50 and over) with higher indicators

of loneliness, when compared to their peers with lower indicators, presented a lesser probablity of performing moderate to vigorous PA. Curiously, and aligning with our results, in that particular study the association between loneliness and moderate to vigorous PA was broken after correction of confouding variables.

Older people spend a large part of their day sitting down and tend not to achieve their recommended PA[27]. Thus, physical exercise programmes represent an opportunity to engage in PA, with positive outcomes for mental and physical health[27]. These programmes may simultaneously increase interactions and social support[9], possibly reducing feelings of loneliness. Stenlund et al[28], in a longitudinal study over 9 years with adults observed a correlation between health behaviors, including PA and the subjective sensation of well-being, including a low precession of loneliness[29].

The field of research regarding the detrimental effect of sedentary behavior on mental health is recent and to the best of our knowledge, the relationship between sedentariness and levels of loneliness has not been explored. Contrary to our initial expectations, we did not find greater levels of sedentary behavior among subjects with loneliness. However, it is possible to speculate that sedentary time in front of a television, telephone or other device reduces the quantity and quality of social interactions, thus contributing to higher levels of loneliness[6]. The methodology for the evaluation of sedentary time did not include the context or the objective of the sedentary time. In fact, sedentary activities are innumerous and can just as easily be positive from the perspective of loneliness (sitting in a café, on a bench conversing with friends, chatting on the phone or on a video call), as they can be negative (sitting in front of the television, with no significant interactions with others). The non-differentiation of the nature of sedentary time is a limitation of this study.

The limitations of this study include the reduced number of participants, the transversal design with non-aleatoric participant selection, the subjective evaluation of PA and the data collection via telephone interview, which may create a bias towards social desirability. For these reasons, the results must be carefully interpreted. The strong points of this study include the collection of objective data relating to PF while adhering to the restrictions imposed by the Portuguese authorities in response to the new coronavirus SARS-COV-2 pandemic (note that all recommendations and safety procedures in vigor were rigorously followed) and the recruitment of individuals from two groups engaging in different social-cultural, recreative activities.

There is a strong tendency toward feelings of loneliness and a tendency for the category with Affinities to present higher levels of moderate to vigorous PA than the category Social Isolation, however this result requires confirmation through studies with larger samples. If confirmed, these results would demonstrate that PA programmes may be important for mental health.

Conflict of interest

The authors declare that there is no conflict of interest.

Author contributions

Data collection was undertaken by Pedro-Costa S, Bohn L, Marques-Aleixo I, Guimarães JP and Hiney A. Statistical analysis was conducted by Pedro-Costa S and Bohn L. The article was written by Pedro-Costa S, Bohn L and Marques-Aleixo I. The revision of the article was the task of Marques-Aleixo I, Sampaio A e Hiney A.

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References

1. Cacioppo JT, Cacioppo S. The growing problem of loneliness. Lancet. 2018;391(10119):426.
2. National Academies of Sciences, Engineering, and Medicine; Division of Behavioral and Social Sciences and Education; Health and Medicine Division; Board on Behavioral, Cognitive, and Sensory Sciences; Board on Health Sciences Policy; Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults. Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System. Washington (DC): National Academies Press (US). 2020.
3. Domènech-Abella J, Lara E, Rubio-Valera M, Olaya B, Moneta M, Rico-Uribe L, et al. Loneliness and depression in the elderly: the role of social network. Soc Psychiatry Psychiatr Epidemio. 2017;52:381.
4. Luo Y, Hawkley LC, Waite LJ, Cacioppo JT. Loneliness, health, and mortality in old age. Soc Sci Med. 2012;20(8):6501–4.
5. Pels F, Kleinert J. Loneliness and physical activity: A systematic review. Int Rev Sport Exerc Psychol. 2016;9(1):231–60.
6. Vancampfort D, Lara E, Smith L, Rosenbaum S, Firth J, Stubbs B, et al. Physical activity and loneliness among adults aged 50 years in six low- and middle-income countries. Int J Geriatr Psychiatry. 2020;34(12):1855–64.
7. McKee G, Kearney PM, Kenny RA. The factors associated with self-reported physical activity in older adults living in the community. Age Ageing. 2015;44(4):586–92.

8. Harris TJ, Owen CG, Victor CR, Adams R, Cook DG. What factors are associated with physical activity in older peo-ple, assessed objectively by accelerometry? Br J Sports Med. 2009;43(6):442–50.
9. Meurer ST, Benedetti TRB, Mazo GZ. Fatores motivacionais de idosos praticantes de exercícios físicos: Um estudo base-ado na teoria da autodeterminação. Estud Psicol. 2012;17(2):299–304.
10. Chou C, Hwang C, Wu Y. Chou CH, Hwang CL, Wu YT. Efeito do exercício na função física, atividades de vida diária e qualidade de vida em idosos frágeis: uma meta-análise. Arch Phys Med Rehabil. 2012;93:237–44.
11. Manini T, Pahor M. Atividade física e manutenção da função física em idosos. Br J Sport Med. 2009;43:28–31.
12. Jones CA, Siever J, Knuff K, Van Bergen C, Mick P, Little J, et al. Walk, Talk and Listen: A pilot randomised controlled trial targeting functional fitness and loneliness in older adults with hearing loss. BMJ Open. 2019;9(4):1–10.
13. Philip KEJ, Polkey MI, Hopkinson NS, Steptoe A, Fancourt D. Social isolation, loneliness and physical performance in older-adults: fixed effects analyses of a cohort study. Sci Rep. 2020 Aug 17;10(1):13908.
14. Xavier AI, Rodrigues AL, Oliveira F. HUMANA GLOBAL Associação para a Promoção dos Direitos Humanos, da Cultura e do Desenvolvimento A Organização das Nações Unidas. 2007.
15. Pocinho M, Farate C, Dias C. Validação psicométrica da escala UCLA-loneliness para idosos portugueses. Interações Soc e novas Mod. 2010;18:65–77.
16. Craig CL, Marshall AL, Sjöström M, Bauman AE, Booth ML, Ainsworth BE, et al. International physical activity ques-tionnaire: 12-Country reliability and validity. Med Sci Sports Exerc. 2003;35(8):1381–95.
17. Rikli RE, Jones CJ. Senior fitness test manual. Champaign, IL: Human Kinetics. Champaign, IL: Human Kinetics. 2001.
18. Miot HA. Avaliação da normalidade dos dados em estudos clínicos e experimentais. J Vasc Bras. 2017;16(2):88-91.
19. Savikko N, Routasalo P, Tilvis RS, Strandberg TE, Pitkälä KH. Predictors and subjective causes of loneliness in an aged population. Arch Gerontol Geriatr. 2005;41(3):223–33.
20. Stathokostas L, Al. Flexibility of older adults aged 55–86 years and the influence of physical activity. J Aging Res. 2013;1:743–843.
21. Avila JJ, Gutierres JA, Sheehy ME, Lofgren IE, Delmonico MJ. Effect of moderate intensity resistance training during weight loss on body composition and physical performance in overweight older adults. Eur J Appl Physiol. 2010;109(3):517–25.
22. Russell DW, Cutrona CE, de la Mora A, Wallace RB. Loneliness and nursing home admission among rural older adults. Psychology and Aging. 1997;12:574–89.
23. em estudos clínicos e experimentais. J Vasc Bras. 2017;16(2):88-91.
24. Gates DH, Walters LS, Cowley J, Wilken JM, Resnik L. Range of motion requirements for upper-limb activities of daily living. Am J Occup Ther. 2016;70(1).
25. ACSM, Ehrman J, Liguori G, Magal M. ACSM's guide- lines for exercise testing and prescription. 10th ed. Philadelph-ia; 2018.
26. Guaralnik JM, Ferruci L, Simonsick EM, Salive ME, Wallace RB. Lower-extremity function in persons over the age 70 years as a predictor as subsequent disability. N Engl J Med. 1996;332:556–61.
27. Kobayashi, L. C., & Steptoe, A. Social isolation, loneliness, and health behaviors at older ages: Longitudinal cohort study. Annals of Behavioral Medicine. 2018;52(7):582–93.
28. Bull FC, Al-Ansari SS, Biddle S, Borodulin K, Buman MP, Cardon G, et al. World Health Organization 2020 guide-lines on physical activity and sedentary behaviour. Br J Sports Med. 2020;54(24):1451–62.
29. Stenlund S, Junttila N, Koivumaa-Honkanen H, et al. Longitudinal stability and interrelations between health behavior and subjective well-being in a follow-up of nine years. PLoS One. 2021;16(10):e0259280.
30. Stenlund S, Koivumaa-Honkanen H, Sillanmäki L, Lagström H, Rautava P, Suominen S. Changed health behavior im-proves subjective well-being and vice versa in a follow-up of 9 years. Health Qual Life Outcomes. 2022;20(1):66.

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