Open Access

OBM Geriatrics

LIDSEN Publishing Inc.

Original Research

Association of Stress with Healthy Aging, the Role of Physical Activity

Helena Andrade Figueira [1,*], Olivia Andrade Figueira [1], Alan Andrade Figueira [2], Carlos Roberto Lyra da Silva [1], Joana Andrade Figueira [2], Estelio Henrique Martins Dantas [1]

1. Universidade Federal do Rio de Janeiro (UNIRIO). Rio de Janeiro, Brazil; E-Mails: helenafigueira@gmail.com; olivia2407@yahoo.com.br; profunirio@gmail.com; estelio_henrique@unit.br
2. Pontificia Universidade Catolica do Parana (PUR-PR). Curitiba, Brazil; E-Mails: alan_figueira@hotmail.com.br; jofigueira75@gmail.com.br

* **Correspondence:** Helena Andrade Figueira; E-Mail: helenafigueira@gmail.com

Academic Editor: Paul M. Valliant

Special Issue: Positive Aging a Two-Way Street: Healthy Lifestyle and Attitudes of Others

OBM Geriatrics
2022, volume 6, issue 4
doi:10.21926/obm.geriatr.2204219

Received: October 14, 2022
Accepted: December 18, 2022
Published: December 29, 2022

Abstract

The World Health Organization attracted more attention to the positive effects of physical activity (PA) and the adverse effects of stress on the health of older people and, therefore, attracted a more significant number of practitioners. To verify the impact of PA on stress in older people. Observational and analytical research, composed of 690 older people of both genders residing in Brazil, present in street races (as participants or observers), who volunteered to respond to the research protocol consisting of sociodemographic profile, selected questions from the physical activity inventory for the older people, Baecke-Old, and the Perceived Stress Scale (PSS). The sample of active older people, 84.35% practitioners of physical activity and 75.4% with higher education, revealed mild-moderate stress at 83.77%, with mean = 51.68%, standard deviation = 12.33%. There was correspondence between PA and stress ($p < 0.05$). Older people practitioners of physical activity with a higher education level have a mild-moderate stress level. Considering the aging of societies worldwide, with

the tendency of older people to present a mild-moderate level of stress, it is suggested that measures be taken for greater vigilance about the stress of older people.

Keywords
Stress; physical activity; PSS; Baecke-Old; older people

1. Introduction

Aging is a natural process for those who have the opportunity to reach this stage of the life cycle [1]. Considering the aging of societies around the world and the positive effects of physical activity (PA) on the mental, physical, and social health of older people, PA should be encouraged [2]. Stress is an inevitable part of fast-paced living, and how stressors are managed can greatly impact mental and physical health [3]. Stress is associated with emotional vitality, and successful aging is defined by independence and emotional vitality [4]. Stress refers to the state generated by the perception of stimuli that provoke emotional excitement that, by disturbing homeostasis, trigger an adaptation process generating physiological and psychological systemic disturbances in a general and non-specific response of the organism to a stressor or stressful situation [5]. There are many causes of stress, including personal difficulties, problems at work, or major threats in the community [6], depending on how the individual will react to stressors, their resources, and means of adaptation [7]. Stress is a prevalent problem in today's society. However, is a neglected target of public policies: it interferes with cognitive processes, affects behavior by decreasing PA, triggers physiological changes in the hypothalamic-pituitary-adrenal axis, and rewards processing in the brain [8]. The human stress response has evolved to maintain homeostasis under real or perceived stress. Acute rises in cortisol levels are beneficial in promoting survival of the fittest as part of the fight-or-flight response. However, chronic exposure to stress results in the reversal of beneficial effects [9]. Older people's coping resources, such as education and successful aging, can affect their stress levels [10].

A sedentary lifestyle compromises the autonomy of the elderly [11], interfering with their stress [3]. PA should be adequately addressed, as opposed to a sedentary lifestyle, to ensure healthy aging [12]. In its global PA recommendation for health, the World Health Organization (WHO) clarifies that the elderly should include recreational, occupational, and leisure activities, transportation (walking or cycling), home care, games, sports, and exercises in their PA. Planned in the context of daily, family, and community activities [13]. In order to optimize the satisfaction, whether existential or not, of older people, observing their tendency to stress, we seek to reveal the issues that raise their stress level and their relationship with PA. To promote successful aging, it is proposed to ask the opinion of the older about their stress, observing their level of PA.

2. Objective

To establish a descriptive and analytical observation of the influence of PA on the stress of older people for healthy aging.

3. Methods

Design and Research Ethics: Ex post facto observational analytical inquiry cross-sectional research adhering to the Declaration of Helsinki [14].

Sample: Comprising 690 older people aged 60 years and over [15], residents of the community of both genders, volunteers, and unselected Brazilians, present (as participants or observers) in street races in Rio de Janeiro, Brazil, from October 30, 2019, to March 12, 2020. Exclusion criteria were blindness, deafness, or cognitive impairment, which would be an obstacle to answering the questionnaire. To determine the sample size, the older people population in Brazil [16], of 20,590,599, with a confidence level of 95% and a confidence interval of 4, presented a desirable sample size of 600.

Data Collection: Instrument composed of sociodemographic questions [16]: a. full name (in code); b. genre; c. age range; d. cohabitation; e. marital status; f. schooling; plus PA questions selected from the Baecke-Old questionnaire [12]: a. you do some heavy housework; b. how many steps you climb in a day; c. what means of transport do you use; d. what is your practice of physical activity (walking, running, yoga, swimming, etc.); e. in your leisure time you…; and also added questions from the Perceived Stress Scale [17]: a. you have been feeling sad about something unexpected; b. you have felt that you cannot control the important things in your life; c. you have been feeling nervous and "stressed out; d. you feel like you can't handle everything you need to do; e. you have managed to control the irritation in your life; f. you feel that difficulties are piling up so much that you cannot overcome them.

The World Health Organization recommendation for PA is 150 minutes of moderate to intense activity (or equivalent) per week, performed in several domains: work, travel (walking and cycling), and recreation (including sports), activities that are included in the Baecke-Old inventory [18].

The Perceived Stress Scale [17], with six questions with answers ranging from 0 to 4, and their sum ranging from 0 to 24, classifies the respondent by the level of stress: 0-8 without stress; 9-16 mild to moderate stress; 17-24 perceived stress.

The sample selection procedure was a person-to-person approach by the main researcher, personally, with an explanation about the research that was being carried out and an invitation to participate, lasting approximately 10/15 min each, asking them to remember their last two weeks when responding, after their free and informed consent. The double-blind statistical method was adopted, with the results being tabulated by an independent researcher without prior knowledge of the tested hypothesis [19].

Descriptive statistical measures of dispersion and location and non-parametric statistics were used to verify sample homogeneity, hypothesis testing, and post hoc procedures. Spearman's chi-square tests analyzed possible associations and comparisons between study variables, $\alpha = 5\%$, 20% type II errors. The software used was SPSS, version 25.

4. Results

The sociodemographic profile of the elderly sample showed a greater number of women, and the average age ranged from 65 to 69. Most live with their families, are married, and have completed high school, as shown in Table 1.

Table 1 Sociodemographic profile of the sample.

Questions	Answers	Percentage	Absolute
Gender	Feminine	**73.6**	509
	Masculine	26.2	181
	Other	0.1	1,0
Age-Bracket	60-64	**39.4**	273
	65-69	**32.9**	228
	70-74	18.3	127
	75-79	6.1	43
	80-84	2.0	14
	85-80	0.7	5
	90-	0.6	4
Living Status	Family	**68.5**	474
	Alone	24.7	171
	Friends	0.7	5
	Others	6.1	42
Marital Status	Single	10.6	73
	Married/Stable Union	**54.4**	376
	Separated/Divorced	22.8	158
	Widow	12	83
Schooling	Iliterate	0	0
	E.S. Incomplete	2.6	18
	E.S. Complete	1.4	10
	H.S. Incomplete	1.9	13
	H.S. Complete	9.2	64
	U.E. Incomplete	9.2	64
	U.E. Complete	**38.4**	266
	Pos-Graduation	**37**	257

Caption: E.S. = elementary School; H.S. High School; U.E. University Education

Seniors with higher education represented 75.4% of the sample. Considering that the Brazilian population with higher education during the data collection period (in 2019) was 17.4% [20], the education of the sample of this study was considered relevant because it stands out about the Brazilian elderly population.

Older people who practice at least 150 minutes of moderate PA per week or 75 minutes of vigorous-intensity are considered by the WHO as active [13]. Thus, the older people who scored less than or equal to 2 on the Baecke-Old PA questionnaire were classified as sedentary, and those with the above 3 were classified as active. According to this classification, the sample had 582 active older people, 84.35%, 108 sedentary, and 15.65%, as shown in Figure 1.

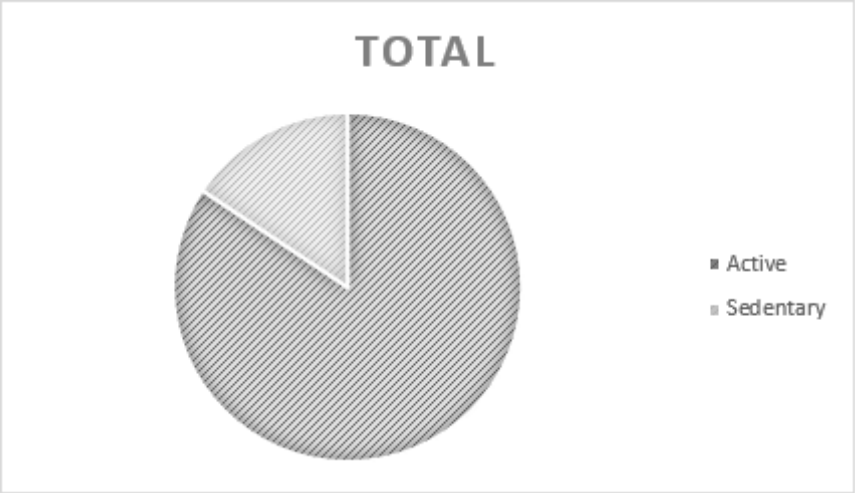

Figure 1 Physical activity status of the older people.

The Perceived Stress Scale has six questions with answers from 0 to 4, 0 = never, 1 = almost never, 2 = sometimes, 3 = often, 4 = always. The PSS result is considered in absolute and percentage values, as shown in Table 2.

Table 2 Stress Results in absolute and percentage values.

	Never	Almost Never	Sometimes	Often	Always
Question 1	39 = 5,6	160 = 23,2%	424 = 61,4%	56 = 8,2%	11 = 1,6%
Question 2	101 = 14,6%	209 = 30,3%	313 = 45,4%	52 = 7,5%	15 = 2,2%
Question 3	50 = 7,2%	203 = 29,4%	328 = 47,6%	95 = 13,8%	14 = 2%
Question 4	51 = 7,4%	179 = 26%	362 = 52,4%	83 = 12,1%	15 = 2,2%
Question 5	2 = 0,3%	32 = 4,6%	237 = 34,4%	323 = 46,8%	96 = 13,9%
Question 6	131 = 19%	308 = 44,7%	210 = 30,4%	32 = 4,6%	9 = 1,3%

Caption: Question 1: in the last two weeks you were sad about something unexpected; Question 2: you feel that you are not able to control important things in your life; Question 3: have you been feeling nervous and stressed; Question 4: you feel you are not able to handle everything you need to do; Question 5: have you been able to control irritation in your life; Question 6: you feel that the difficulties pile up so much that you cannot overcome them.

The Perceived Stress Scale classifies stress into three levels: no stress (0-8), mild to moderate stress (9-16), and perceived stress (17-24). In this study, the sample average of stress was 12.4 (51.7%), and the standard deviation of 2.96 (12.33%); therefore, the sample average presented a mild to the moderate stress level. The sample divided by the level of stress was: no stress 8.41% (58 seniors in level 1), mild-moderate stress 83.77% (578 seniors in level 2), and perceived stress 7.82% (54 seniors in level 3), as shown in Figure 2.

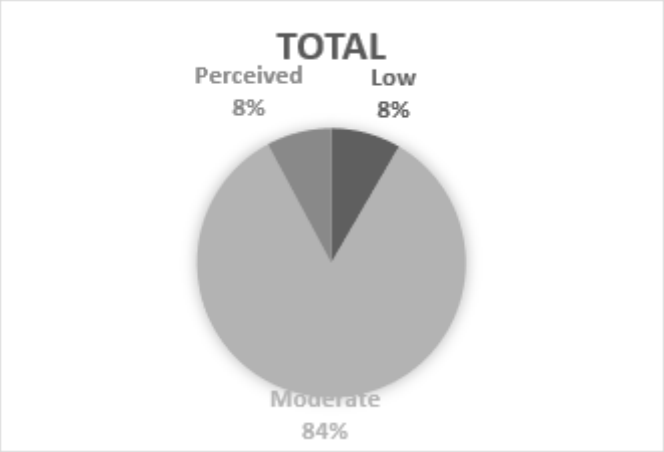

Figure 2 Distribution of the sample by levels of stress.

A comparison was made between the stress of active and sedentary older people, as shown in Table 3, in absolute and percentage values.

Table 3 Comparison of the stress of the active and sedentary.

PSS & AF	PSS 1	PSS 2	PSS 3
AF0	1,4%	13,1%	5.8%
AF1	7%	70,6%	2.1%

Caption: AF0 = Sedentary; AF1 = Active; PSS1 – low stress; PSS2 – mild-moderate stress; PSS3 – perceived stress

Considering the stress of active and sedentary older people, there was a significant difference ($p < 0.05$). The hypothesis tests concluded: Chi-square = 2.41044, there is a difference between groups, with a chi-square greater than zero, showing that PA influences stress levels. The critical value for inference = 1.99, with $p = 0.02$, $p < 5\%$, results in a certainty level of 98%, and the difference found is significant.

5. Discussion

The sample of community-dwelling elderly whose sociodemographic data reported an average age of 65-69 years, mostly female (74%), practicing PA (84%), with average stress of 52%, declared having higher education (75%), a very high level considering the Brazilian national average, in 2019 of 17.4% [20] In a nationally representative sample of 1,284 seniors in Taiwan, healthy aging was associated with a higher level of education [4]. Findings from a study carried out in Khoy, Iran, in 2014 and 2015 with 390 elderly people demonstrate stress significantly associated with education, showing that the educational level of the elderly impacts the stress level [21]. This finding corroborates the finding of the present study, in which 75.4% of the elderly have completed higher education (a high level of education), and 84% have mild-moderate stress. In a study carried out at a gym in Tocantins, Brazil, the average perceived stress was 52%, mild-moderate. In contrast PA levels, 70%, were quite high, exactly as was found in the present study, with PA and high academic levels of the elderly and the level of mild-moderate stress [22]. Accessing the stress of 341 elderly people in Brazil, without informing the levels of education or physical activity, an average of 46.25%

was found [23]. Studying 50 elderly people without informing their levels of education or physical activity in São Carlos, São Paulo, Brazil, the average stress found was 59.8% with a standard deviation of 31.8% [24].

PA improves overall health and reduces the risk of many negative health outcomes, concludes a study carried out with 10,022 individuals in Denmark associated low education and low PA with high-stress levels [25]. Assessing stress in 390 elderly people in Bangladesh and India, it was observed that 58.2% of the elderly suffered from stress, with stress being greater among those who did not practice PA [26]. A study from the University of Murcia, Spain, found that a higher level of PA practices was related to a greater perception of control in a stressful situation. The less PA practice, the greater the perception of being overwhelmed by a stressful situation. Finally, the PA level mediates the relationship between perceived stress (with and without control of the stressful situation), concluding that PA helps to perceive less stress in demanding situations [27]. In a nationally representative sample of 1,284 older adults for 50 months in Taiwan, PA was a significant factor in independent living. Stress was exclusively associated with emotional vitality, a global indicator of the happiness domain [4]. A moderate level of stress perception was found in a sample of 93 older ballroom dancers from Maringá, Paraná, Brazil, with a good level of physical activity (Average = 50) [28]. These results are similar to those of the present study, which observed 83.77% of the older in mild and moderate stress and 84.35% of the older falling under the concept of actives.

Research carried out in Varanasi, Utah Pradesh, India, with 150 elderly people, found that the level of perceived stress among those who do not live with their family is higher than among those who live with their family. The total stress means were 16.88 and 20.31, respectively [29].

Aging is characterized by transformations at all levels [30] and has been associated with fragility and functional limitation due to a sedentary lifestyle and comorbidities [31]. Longevity is not always accompanied by health [15], as the effects of aging lead to frailty and increase the risk of morbidity and mortality [32]. Old age enhances limitations, requiring adaptation, and non-adaptation generates imbalance [1]. Prolonged exposure to cortisol - poor adaptation - can lead to many of problems, including metabolic syndrome, obesity, changes in mental health, cardiovascular disease, and increased susceptibility to infections [9]. The WHO has developed a guide called Doing What Matters in Times of Stress, Feeling Uncomfortable or Threatened by Life, Feelings, and Thoughts. In it, the WHO advises learning to stay focused, concentrate the mind, and stretch the body, making breathing very slow, involving feelings and thoughts without fighting with them, stopping fighting feelings and thoughts, and identifying and remaining in the present moment. The WHO states that by remaining faithful to their values, the individual will live with a purpose, a more satisfying, fuller life, and less close to stress [6]. Attributing positive meanings to this phase of life is the ideal way to face the stereotype of old age. Old age can be a phase of pleasure without conflicts, frustrations, dramas, feelings of rejection, and/or inferiority in the face of changes and losses [33]. It can be lived with joy and made the most of it, with a new look at old age and a new identity for the elderly, taking care of the body and appearance as self-care, manifesting a feeling of well-being and good self-esteem [34]. Due to the contemporary development process and the accelerated growth of societies, individuals began to acquire a tendency to exhaust their physical and mental integrity, making stress problematic as the main disease of the century, the epidemic of the 21st century [35]. Policies and programs tied to the outdated paradigm that associates aging with disease and dependence do not reflect reality. The elderly often remain independent even at a very advanced age, adhering to programs and promoting their health [36]. A global public health policy agenda for

aging with a higher priority on encouraging physical activity must be included in the appropriate approach to stress.

6. Conclusion

The socio-cultural bias of increased life expectancy has radically changed the attitude of the elderly, abandoning the old definition of the frailty of the elderly for the new way of living, that of the active individual. Man instinctively seeks his well-being, and although he is certain that he will remain in the place where he is for a short time, he takes care to be there in the best possible way or with the least amount of damage possible. There is no one who, finding a thorn under his hand, does not pull it out so as not to be pricked. Now, the desire for well-being compels man to improve everything, moved by the instinct of progress and conservation. This study provides additional support that education correlates with physical activity in a Brazilian sample that had mild to moderate stress levels, high education, and high levels of physical activity: active elderly people experience less stress due to their health conditions and also vitality. The sample of this research was characterized as active (84%), aged between 65 and 69 years, 74% female, and 75% with higher education (94% with secondary education). To clarify what type of exercise and time will help seniors stay away from stress or reduce the severity of stress, the World Health Organization (WHO) advises that seniors should include recreational, occupational, and leisure activities, transportation (walking or cycling), home care, games, sports, and planned exercise in the context of daily physical activities, and maintaining a minimum of 150 minutes weekly of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity aerobic exercise. Observing the tendency of the elderly in the sample to a level of mild to moderate stress, it is suggested that measures be taken to create greater vigilance about elderly stress, as well as the development of policies and programs to face these challenges.

6.1 Ethics Approval and Consent to Participate

This research complied with the Helsinki Declaration [14] and was submitted to the Research Ethics Committee Involving Human Beings at the Federal University of Rio de Janeiro, UNIRIO, and received the # 3.670.727.

6.2 Summary Statement of Implications for Practice

What does this research add to existing knowledge in gerontology?

- The most common stress symptoms reported are emotional: being sad about something unexpected and feeling unable to handle what is needed to
- The most intense stress symptom is: being able to control irritation in one's life

What are the implications of this new knowledge for nursing care with older people?

- The complexity and heterogeneity of aging justify a multidimensional approach to promoting successful aging
- A sedentary lifestyle is associated with higher levels of stress, with a strong relationship between vitality and mental health
- Older People's coping resources, such as education and aspects of successful aging, affect stress potential

How could the findings influence policy, practice, research, or education?

- Considering the positive effects of physical activity on the mental, social and physical health of older people, it should be encouraged worldwide
- Stress is an inevitable part of fast-paced life, and the way stressors are being managed can have a great impact on mental and physical health

7. Strengths and Weaknesses

A strength of this study was the large study sample. Among its weaknesses is the spatial limitation to only one nation, without comparison with other cultural contexts: a prospective study could cover other countries in the American, European, and Asian continents. Another limitation of this study is its cross-sectional design, which does not allow for determining the action of time on the variables studied; continuous prospective research may allow systematic analysis of PA and its relationship with stress, and confounding factors. Other relevant limitations to consider are that comorbidities, drug addiction, varied aspects of functionality, and emotional and cognitive issues have not been addressed. Given high homogeneity in education, age, physical activity, and stress (three of which are the areas of interest), the power to discern between groups is low. The chi-square test allows for comparison across samples of different sizes; the validity of that comparison is diminished if homogeneity in the sample is not representative.

8. Difficulties

The COVID-19 pandemic prevented data collection, leading older people in Brazil to isolate at home from 12 March 2020. For this reason, the field research had to be ended with the sample obtained at that time.

9. Suggestions

The analysis carried out in this research did not make comparisons of stress and PA regarding the sociodemographic levels of marital status, gender, educational level, and other sociodemographic characteristics. The relationships between the answers given to the facets of the PSS, which can be contemplated in future analyses and may be considered relevant for discussion, were also not examined with statistical analysis. Other nuanced issues between stress and PA can be addressed in future research, which is to examine stress as a psychological construct, as well as the clinical and geriatric aspects to identify other possible mediators in the relationship between stress and PA, or over medical problems the subjects might have as well as other stressors in their lives. A future study can contemplate the types of PA that decrease older people's stress.

10. Contributions to the Fields of Health

The results found in this study can contribute to the development of public policies aimed at older people andthe development and improvement of policies and programs focused on older people. This study may improve stress reduction and the physical and psychological health of older people.

Abbreviations

Perceived Stress Scale (PSS); Physical Activity (PA).

Author Contributions

Conceptualization, Methodology - Lyra da Silva, Carlos Roberto.; Formal analysis, investigation, Figueira, Helena Andrade; data curation, Figueira, Olivia Andrade; writing—original draft preparation, Figueira, Helena Andrade; writing—review and editing, Figueira, Olivia Andrade and Figueira, Alan Andrade and Figueira, Joana Andrade; supervision, Dantas, Estelio Henrique Martin; project administration, Dantas, Estelio Henrique Martin.

Competing Interests

The authors declare that they have no competing interests

References

1. Figueira O, Casellas J, Figueira A, Perini CC. A luta contra o envelhecimento, uma análise na perspectiva bioética. Res Soc Dev. 2021; 10: e56210112254.
2. Kahlmeier S, Wijnhoven T, Alpiger P, Schweizer C, Breda J, Martin BW. National physical activity recommendations: Systematic overview and analysis of the situation in European countries. BMC Public Health. 2015; 15: 133.
3. Dėdelė A, Miškinytė A, Andrušaitytė S, Bartkutė Ž. Perceived stress among different occupational groups and the interaction with sedentary behaviour. Int J Environ Res Public Health. 2019; 16: 4595.
4. Lee WJ, Peng LN, Lin MH, Loh CH, Chen LK. Determinants and indicators of successful ageing associated with mortality: A 4-year population-based study. Aging. 2020; 12: 2670-2679.
5. Gnam JP, Loeffler SN, Haertel S, Engel F, Hey S, Boes K, et al. On the relationship between physical activity, physical fitness, and stress reactivity to a real-life mental stressor. Int J Stress Manag. 2019; 26: 344-355.
6. WHO. Doing what matters in times of stress. Geneva: World Health Organization; 2020.
7. dos Santos FA, de Oliveira DV, Antunes MD, Faria TG. Efeitos do exercício físico sobre o estresse percebido de idosos. Revista Interdisciplinar de Promoção da Saúde. 2018; 1: 127-136.
8. Tomiyama AJ. Stress and obesity. Annu Rev Psychol. 2019; 70: 703-718.
9. Russell G, Lightman S. The human stress response. Nat Rev Endocrinol. 2019; 15: 525-534.
10. Lee J, Bae H, Lee E. Influence of successful aging, quality of life, and factors related to potential stressors on older consumers' purchase of private health insurance in South Korea: An empirical study based on proactive coping theory. J Appl Gerontol. 2022; 41: 253-261.
11. Dantas EH. A Prática da Preparação Física. 6th ed. São Paulo: Roca; 2014.
12. Figueira HA, Figueira OA, Corradi-Perini C, Martínez-Rodríguez A, Figueira AA, da Silva CR, et al. A descriptive analytical study on physical activity and quality of life in sustainable aging. Sustainability. 2021; 13: 5968.
13. WHO. Global recommendations on physical activity for health. Geneva: World Health Organization; 2010.

14. World Medical Association. World medical association declaration of Helsinki-Ethical Principles for medical research involving human subjects. Geneva: World Medical Association; 2020. Available from: https://www.wma.net/policies-post/wma-declaration-of-helsinki-ethical-principles-for-medical-research-involving-human-subjects.
15. WHO. World report on ageing and health. Geneva: World Health Organization; 2017.
16. IBGE. Censo Demografico 2010. Brasilia: IBGE; 2010. Available from: https://www.ibge.gov.br/estatisticas/sociais/saude/9662-censo-demografico-2010.html.
17. Cohen S. Perceived stress in a probability sample of the United States. In: The social psychology of health. Thousand Oaks: Sage Publications, Inc.; 1988.
18. Voorrips LE, Ravelli AC, Dongelmans PC, Deurenberg PA, Van Staveren WA. A physical activity questionnaire for the elderly. Med Sci Sports Exerc. 1991; 23: 974-979.
19. Kosmulski M. Skeptical comment about double-blind trials. J Altern Complement Med. 2010; 16: 339.
20. IBGE. PNAD - Educacional - Pesquisa Nacional de Amostra por Domicilio. Brasilia: IBGE; 2020. Available from: https://www.ibge.gov.br/estatisticas/sociais/populacao/9127-pesquisa-nacional-por-amostra-de-domicilios.html?=&t=destaques.
21. Babazadeh T, Sarkhoshi R, Bahadori F, Moradi F, Shariat F, Sherizadeh Y. Prevalence of depression, anxiety and stress disorders in elderly people residing in Khoy, Iran (2014-2015). J Res Clin Med. 2016; 4: 122-128.
22. Azevedo RR, Ribeiro HS, da Costa Borges GA, Madrid B. Correlacao entre estresse percebido e niveis de atividade fisica de recepcionistas de academias. Revista Brasileira de Pesquisa em Ciências da Saúde. 2019; 5: 16-19. .
23. Luchesi BM, Souza ÉN, Gratão AC, de Oliveira Gomes GA, Inouye K, da Silva Alexandre T, et al. The evaluation of perceived stress and associated factors in elderly caregivers. Arch Gerontol Geriatr. 2016; 67: 7-13.
24. Oliveira NA, Souza ÉN, Luchesi BM, Inouye K, Pavarini SCI. Stress and optimism of elderlies who are caregivers for elderlies and live with children. Rev Bras Enferm. 2017; 70: 697-703.
25. Nuzum H, Stickel A, Corona M, Zeller M, Melrose RJ, Wilkins SS. Potential benefits of physical activity in MCI and dementia. Behav Neurol. 2020; 2020: 7807856.
26. Uddin MT, Kabir A, Islam MN. Prevalence and determinants of psychological stress of elderly in Bangladesh: A cross sectional study. Indian J Gerontol. 2019; 33: 381-392.
27. López-Walle J, Tristán J, Tomás I, Gallegos-Guajardo J, Gongora E, Hernández-Pozo M. Perceived stress and authentic happiness through the level of physical activity in young university students. Cuad de Psicol del Deporte. 2020; 20: 265-275.
28. Oliveira DV, Favero PF, Codonhato R, Moreira CR, Antunes MD, Nascimento JR. Investigation of the emotional and psychological factors of elderly persons frequenting ballroom dancing clubs. Rev Bras Geriatr e Gerontol. 2017; 20: 797-804.
29. Prakash S, Srivastava AS. Resilience, life satisfaction and perceived stress among elderly people living separately from their adult children-: A cross–sectional comparative study. Int J Indian Psychol. 2019; 7: 802-808.
30. Marques RF. Corpo e liberdade: Possibilidade, condição, ambiguidade. Volunt Rev Int Filos. 2019; 10: 5-17.

31. Latorre-Roman PA, Carmona-Torres JM, Cobo-Cuenca AI, Laredo-Aguilera JA. Physical activity, ability to walk, weight status, and multimorbidity levels in older Spanish people: The national health survey (2009–2017). Int J Environ Res Public Health. 2020; 17: 4333.
32. Tsekoura M, Kastrinis A, Katsoulaki M, Billis E, Gliatis J. Sarcopenia and its impact on quality of life. GeNeDis. 2017; 1: 213-218.
33. Jardim VC, Medeiros BF, Brito AM. Um olhar sobre o processo do envelhecimento: A percepção de idosos sobre a velhice. Rev Bras Geriatr e Gerontol. 2006; 9: 25-34.
34. dos Santos Marinho M, dos Reis LA. Velhice e aparência: A percepção da identidade de idosas longevas. Rev Kairós Gerontol. 2016; 19: 145-160.
35. Kulkarni SH, Vaidya RR, Jadhav SA. Stress, its consequences and ways to combat it in modern era. Stud Indian Place Names. 2020; 40: 185-191.
36. Baumann D, Ruch W, Margelisch K, Gander F, Wagner L. Character strengths and life satisfaction in later life: An analysis of different living conditions. Appl Res Qual Life. 2020; 15: 329-347.