

Article

A Descriptive Analytical Study on Physical Activity and Quality of Life in Sustainable Aging

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Abstract: Physical activity (PA) improves the quality of life (QOL) of older people, increasing overall health and well-being and enabling them to take control over their own lives, and is highly correlated with sustainable aging. **Objective:** To relate the practice of PA with QOL for sustainable aging. **Method:** The sample of this cross-sectional inquiry analytical observational ex post facto research was composed of 690 community-dwelling older people of both genders, non-selected volunteers, living in Brazil, present at a road run in Rio de Janeiro, from 30 October 2019 to 12 March 2020, that answered an instrument starting with profile questions, followed by selected questions on QOL from world health organization quality of life for old age (WHOQOL-Old) and on PA from Baecke-Old. **Results:** The mean age bracket was 65–69 years, 73.6% female. This sample was characterized as active (84%), having university level education (75%), fitting the concept of a high level of QOL (73.35 ± 12.6). QOL was distributed as: 562 (81.2%) at 70–100%; 123 (17.9%) at 41–69%; 5 (0.7%) at 32–40%. Between active and sedentary lifestyle and QOL, the sedentary lifestyle presented a lower QOL score while the active QOL score was highest, with a correspondence with $p < 0.001$, $DF = 2$, with 99.9% certainty and Pearson's chi-square test critical value = 19.2. **Conclusion:** The sample of older people characterized by high QOL and PA with a university level education suggests the triangulation between advanced education, PA and QOL. The QOL of the older people with high scores was associated with the practice of PA, and low scores were associated with a sedentary lifestyle; this conclusion can be applied to sustainable aging of general society.

Keywords: quality of life; physical activity; aging; sustainable aging; WHOQOL-Old

1. Introduction

Worldwide, the proportion of people aged 60 and over is growing faster than any other age group [1]. The older population has increased exponentially over the past few years, and it should continue to grow in next few decades, from 841 million people in 2013 to more than 2 billion in 2050 [2]. When developing policies related to population aging, there has been a global promotion of active aging for sustainability, promoting the right of older people to health and active participation in social and community activities [3]. Active aging policies and programs allow them to remain engaged according to their abilities and preferences as they age, preventing or delaying disabilities [4]. In addition, active aging has the potential to confront many of the challenges of individual and population aging, improving mental health and promoting social contacts [5]. Sustainability, once established as a guiding norm for the development of society, can become a deep structural

gradient of strength [6], acting on aging and health. This fact could be considered as fundamental to support the decade of healthy aging (2020–2030) proposed by the World Health Organization (WHO) and, additionally, to have the opportunity to achieve the goals of sustainable development, developed to guarantee “the future we want” [7].

Public policy makers in Brazil are promoting PA as a key component in national health plans for the older population [8]. PA should be approached in a broad way, because in addition to the practice of physical exercises, it involves structuring the routine and is practiced through social interaction, becoming a socialization activity [9]. The scientific standard of PA for the older population [10] includes recreation, occupation, leisure, transportation, home care, and reaching a minimum of 150 min a week of physical activity. Furthermore, the internationally validated Baecke-Old questionnaire [11] contemplates this approach. There is consensus in the academic literature on the benefit of the practice of individual and/or collective PA for the older population, both in health and in quality of life [12]. Being active helps older people to remain as independent as possible for the longest period of time, participating in physical activities (PAs), delaying functional decline, identifying strengths, personal values, and interests, and creating a full life [13].

Quality of life (QOL) has been defined as subjective well-being reflecting the distance between one's own goals, expectations, standards, and concerns and the effective experience, supported by the achievement of goals according to the value system in which the person is inserted [14]. It is a subjective and broad concept with multiple dimensions that encompass physical, psychological, emotional, mental, spiritual, social, and environmental conditions, including positive and negative aspects of life [15]. Sufficient unanimity has been observed to confirm that older people have peculiar issues in common, constituting relevant specificity for QOL [14]. In older people, a predictor of better QOL is increased PA, while a predictor of decreased QOL is loss of mobility [15]. The World Health Organization's Quality of Life Group (WHOQOL Group) developed a specific QOL scale for older people, in a cross-cultural perspective, the WHOQOL-Old [16], which was validated, translated, and adapted to Portuguese [17].

There is a global need to evolve towards sustainable aging, following the WHO and the United Nations proposal on the development of sustainable public policies to implement QOL, focusing on older people and aging population QOL. Implementing PA and QOL to promote active aging and dignify older people is a moral and ethical challenge, targeting what marginalizes and isolates older people [18]. The authors hypothesized that raising older people's QOL is essential to gain information about how the PA may have an effect on the QOL in the older population. For this reason, the main aim of this study was to study PA and its relationship with the QOL in older people, in the context of sustainable aging.

2. Material and Methods

Design and Ethics in Research: This cross-sectional inquiry analytical observational ex post facto research adhering to the Helsinki Declaration [19] was approved by the Research Ethics Board—UNIRIO on 30 October 2019, number 3.670.727.

Sample: The sample consisted of 690 older people living in the community (WHO, 2002), of both genders, as unselected Brazilian volunteers, present (as a participant or observer) in street races in Rio de Janeiro, Brazil, from 30 October 2019 to 12 March 2020. The exclusion criteria were blindness, deafness, or cognitive impairment, which would be an obstacle to answering the questionnaire. To determine the sample size, the population of elderly people in Brazil was used according to the National Census [20], which was 20,590,599, with a 95% confidence level and a confidence interval of 4, and a desirable sample size of 600 was reached.

Data Collection: The instrument composed for this research started with eight sociodemographic questions adopted by the Brazilian Demographic Census [20]: a. Full name (in code); b. Gender; c. Age group; d. Co-habitation; e. Marital status; f. Schooling. These were followed by selected questions from the WHOQOL-Old [11] questionnaire: a.

Losses in the senses (hearing, sight, taste, smell and touch) that affect your daily life, b. How much freedom do you have to make your own decisions, c. Are you afraid to die, d. Can you do the things you like, e. Are you satisfied with the opportunities to continue achieving achievements in your life, f. Do you feel that you have received the recognition you deserve in life, g. Do you feel love in your life. In calculating the levels of results of the WHOQOL-Old questionnaire [21], self-assessed from 0 to 4, the score was weighted by dividing the older people into three groups: 0–40 = low QOL; 41–69 = moderate QOL; 69–100 = high QOL. These were followed by five PA questions selected from the Baecke-Old questionnaire [22]: a. Do you do some heavy housework; B. How many steps do you go up in a day; c. What form of transport you use; d. Practicing physical activity (walking, running, Pilates, yoga, fighting, swimming, etc.); e. In leisure time you . . . Each facet had 4 items—on a Likert scale from 1 to 5—resulting in a set of scores per facet ranging from 4 to 20 and a total score (TS).

The sample selection procedure was a person-to-person approach, and involved explaining that a QOL survey was being carried out, and participants were invited to answer the questionnaire, which was available online. The main researcher personally approached the older people in individual sessions by applying the questionnaire, lasting approximately 10/15 min, asking them to keep in mind their values, hopes, concerns, and expectations in the last two weeks when answering, after signing the informed consent. In order to maintain a high scientific standard, the double-blind statistical method was adopted, making sure that the people involved did not have access to certain information that could lead to biases, and the results were tabulated by an independent researcher, without prior knowledge of the hypotheses being tested, and the researchers were tested for intra- and inter-rater error [23].

Data Analysis: Descriptive statistical measures of dispersion and location were used: mean and standard deviation. Nonparametric statistics included procedures to check the sample homogeneity; hypothesis testing procedures; post hoc procedures. The chi-square and Spearman tests were used, analyzing the possible associations and comparisons between the study variables, assuming a probability of $\alpha = 5\%$ for the results obtained at random, with an experimental power corresponding to at least 80%, allowing control of type II errors of 20%. The software used was SPSS version 25.

3. Results

Regarding the sample profile of the older population, there was a greater participation of women and those aged between 60 and 70 years old, living with family, married, with an educational level above high school. The present research adopted an age range, and the average age of the sample ranged from 65 to 69 years. The sample profile is shown in Table 1.

Physical Activity Results of the Sample: The results of the responses to the Baecke-Old inventory in absolute and percentage values are presented in Table 2. Almost 50% of the older people did any heavy housework; usually climb 1–5 steps per day; use a car as their means of transportation; study or watch TV during leisure hours. Additionally, 33% practice physical activity (walking, running, Pilates, yoga, fighting, etc.) three times a week, 30 min per day. Taking into account the WHO guidelines for PA for the elderly [24], all the elderly people in the sample who had a total of 0 to 2 in the Baecke-Old were classified as sedentary, and the elderly people who had a total above 3 were considered active. Of the 690 elderly people who made up this sample, 582 (84%) were active, while 108 (16%) were sedentary, characterizing the sample as mostly active.

Table 1. Sample characteristics.

Questions	Answers	Percentage	Absolute
Gender	Female	73.6	509
	Male	26.2	181
	Alternative Gender	0.1	1
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
	85–89	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	Illiterate	0.0	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
	Post Graduate	37	257

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

Table 2. Results of the responses to the Baecke-Old inventory.

Question	Answer	Percentage	Absolute
A	Never	16.5	112
	Sometimes	47.2	326
	Almost Always	18.6	128
	Always	17.7	124
B	Never	26.8	184
	1–5 a day	46.2	319
	6–10 a day	11.8	82
	>10 a day	15.2	105
C	Walking	29.6	204
	Bike	3.0	21
	Car	49.6	342
	Public Transportation	17.8	123
	Never goes out	0	0
D	Never	29.2	201
	<30 min/day 3 times/week	33	228
	<30 min/day 5 times/week	11.5	79
	<50 min/day 3 times/week	12.7	88
	<50 min/day 5 times/week	4.6	32
	>50 min/day 3 times/week	9	62
E	TV/Read/Study	52	359
	Walk/Run	4.4	30
	Gardening/House	14.7	101
	Cycling	1.7	11
	Others	27.4	189

Caption: A. Do you do any heavy housework; B. How many steps do you usually climb per day; C. What means of transportation do you use; D. Do you practice physical activity (walking, running, Pilates, yoga, fighting, etc.); E. During leisure hours you ... The highest percentage scores are identified with yellow highlight.

Quality of Life Results of the Sample: The total mean QOL of the sample was 73.4% and the standard deviation was 12.6%. Figure 1 presents the total sum of QOL separated by levels in percentage and absolute values.

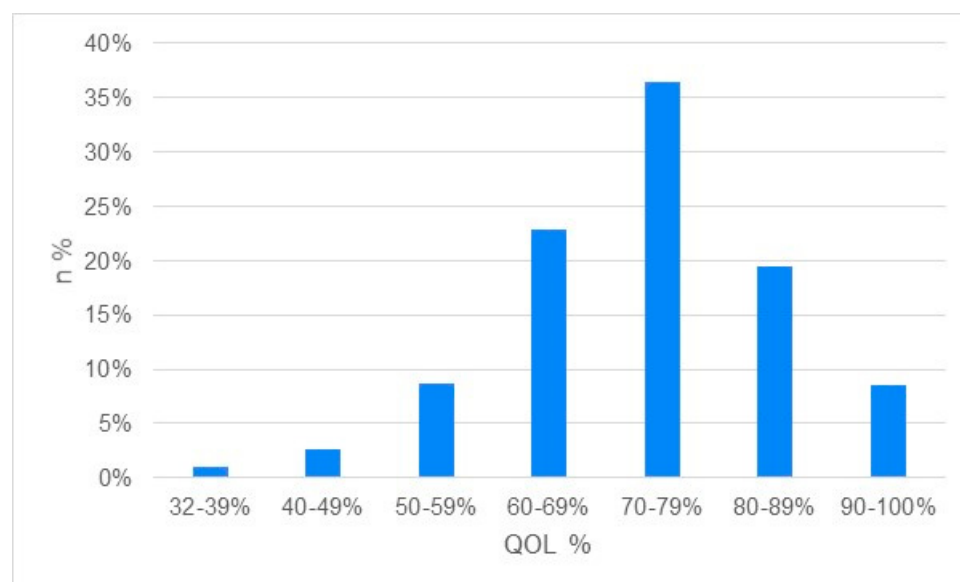


Figure 1. QOL by levels in percentage and absolute values.

The results of the WHOQOL-Old inventory by facet in percentages are presented in Table 3, underlining that facets A and C have a reverse score.

Table 3. Results of WHOQOL-Old inventory by facet in percentages.

	A	B	C	D	E	F	G
Nothing	54%	0.1%	30%	0.4%	2.3%	0.9%	0.1%
Little	25.1%	1.5%	26.7%	7.2%	7.1%	7.2%	2.3%
More or Less	13.5%	7.4%	31.3%	35.9%	26.1%	27.1%	11.5%
Much	5.8%	33.3%	8.8%	46.5%	49.6%	49.4%	55.2%
Extremely	1.6%	57.7%	3%	10%	14.9%	15.4%	30.9%
Mean	80%	88%	68%	80%	68%	68%	79%

Caption: A. Loss of senses affects your life; B. Freedom to make one's own decisions; C. Fear of dying; D. Able to do the things you would like; E. Opportunities to continue attaining achievements in life; F. Receive the recognition you deserve in life; G. Feeling love in life.

The total QOL mean and standard deviation were 73.35 ± 12.6 with the distribution of answers by the facets of WHOQOL-Old visualized in Figure 2.

Comparing the QOL of active and sedentary older people, Figure 3 shows the division of the sample by these clusters, presenting that among the older people in the sample who reported low QOL, 1.29% were from the active group and 52.53% were from the sedentary group.

When comparing QOL and PA, there is a correspondence between active and sedentary lifestyle and QOL, with 99.993% certainty, $p < 0.001$. Pearson's chi-square test has a critical value of 19.218, with 2 degrees of freedom (FD), stating that a good relationship between QOL and PA is observed, with $p < 0.05$.

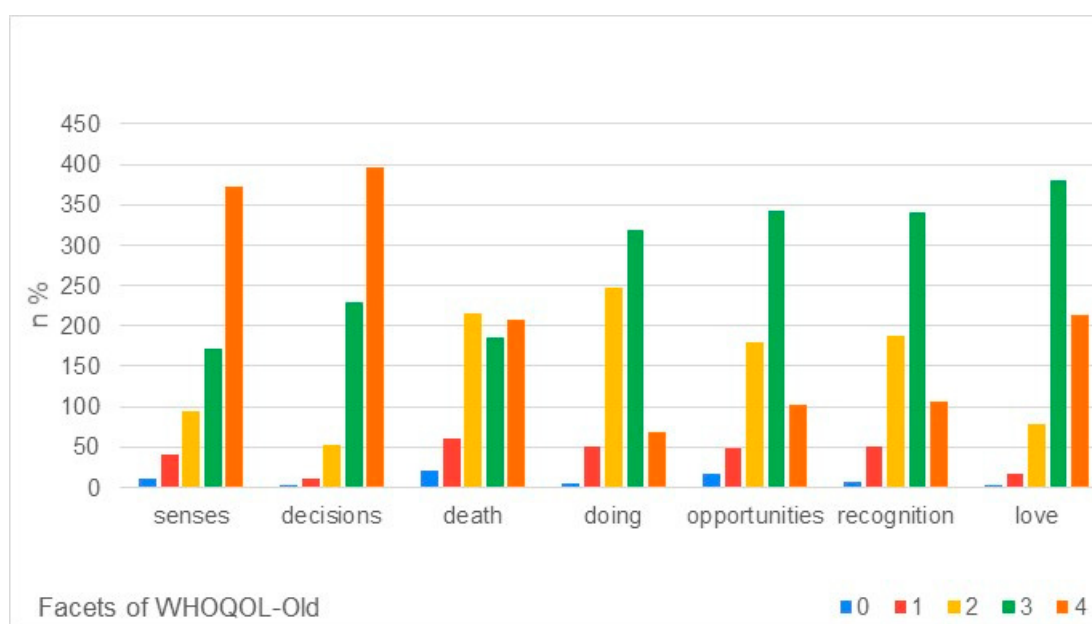


Figure 2. Distribution of the answers by theme of WHOQOL-Old. Caption: Key to the numerical group 0, 1, 2, 3, 4 = each facet is self-evaluated on a Likert scale from 0 to 4. A. Senses = Loss of senses affects your life; B. Decisions = Freedom to make one's own decisions; C. Death = Fear of dying; D. Doing = Able to do the things you would like; E. Opportunities = Opportunities to continue achieving achievements in life; F. Recognition = Receive the recognition you deserve in life; G. Love = Feeling love in life.

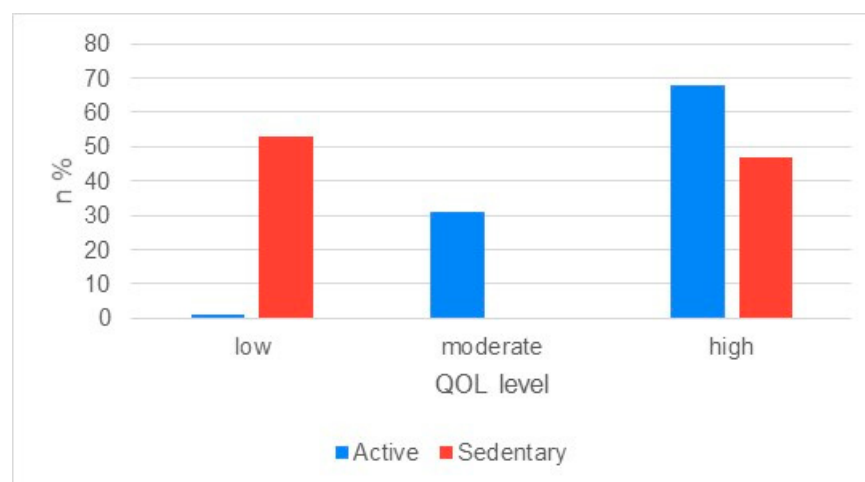


Figure 3. Percentage comparison of QOL by active and sedentary clusters. Low: <40 points for QOL; moderate: 41–69 points for QOL; high: >70 points for QOL.

4. Discussion

The results of the current study showed 99.9% confidence that the highest QOL is presented by older people who practice PA. All active older people who practice PA have high or moderate QOL, while inactive people have low QOL (53%) and only 47% among the inactive older people have high QOL. A significant statistical correlation was found between QOL and PA, $p < 0.001$, showing that it can be applied to society as a whole. These older people, living in a community, whose average age range is 65–69 are characterized as practicing PA (84%), female (74%), having university level education (75%), and high QOL (73.35 ± 12.6). QOL was distributed as follows: 81% of older people from 70–100%; 18% from 41–69%; 1% from 32–40%.

Research in a nursing home for older people in the Netherlands found an average QOL of 60% [25], as well as a survey carried out in Brazil, with 238 older people found showing QOL aspects between 50% and 72% [26]. Compared with the current research (73.35 ± 12.6), it is observed that the QOL reported by these studies is lower.

The highlights regarding the facets are: “you are free to make your own decisions” with an average of 88%; three questions contributed to the high QOL with an average of 80%: the loss of senses affects your life; being able to do the things you like; and feeling love in your life; three issues reduced QoL with an average of 68%: having opportunities to continue achieving achievements in life; have received due recognition; death and dying. These results are higher than those usually found in the literature [14]. A study in Brazil found its lowest QOL for being afraid of death and dying, 38%, and having opportunities to continue achievements in life, 50%, demonstrating the existence of a massive preoccupation on these themes, while Indian older people revealed associations with being afraid of death and dying resulting in QOL = 55%, and having opportunities to continue achievements in life, 66% [14]. Both samples were composed of older people with a low educational level, which may suggest that a high educational level can improve QOL, in every QOL facet.

4.1. QOL—Educational Level

The Brazilian population at the university level according to the 2010 census [16] is 11.3% of the total population; the sample of this research presented 75.4% at the university level, therefore the educational level of the sample was considered relevant to be discussed. The other sociodemographic aspects that did not stand out in relation to the Brazilian population were not considered relevant in this study. QOL is rather poor in older people with a low education level, which was found in a study among Iranian older people [27]. QOL is positively affected by high educational level [28], and older people with low educational levels report the worst physical and functional conditioning, while the highly educated ones progress more in terms of functional limitations over time [29].

A positive association was observed between the educational level and the high QOL of the present sample of older people (75.4%). Research carried out with older people with a low level of education in Brazil reached a maximum of 60% in the facets of QOL, and the total average found was less than 50%, while in India similar research did not reach a value above 67% in any facet [14]. A survey of 144 physically active older people with a low level of education in Brazil, 88% of whom were female, identified a total mean QOL lower than 66% [30]. A survey in Brazil with 107 older people with a low educational level, 67% female, reported QOL = 60.5 ± 11.1 [31]. Research with older people with a low educational level in Brazil found for this topic and association of 45% [32], and in India, 49%. Both samples had a low educational level, compared to that of the present research with a high educational level [14]. Older people’s QOL can be affected by health and cultural conditions [33]. In this present research, it was observed that the topic that raised QOL the most, with an average of 88%, was having the freedom to make their own decisions.

4.2. QOL and Family Life

Research carried out in England with 11,234 non-institutionalized older people revealed that QOL is reduced by limitations in mobility and difficulties in daily activities, and it rises with trusting relationships and frequent contacts with family and friends [33]. In a study conducted in Varanasi, India with 100 older people (50 living with their families and 50 living separated from their families), a significant difference was found in the levels of QOL between those living with their families and those living apart [34]. Most of the older people around the world continue to be a vital resource for their families and their communities [35]. A study conducted in Korea analyzing 959 older people concluded that those who live alone have a lower level of QOL than those who live with their families [36]. QOL is quite low among single older people, and those who live with their spouses have a higher level of QOL [27]. While globally around one seventh of the older population

lives alone [8], because the young population migrates to the cities, and older people are left alone [37], in the present study, 25% of the older people reported living alone. All of these studies corroborate what was found in this research, where approximately 69% of the older people claimed to live with their families, 54% of whom were married, and the QOL (73.35 ± 12.6) was remarkably high.

4.3. QOL and PA

There is a consensus in the literature regarding the effects of PA on QOL, that the level of QOL increases with the intensity of PA [38]. Participating in PA for 60 min a day, two or three times a week, increases the QOL in relation to the sedentary lifestyle, providing health and well-being [39]. The presence of high QOL associated with physical activity goes beyond the sense of physical health, involving behavioral, emotional, and physical aspects, factors perceived as a way to remain active during the aging process [40]. Enriching older people's leisure activities strongly enhances their QOL [41]. A recent study in Brazil with 1197 older people concluded that a factor that contributes to raising QOL is the practice of PA [40]. A survey conducted recently in Brazil with 107 older people with a low educational level, 67% female, with $QOL = 60.5 \pm 11.1$, and high adherence to a physical activity program (78.5%) showed a direct and positive relationship of interdependence, where the higher the level of practice of PA, the greater the QOL [31]. The present research, in view of the confirmation of Pearson and chi-square hypothesis tests, concluded that a good relationship between QOL and PA was observed in the sample, with $p < 0.001$, that can be applied to the population, and to society as a whole.

Increasing health as a whole, and not only mental health but also physical health, PA has positive effects on well-being in general, while aging is associated with frailty and functional limitations due to an irreversible biological process with effects of comorbidities when associated with a sedentary lifestyle, and a sedentary lifestyle still tends to predominate in aging [42]. Despite the proven benefits of PA, a sedentary lifestyle still tends to predominate in many countries. Policies and programs should encourage inactive older people to become more active and should provide them with an opportunity to do so [4]. Aging in each society is determined by cultural values and traditions that also influence the behavior of older people, who may not have an extended period of good health, although there has been an increase in longevity [43]. The effects of aging, such as functional losses in the musculature, which start with a reduction in speed, strength, stability, and firmness, are associated with serious health consequences such as fragility, morbidity, and mortality with an impact on QOL [44], and contribute to limiting PA practice and well-being in general, however, physical conditioning can easily reverse this situation and greatly increase older people's QOL [30]. Most research on PA in older people is focused on healthy individuals living in the community, but there is also emerging evidence regarding the benefits of PA even for frail and cognitively impaired older people [45], since PA is a promising non-pharmacological method for promoting health, and is available to all people [42].

4.4. Sustainable Aging

The framework of the active aging policy [5] suggests a new paradigm, which sees older people as active participants in an age-integrated society and as active contributors as well as beneficiaries of development [4]. Active refers to continuous participation in matters, but not only being physically active, and health refers to well-being, therefore, policies and programs that increase the well-being and participation of older people in the matters they refer to are particularly welcome [12]. The agenda for sustainable development with 12 integrated and indivisible goals proposes a way to achieve these goals with a focus on the growing priority of promoting the well-being of older people worldwide [46]. Recognition of the value of prevention programs for older people grows [8]. Prevention need not be expensive, however, in many countries, health promotion campaigns and initiatives have received little priority or remained unavailable to large sections of the older population [5]. The public health policy agenda for healthy aging encourages PA

as being crucial for healthy aging [47], benefiting not only older people but also their direct environments and society as a whole, as well as the economy [48]. With a high level of physical function, coping with deterioration and impairment, aging is successful [49]. Aging is characterized by transformations at all levels, whether social, emotional, mental, physical, or psychological, and in it the biological and the familiar aspects, among others, interact individually and in a complex way [50]. Active aging is defined as a process of optimizing opportunities for health and participation, empowering older people in order to enhance QOL as people age; this applies to both individuals and population groups [4]. Policies and programs that remain tied to outdated paradigms associating aging with retirement, illness, and dependence do not reflect reality, since most older people remain independent, promoting their own health, and taking control of their lives [13].

The aging process simultaneously involves biological, cultural, social, psychological, environmental, historical, political, and economic factors, producing different social representations of aging and older people. Integrating with the social environment, interacting, expressing ideas, contributing to social actions, the perception of needs, and the opportunity to achieve happiness and feel fulfilled at all levels are aspects of QOL. Sustainable changes require changes in behavior, values, philosophy of life, and self-acceptance, and a radical change in the aging paradigm, from decrepitude to active aging. Accepting aging provides older people with adequate tools to embrace this new phase of their lives as it unfolds, just as they embraced their youth and maturity. The quest is to be able to escape the limits of aging by opening up to new adventures instead of allowing life to end like an impasse [16]. Promoting QOL through sustainable aging is an individual challenge and for the health system of the society in which the older people are inserted, involving proposing new standards of individual and collective conduct, promoting dialogues of values and goals. The process is based on scientific knowledge, is inserted in the respective cultural platform, maintains the subjectivity of older people, and enables their capacity for socio-political articulation, for the personal construction of their dignity to grow old as unique, individual subjects, and authors of their own existence.

5. Conclusions

The sample of the present research was characterized as active (84%) with high QOL (73.4 ± 12.6), age range 65–69, 74% female, and 75% with a university degree (94% with a high school diploma). The hypothesis test confirmed the correspondence between PA and QOL with absolute certainty (99.99%), confirming that older people who practice PA have a high level of QOL, a conclusion that can be applied in society as a whole.

The high QOL and PA in a university education-level senior society brings up the link of advanced education in the triangulation with PA and QOL in promoting opportunities for personal satisfaction in the physical, social, psychological, emotional, mental, and spiritual senses. It suggests that promoting QOL in active aging in a proposal for sustainable development involves each of the factors of development and sustainability, integrating the principles of sustainable development.

6. Strengths and Weaknesses

The present study has a number of strengths, including its sample size. Among its weaknesses are 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 QOL, as well as 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.

7. Difficulties

The COVID-19 pandemic prevented the continuation of 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.

8. Suggestions

The analysis carried out in this research did not make comparisons of QOL and PA regarding the sociodemographic levels of marital status, stepson of the residence, school level, work, religion, and other sociodemographic aspects. They were also not examined with statistical analyses between the facets of QOL, which can be contemplated in future analysis, if they are considered relevant in the discussion. Other nuanced issues between QOL and PA can be addressed in future research, which is to examine QOL as a psychological construct representing life satisfaction, as well as the clinical and geriatric results of the perceived health status and to identify other possible mediators in the relationship between QOL and PA. A future study can contemplate the types of PA that increase older people's QOL.

9. Contributions to the Fields of Health

The results found in this study can contribute to the development of public policies aimed at older people, as well as in the development and improvement of policies and programs focused on older people. The study can contribute to improving the promotion of the QOL and physical and psychological health of older people.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Conflicts of Interest: The authors declare no conflict of interest.

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