Quality of life in older adults: impact of a 32-week supervised exercise program

Calidad de vida en adultos mayores: impacto de un programa de ejercicio supervisado de 32 semanas

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Abstract

Introduction: Population aging poses challenges to maintaining quality of life (QoL). In primary health care, supervised exercise is essential for preserving physical, emotional, and social well-being.
Objective: To evaluate the QoL of older adults in primary care during a 32-week individualized exercise program, comparing age groups (60–69 and 70+ years).
Methodology: A quasi-experimental, longitudinal study involving 161 older adults (68.01 ± 5.46 years) at Basic Health Units in Aracaju, Brazil. The WHOQOL-OLD was administered at baseline, mid-program, and final assessments.
Results: A significant increase in the General Quality of Life Index was observed from the diagnostic to the summative assessment (10.52%; $p < 0.001$), with improvements in autonomy, sensory functioning, and social participation, and no differences between age groups.
Discussion: The findings confirm that physical exercise acts as a protective factor for QoL against age-related decline.
Conclusions: The program is an effective intervention in primary care, reinforcing the importance of public policies for active aging.

Keywords

Aging; older adults; physical exercise; primary health care; quality of life.

Resumen

Introducción: El envejecimiento poblacional plantea un desafío para el mantenimiento de la calidad de vida (CV). En la atención primaria de salud, el ejercicio físico supervisado resulta esencial para preservar el bienestar físico, emocional y social.
Objetivo: Evaluar la calidad de vida de personas mayores atendidas en atención primaria a lo largo de 32 semanas de ejercicio físico individualizado, comparando dos grupos de edad (60–69 y 70 años o más).
Metodología: Estudio cuasiexperimental y longitudinal con 161 personas mayores (68,01 ± 5,46 años) en Unidades Básicas de Salud de Aracaju, Brasil. Se aplicó el módulo WHOQOL-OLD en las evaluaciones diagnóstica, formativa y sumativa.
Resultados: Se observó un aumento significativo del Índice General de Calidad de Vida entre la evaluación diagnóstica y la sumativa (10,52 %; $p < 0,001$), con mejoras en la autonomía, el funcionamiento sensorial y la participación social, sin diferencias entre los grupos de edad.
Discusión: Los hallazgos confirman que el ejercicio físico actúa como un factor protector de la calidad de vida frente a las pérdidas inherentes al envejecimiento.
Conclusiones: El programa constituye una intervención eficaz en la atención primaria, lo que refuerza la importancia de las políticas públicas orientadas al envejecimiento activo.

Palabras clave

Envejecimiento; personas mayores; ejercicio físico; atención primaria de salud; calidad de vida.

Introduction

Population aging is one of the most significant demographic phenomena of our time. In Brazil, the population aged 60 and older has already surpassed the 15–24 age group, according to data from the Demographic Census of the Brazilian Institute of Geography and Statistics (IBGE, 2022), reflecting a trend of continuously increasing longevity and posing growing challenges to public policies and health services aimed at caring for this population.

Quality of life (QoL) is a multidimensional construct that goes beyond the mere absence of disease, involving an individual's subjective perception of their physical, psychological, social, and spiritual well-being, based on their values, goals, and cultural norms. For older adults, QoL is directly related to maintaining autonomy, functional independence, social participation, and a sense of purpose in the face of the changes inherent in aging. In Brazil, the right of older adults to comprehensive health care, dignity, and social participation is guaranteed by the Statute of Older Adults (Brazil, 2003), which reinforces the shared responsibility among family, society, and the State in promoting active and healthy aging.

Among the most effective strategies for promoting quality of life in older adults, regular supervised physical exercise stands out. Structured programs for strength, endurance, and flexibility training have been shown to preserve mobility and functional independence, while also promoting psychological benefits such as increased self-esteem and a sense of social belonging (Figueira et al., 2023; Sella et al., 2022). Participation in group physical activities also expands social connections and strengthens support networks—factors that contribute significantly to the emotional well-being of older adults (Indrakumar & Silva, 2024; Antunes et al., 2025).

On the other hand, the literature indicates that low levels of quality of life (QoL) in older adults are associated with greater vulnerability to social isolation, loss of autonomy, and worsening of chronic health conditions, highlighting the importance of ongoing and supervised interventions in the context of primary health care (De Oliveira et al., 2019; Souza et al., 2022). Brandão-Loureiro et al. (2024) point to an inverse relationship between quality of life and the risk of falls among older adults. Despite the growing number of studies on the benefits of physical exercise for older adults' health, there is still a scarcity of longitudinal studies—with repeated measurements, conducted in a community setting, and integrated with the public health system—capable of analyzing changes in quality of life over extended periods of intervention (An et al., 2020).

In this context, the present study is part of a broader project carried out within the Primary Health Care system of Aracaju (Sergipe, Brazil) through an individualized and supervised physical exercise program, whose effects on the resilience of this same population have already been reported in a previous publication (Dantas et al., 2023a). The objective of this article was to assess changes in the quality of life of older adults participating in this program over 32 weeks of intervention, comparing the trend of this variable between two age groups (60–69 years and 70 years or older) and discussing the findings in light of the scientific literature on physical exercise and active aging.

Method

Study Design

The present study is characterized as a quasi-experimental, longitudinal study without a control group and with repeated measures, designed to analyze changes in the quality of life of older adults participating in an individualized and supervised physical exercise program (Thomas et al., 2012). The choice of a quasi-experimental design stemmed from the applied nature of the intervention, conducted within the real-world context of Primary Health Care, which made it impossible to randomly assign participants to a control group. The longitudinal follow-up comprised three assessment time points: diagnostic assessment (baseline), formative assessment (after 16 weeks), and summative assessment (after 32 weeks).

Participants

The study population consisted of older adults registered at nine Basic Health Units (UBS) in Aracaju, Sergipe, located in neighborhoods surrounding the Farolândia Campus of the Tiradentes University. The

inclusion criteria were: age 60 years or older and a commitment to participate in the physical exercise program. Older adults who were unable to walk without assistance, had significant motor limitations, or had contraindications to physical exercise identified by the Revised Physical Activity Readiness Questionnaire (r-PARQ) were excluded.

The sample size was calculated based on a pilot study conducted in 2017 with 39 older adults, using a 95% confidence interval, which resulted in an estimated 132 participants, adjusted to 159 after adding a 20% margin to account for potential sample losses. Of the 375 elderly volunteers initially recruited, 230 comprised the eligible sample. Over the course of the 32-week intervention, sample losses occurred due to death, withdrawal from the program, failure to complete formative and/or summative assessments, change of residence, and dropout, resulting in a retention rate of 70.0% (sample loss of 30.0%; n = 69). A comparative analysis between participants who completed the study and those who dropped out did not identify statistically significant differences in age, sex, educational level, family income, or baseline QoL index ($p > 0.05$ in all cases), suggesting the absence of systematic selection bias resulting from sample mortality.

The final sample consisted of 161 older adults, whose demographic and socioeconomic characteristics are described in Table 1.

Table 1. Demographic and socioeconomic characteristics of the sample (n = 161)

Variable	n	%
Age (years), $\bar{X} \pm SD$	68.01 ± 5.46	—
Age group G1 (60–69 years)	115	71.4
Age group G2 (≥ 70 years)	46	28.6
Female	132	82.0
Male	29	18.0
Household income ≤ 2 minimum wages	92	57.1
Education level ≤ incomplete elementary school	42	26.1
Systemic hypertension	94	58.4
Diabetes mellitus	39	24.2

Note: SD = standard deviation. Source: survey data.

Procedure

The physical exercise program was structured as a circuit training program over 32 weeks, preceded by two weeks dedicated to helping participants adapt to the exercises and to the subjective perceived exertion scales. The intervention was divided into two 16-week phases, with sessions held twice a week, lasting approximately 60 minutes, and supervised directly by previously trained physical education students under the guidance of specialist faculty members.

Each session consisted of an initial warm-up (5–10 minutes), exercises for muscle strength, aerobic endurance, flexibility, and a cool-down. Strength training included exercises for the lower limbs (assisted squats, sitting down and standing up from a chair, plantar extension, knee flexion), upper body exercises (elbow flexion and extension, shoulder presses, rows, and exercises with dumbbells and resistance bands), and core exercises, using body weight, resistance bands, dumbbells, and ankle weights, depending on the availability of equipment at the Basic Health Units. The aerobic component consisted predominantly of guided walking and functional circuit training, while flexibility training included static stretching of the major muscle groups.

Training intensity was individualized based on subjective perception of exertion, using the OMNI-RES scale for strength exercises (Robertson et al., 2003; Jiang & Wu, 2022), the Borg scale for the aerobic component (Van Der Zwaard et al., 2023), and the PERFLEX scale for flexibility exercises (Nogueira et al., 2022; Henriques & Teixeira, 2023). The training load was increased gradually, taking into account the participants' individual adaptation, through biweekly reassessments of intensity, the number of repetitions, equipment resistance, exercise complexity, and execution time, while always maintaining safe levels of exertion compatible with each participant's clinical and functional condition. Diagnostic, formative, and summative assessments followed standardized measurement protocols.

Ethical Considerations

The study was conducted in accordance with Law No. 14,874, dated May 28, 2024, which establishes the National System of Ethics in Research Involving Human Subjects in Brazil (Brazil, 2024). The umbrella project was approved by the Research Ethics Committee of Tiradentes University (CAAE No. 26524719.4.0000.5371, opinion No. 3,936,886), with an update approved via opinion No. 6,847,940. All participants signed an Informed Consent Form, and data confidentiality was ensured in accordance with the General Personal Data Protection Law (Brazil, 2018).

Data analysis

Data normality was assessed using the Kolmogorov-Smirnov test, and sphericity was assessed using the Mauchly test, with Greenhouse-Geisser correction when necessary. To compare the three assessment time points (diagnostic, formative, and summative), a one-way analysis of variance (ANOVA) with repeated measures was used, followed by Bonferroni post hoc tests. Comparisons between age groups (G1: 60–69 years; G2: ≥ 70 years) over time were performed using a 2×3 ANOVA with repeated measures, supplemented by analysis of covariance (ANCOVA) with Bonferroni adjustment to control for covariates. Pearson's correlation test was used to analyze associations between variables (Triola, 2024). A significance level of $p < 0.05$ was adopted, and the statistical power of the experiment was calculated for the quality of life variable (Costa Neto, 2002; Thomas et al., 2012).

Results

Data Analysis with Smart PLS-SEM

Table 1 presents the demographic and socioeconomic characteristics of the final sample (n = 161), composed mainly of women, with a mean age of 68.01 ± 5.46 years and a high prevalence of chronic noncommunicable diseases, particularly systemic hypertension and diabetes mellitus.

Table 2. Diagnostic assessment of quality of life (WHOQOL-OLD)

Dimension (WHOQOL-OLD)	$\bar{X}$	SD
Past, Present, and Future Activities (PPF)	14.71	2.60
Autonomy (AUT)	16.29	3.16
Sensory Functioning (FUS)	16.20	2.13
Intimacy (INT)	15.49	3.81
Death and Dying (MEM)	14.74	2.41
Social Participation (PSO)	14.40	2.86
General Quality of Life Index (QVG)	15.31	2.04

Note: $\bar{X}$ = mean; SD = standard deviation. Source: survey data.

Table 2 presents the mean values and standard deviations for the six facets of the WHOQOL-OLD and the General Quality of Life Index (QVG) obtained in the diagnostic assessment, characterizing the participants' baseline status before the start of the intervention.

The initial quality of life index, as measured by the QVG, was $\bar{X}$ = 15.31 ± 2.04, a value already at the lower end of the "High" category (14.1 to 20) according to Mello's (2008) classification. The highest means in the diagnostic assessment were observed in the Autonomy ($\bar{X}$ = 16.29 ± 3.16) and Sensory Functioning ($\bar{X}$ = 16.20 ± 2.13) dimensions, while the lowest scores were found in the Social Participation dimension ($\bar{X}$ = 14.40 ± 2.86), a finding consistent with the sample's socioeconomic and age profile.

Table 3 presents a comparison of the means and standard deviations of the quality-of-life dimensions across the three assessment stages—diagnostic (AD), formative (AF), and summative (AS)—for the overall sample.

Table 3. Quality of life across the three assessment stages (overall sample)

Dimension	AD $\bar{X}$ ± SD	AF $\bar{X}$ ± SD	AS $\bar{X}$ ± SD	p (AD–AF)	p (AD - AS)	p (AF - AS)
PPF	14.71 ± 2.60	15.91 ± 1.88	15.80 ± 2.25	0.049	0.128	1.000
AUT	16.29 ± 3.16	17.36 ± 3.12	18.06 ± 1.98	0.671	0.006	0.839
FUS	16.20 ± 2.13	17.13 ± 2.47	17.54 ± 2.03	0.193	0.012	1.000
INT	15.49 ± 3.81	14.80 ± 4.34	16.74 ± 2.16	1.000	0.123	0.044
MEM	14.74 ± 2.41	16.51 ± 1.93	16.80 ± 2.07	0.003	0.000	1.000
PSO	14.40 ± 2.86	16.63 ± 2.31	16.57 ± 1.80	0.002	0.000	1.000
QVG	15.31 ± 2.04	16.39 ± 1.49	16.92 ± 1.31	0.027	0.000	0.375

Note. AD = diagnostic assessment; AF = formative assessment; AS = summative assessment; PPF = Past, Present, and Future Activities; AUT = Autonomy; FUS = Sensory Functioning; INT = Intimacy; MEM = Death and Dying; PSO = Social Participation; QVG = General Quality of Life Index. Source: research data.

A statistically significant increase ($p < 0.05$) was observed (Table 3) in the perception of quality of life in the PPF, PSO, and MEM dimensions, as well as in the QVG (percentage change of 7.05%; $p < 0.001$), from the diagnostic to the formative assessment, indicating an initial improvement in perceived well-being and daily functioning. From the diagnostic to the summative assessment, additional significant gains ($p < 0.05$) were observed in the Autonomy, Sensory Functioning, Social Participation, and Death and Dying dimensions, and particularly in the QVG (percentage change of 10.52%; $p < 0.001$), demonstrating consistent progress over the 32 weeks of intervention. A significant increase was also observed in the Intimacy dimension between the formative and summative assessments ($p = 0.044$), suggesting a strengthening of interpersonal and emotional bonds by the end of the participation cycle. No significant differences were observed between the diagnostic and formative assessments in the Autonomy, Sensory Functioning, and Intimacy dimensions, indicating that gains in these areas were consolidated primarily during the second half of the program.

Tables 4a and 4b present a comparison of quality of life throughout the intervention process, according to the age groups G1 (60–69 years) and G2 (70 years or older).

Table 4a. Quality of life across the three assessment stages — Group G1 (ages 60–69)

Dimension	AD $\bar{X}$ ± SD	AF $\bar{X}$ ± SD	AS $\bar{X}$ ± SD	p (AD–AF)	p (AD - AS)	p (AF - AS)
PPF	14.47 ± 2.65	15.74 ± 1.88	15.26 ± 2.31	0.185	0.816	1.000
AUT	15.74 ± 3.53	17.56 ± 3.18	18.32 ± 2.08	0.395	0.002	1.000
FUS	15.89 ± 2.18	16.53 ± 2.74	17.16 ± 2.14	1.000	0.126	1.000
INT	15.37 ± 4.57	15.00 ± 4.59	17.05 ± 2.55	1.000	0.135	0.170
MEM	14.74 ± 2.73	16.16 ± 1.83	16.74 ± 2.16	0.124	0.012	1.000
PSO	14.42 ± 2.95	16.63 ± 2.14	16.74 ± 2.00	0.031	0.007	1.000
QVG	15.11 ± 2.31	16.27 ± 1.44	16.88 ± 1.45	0.117	0.000	0.590

Note. DA = diagnostic assessment; FA = formative assessment; SA = summative assessment. Source: research data.

Table 4b. Quality of life across the three assessment stages — Group G2 (≥ 70 years)

Dimension	DA $\bar{X}$ ± SD	FA $\bar{X}$ ± SD	SA $\bar{X}$ ± SD	p (AD–AF)	p (AD - AS)	p (AF - AS)
PPF	15.00 ± 2.58	16.13 ± 1.93	15.26 ± 2.31	0.370	0.213	1.000
AUT	16.94 ± 2.62	17.13 ± 3.14	17.75 ± 1.88	1.000	0.869	1.000
FUS	16.56 ± 2.06	17.85 ± 1.95	18.00 ± 1.86	0.256	0.103	1.000
INT	15.63 ± 2.80	14.56 ± 4.16	16.38 ± 1.59	1.000	1.000	0.357
MEM	14.75 ± 2.05	16.94 ± 2.02	16.88 ± 2.03	0.015	0.015	1.000
PSO	14.38 ± 2.85	16.63 ± 2.58	16.38 ± 1.59	0.048	0.039	1.000
QVG	15.54 ± 1.70	16.54 ± 1.60	16.97 ± 1.16	0.301	0.006	1.000

Note: DA = diagnostic assessment; FA = formative assessment; SA = summative assessment. Source: research data.

In both groups, a statistically significant increase ($p < 0.05$) was observed in the Social Participation facet from the diagnostic to the formative assessment, indicating an initial improvement in the perception of interpersonal relationships and the social support network shortly after the start of the intervention. In Group G1, significant gains ($p < 0.05$) were observed in the Autonomy, Social Participation, Death and Dying dimensions, and in the General Quality of Life Index from the diagnostic to the summative assessment. In Group 2, a significant increase was observed in the Death and Dying and Social Participation dimensions, as well as in the QoL Index, over the same time period, indicating relevant gains even among older participants. No significant differences were observed between the formative and summative assessments in any of the evaluated dimensions in either group, indicating stability in quality of life levels after the intermediate phase. The results of the ANCOVA, adjusted using the Bonferroni method,

did not reveal statistically significant differences between the age groups in the domains of quality of life, suggesting that the physical exercise program promoted comparable gains in well-being and functionality, regardless of age group.

The analysis of the experiment's statistical power, conducted for the quality of life variable, indicated a value of 99%, demonstrating the high sensitivity of the experimental design for detecting real effects resulting from the intervention and lending robustness and reliability to the interpretation of the results.

Discussion

The results of the present study showed a significant improvement in the participants' perceived quality of life after 32 weeks of supervised physical exercise intervention, with a statistically significant increase in the dimensions of Autonomy, Sensory Functioning, Social Participation, Death and Dying, and the General Quality of Life Index. The improvement in QoL observed between the diagnostic and formative assessments (a percentage change of 7.05%) is similar to the finding reported by Wang and Wang (2025), who observed a 7.67% change in the WHOQOL-OLD after 12 weeks of a semi-immersive virtual reality exercise program in older adults.

The gains observed in both age groups, with no significant differences between them, are consistent with the systematic review by Wei et al. (2022), which identified positive effects of physical exercise on the quality of life of healthy older adults to varying degrees in virtually all of the studies analyzed. Similarly, Indrakumar and Silva (2024) emphasize that regular, supervised physical exercise programs promote active and healthy aging, with consistent improvements in autonomy, sensory function, and interpersonal relationships—findings that align directly with the results presented here and corroborate preliminary analyses conducted with this same population (Dantas et al., 2023b).

The results of this study expand upon the evidence presented by Dantas et al. (2023b)—which was based on this same population—by demonstrating that the benefits to quality of life were not only maintained but remained consistent over a longer intervention period and as assessed through a longitudinal analysis incorporating diagnostic, formative, and summative evaluations. This continuity reinforces the stability of the effects of supervised physical exercise and suggests that ongoing programs tend to produce cumulative benefits for different dimensions of older adults' quality of life.

From the perspective of Primary Health Care, the findings have important implications for the Unified Health System (SUS). The implementation of supervised physical exercise programs in Basic Health Units constitutes a feasible strategy with low operational costs and one that is aligned with the health promotion and disability prevention initiatives outlined in the National Health Policy for Older Adults. In addition to promoting autonomy and social participation, interventions of this nature can help reduce the demand for specialized services, slow age-related functional decline, and strengthen the longitudinal care provided by primary care teams.

The significant improvement observed in the "Autonomy" domain throughout the intervention also aligns with the findings of Da Costa et al. (2024), who reported improved functional autonomy among older adults participating in this same supervised physical exercise program, reinforcing the consistency between functional indicators and subjective quality-of-life indicators in this population.

The increase in Social Participation observed in this study corroborates the findings of Figueira et al. (2023), who reported a significant improvement in this same dimension of the WHOQOL-OLD following a 16-week physical exercise program among Brazilian older adults, reinforcing the role of group physical exercise in strengthening social support networks and the perception of social usefulness among older adults. This finding is also consistent with the association between physical exercise, sleep, and subjective well-being described by Sella et al. (2022), and with the relationship between self-esteem and quality of life in older adults reported by Souza Júnior et al. (2022).

The relatively high QoL scores already observed in the diagnostic assessment may be related to a positive selection bias, since more active and motivated older adults tend to be more likely to voluntarily engage in community-based physical exercise programs, as discussed in the systematic review by Marzo

et al. (2023) on the determinants of active aging. Nevertheless, the maintenance and progressive improvement in QoL levels over the 32 weeks suggest that the program exerted a real and continuous influence on perceived well-being, acting as a protective factor against the natural declines associated with aging.

These findings are also consistent with studies linking supervised physical exercise to a reduction in depressive symptoms and an increase in emotional well-being among older adults (De Oliveira et al., 2019; Hidalgo et al., 2021; Pérez Bedoya et al., 2023), reinforcing the hypothesis that structured physical activity programs, when integrated into the primary health care routine, constitute an effective and replicable non-pharmacological strategy for promoting the overall well-being of older adults (Souza et al., 2022).

The present study has limitations that should be considered when interpreting the results. The sample was recruited through purposive sampling in a specific geographic context (Aracaju, Sergipe), which limits the generalizability of the findings to older adult populations with different socioeconomic, ethnic, or geographic profiles. The measurement of quality of life relied exclusively on a self-report instrument, which is subject to social response bias and the subjectivity inherent in individual perception, especially among participants with possible uncontrolled mild cognitive impairments. Additionally, the absence of a randomized control group—inherent to the quasi-experimental design—does not allow for the complete exclusion of the influence of external factors or a placebo effect on the observed results. Nevertheless, the findings were consistent with the international literature on the benefits of supervised physical exercise for the quality of life of older adults.

Conclusions

The individualized and supervised physical exercise program proved effective in promoting consistent improvements in the quality of life of older adults receiving care in Primary Health Care, yielding significant gains in autonomy, sensory functioning, social participation, and overall perception of quality of life, regardless of age group.
The results reinforce that structured physical exercise programs can be incorporated as a permanent health promotion strategy within the Unified Health System, contributing to active aging, the preservation of functional capacity, and the strengthening of older adults' social participation.

In addition to their clinical and public health relevance, the findings align directly with the Sustainable Development Goals of the 2030 Agenda, particularly SDG 3 (Good Health and Well-being), by promoting healthy aging and the prevention of chronic diseases, and SDG 10 (Reduced Inequalities), by expanding older adults' access to effective interventions in the context of primary health care. Thus, the study provides evidence supporting the expansion of community-based physical exercise programs as a strategy for promoting health and improving the quality of life of the older adult population.

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