



Does the perception of the elderly reflect their practice of physical activities in the prevention of health risk factors?

Does the perception of elderly individuals reflect their practice of physical activities in the prevention of health risk factors?

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Summary

Introduction: Global population aging brings challenges related to physical inactivity, which contributes to functional decline and the increase in chronic diseases. Regular physical activity is essential for the health and autonomy of older adults, but adherence depends on motivation. **Objectives:** To analyze the frequency, duration, and intensity of physical activity among older adults in Maringá, assess their health perception, and correlate it with physical activity, supporting incentive strategies. **Methodology:** This was a quantitative, cross-sectional, observational study with 100 older adults (\bar{y} 60 years) selected by convenience. An online form with the Mini-Mental State Examination (MMSE), a sociodemographic questionnaire, the IPAQ-FI for physical activity level, and the QBPAFI for barriers were used. The analysis included descriptive statistics, Pearson's correlation, and multiple regression (SPSS). **Results:** Women predominated (68%), with a mean age of 68.5 years. The majority (75%) engaged in weekly physical activity, mainly walking (65%). There was a positive correlation between health perception and physical activity level ($r = 0.45$; $p < 0.01$). The main barriers were fear of injury (42%), lack of energy (35%), and lack of companionship (28%), predictors of inactivity ($R^2 = 0.38$; $p < 0.001$). **Conclusion:** Positive health perception is associated with greater physical activity. Safe, adapted, and socializing programs that reduce fears, encourage social interaction, and strengthen self-efficacy are essential to promote active and healthy aging.

Keywords: Physical activity, Elderly, Elderly perspective, Prevention.

Abstract

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Objectives: To analyze the frequency, duration, and intensity of physical activity among older adults in Maringá, assess their health perception, and correlate it with practice, providing support for incentive strategies. **Methodology:** A quantitative, cross-sectional, and observational study was conducted with 100 older adults (\bar{y} 60 years) selected by convenience sampling. Data were collected through an online form including the Mini-Mental State Examination (MMSE), a sociodemographic questionnaire, the IPAQ-E for physical activity level, and the QBPAFI for barriers. Statistical analysis included descriptive statistics, Pearson's correlation, and multiple regression (SPSS). **Results:** Women predominated (68%), with a mean age of 68.5 years.

Most participants (75%) engaged in weekly physical activity, mainly walking (65%). There was a positive correlation between health perception and physical activity level ($r = 0.45$; $p < 0.01$). The main barriers were fear of injury (42%), lack of energy (35%), and lack of companionship (28%), which predicted inactivity ($R^2 = 0.38$; $p < 0.001$).

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health perception is associated with greater physical activity. Safe, adapted, and socially engaging programs that reduce fears, encourage social interaction, and strengthen self-efficacy are essential to promote active and healthy aging.

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1. INTRODUCTION

According to the Ministry of Human Rights and Citizenship (BRAZIL, 2024) elderly population has increased significantly over the last few years, a phenomenon global marked by increased longevity. In Brazil, for example, the population aged 65 years or older has grown significantly, reflecting the inversion of the age pyramid. According to the Brazilian Institute of Geography and Statistics (IBGE, 2024), the number of people in this age group increased by 57.4% in the last 12 years, highlighting the transition from a country with a young population to an older population (BRAZIL, 2023).

This global demographic shift is associated with reduced fertility rates and mortality, due to the increase in life expectancy and factors that have generated changes structural in several areas, such as health, labor market and public policies (BRAZIL, 2023). In Brazil, the IBGE estimate indicates that the elderly population will represent 30% of the total population by 2030. This increase in longevity highlights health-related challenges, well-being and independence of the elderly, making the implementation of policies essential effective public policies to meet the needs of this population (Novaes *et al.*, 2023).

Regular physical exercise is directly associated with a series of health benefits, not only for the body but also for the mind. According to (Sherrington *et al.*, 2020), physical exercise can promote significant improvements in fitness cardiovascular, increasing resistance and muscular strength and contributing to the maintenance flexibility, body weight and motor coordination. In addition, physical exercise regular is related to the reduction of the risk of several chronic diseases, such as hypertension, type 2 diabetes and some forms of cancer (WHO, 2020). This set of benefits highlights the importance of exercise in preventing and treating conditions that affect health in long-term, cognitive, psychomotor and quality of life (Rodrigues *et al.*, 2022; Machado *et al.*, 2023).

Therefore, physical exercise, characterized by its intentional and structured nature, plays a crucial role in promoting health and preventing disease (Sherrington *et al.*, 2020). Including physical exercise in your daily routine is an effective strategy for achieving a healthier and more balanced life, offering a wide range of benefits for both the

both body and mind (Eckstrom *et al.*, 2020). Integrating these practices into your lifestyle on an ongoing basis can result in significant improvements in the quality of life of individuals and in the preservation of functional autonomy (Monti *et al.*, 2023).

In this scenario, it is essential to understand how the elderly perceive their condition, health, its limitations and capabilities, especially with regard to preventive actions, such as performing physical activity (Shi; Jiang; Zhao, 2024). The way in which the elderly see the importance of physical exercise is strongly associated with aging healthy and the prevention of chronic diseases (Silva *et al.*, 2024). There are studies that show that, despite the natural difficulties that arise with age, physical exercise has shown to be one of the main tools in promoting a long and healthy life (Kachouri *et al.*, 2022). Thus, the adoption of healthy habits, such as the constant practice of physical activity, has proven to be fundamental in promoting active aging and improving the quality of life in old age (Sherrington *et al.*, 2020). However,

When it comes to physical health, exercise has a significant effect on maintenance of muscle mass, strength, and bone density. Muscular endurance is a of the most important pillars of physical exercise in aging, since it acts directly in the prevention of musculoskeletal diseases such as sarcopenia and osteoporosis, which are directly related to the risk of falls and fractures in the elderly (Papalia *et al.*, 2020). In this context, regular physical exercise promotes muscle strengthening and is essential to guarantee the autonomy and independence of the elderly (Rodrigues *et al.*, 2022).

The engagement of the elderly population in the practice of physical activity does not always occur with ease. Barriers such as fear of injury, lack of time, inadequate environment and lack of motivation are factors that make it difficult to incorporate physical activity into your daily routine (Weng *et al.*, 2022). Even with growing awareness of the benefits of exercise, many elderly people are still afraid to start any type of physical exercise, especially those with pre-existing conditions (Paiva *et al.*, 2022). Therefore, it is essential to understand the perspectives of older adults regarding physical activity to formulate incentive approaches more assertive (Rodrigues *et al.*, 2021).

2. THEORETICAL FRAMEWORK

In this context, the elderly's adherence to physical activity is directly linked to support social interaction with family, friends, and community groups. Participate in group programs, such as group walks strengthen motivation and engagement, promoting continuity of

practices. Furthermore, physical activity contributes to maintaining health, mobility and of a healthy lifestyle in this population (Chia *et al.*, 2023).

This study aims to examine the motivation of elderly people to practice physical activity, and its role in disease prevention. Although there are obstacles, such as fear of injury and lack of support, regular physical activity is an effective solution to improve quality of life, ensure autonomy and reduce the impairment of physical functions and mental, contributing to the implementation of more effective public policies and encouraging balanced aging. The central hypothesis of this study is that elderly people who maintain a balanced aging regular routine of physical activities tend to present better health, greater functional autonomy and superior quality of life compared to those who do not practice exercise frequently.

3. MATERIAL AND METHOD

This study was designed as a quantitative, cross-sectional and observational research, conducted with elderly people living in the municipality of Maringá, Paraná. Data collection was carried out through an online form, using the Google Forms platform and transferred to a secure folder on Google Drive. All ethical procedures were followed. strictly followed, in accordance with Resolution No. 466/2012 of the National Council of Health (CNS) and the General Data Protection Law (LGPD), Law No. 13,709/2018. The research project was submitted and approved by a Research Ethics Committee (CEP) before the start of data collection by CAAE: 90140525.2.0000.0255 and opinion number 7,821,225. All participants were informed about the objectives, procedures, risks and benefits of the study and formalized their participation by signing the Consent Form Free and Informed Consent (TCLE), presented at the beginning of the online form.

The sample consisted of 100 elderly people, of both sexes, aged 18 or over 60 years old, living in Maringá. Participants were selected based on convenience, by sharing the questionnaire link on social media, email and posters with QR codes in academic environments and places frequented by the elderly population. The inclusion criteria were: being 60 years old or older, residing in Maringá, and practicing physical activity at least three times per week. Elderly people who did not meet these criteria or who had cognitive deficit that prevented them from understanding and responding appropriately to questionnaires, assessed by the Mini Mental State Examination (MMSE).

For data collection, the following instruments were used: Mini Exam of the

Mental State (MMSE), used as a screening tool to assess cognitive function of participants. The MMSE is a 30-point standardized test that assesses orientation, memory, attention, calculation and language (Folstein; Folstein; Mchugh, 1975). The following were adopted cut-off points validated for the Brazilian population, adjusted for education, for exclusion of participants with probable cognitive impairment.

Sociodemographic and Perception Questionnaire, prepared by the authors, this questionnaire included variables such as age, sex, marital status, education, health condition self-declared, presence of comorbidities, source of income and frequency and type of physical activity practiced.

International Physical Activity Questionnaire for the Elderly (IPAQ-FI), version adapted and validated for the elderly, used to measure the level of physical activity. The IPAQ-FI quantifies the frequency, duration and intensity of physical activities performed in the last week, in different domains (walking, moderate and vigorous activities) (Matsudo *et al.*, 2001).

Questionnaire on Barriers to Physical Activity in Elderly People (QBPAFI), used to identify the main barriers perceived by the elderly that hinder or prevent the regular practice of physical activity (Hirayama, 2006).

Data from the Brazilian Institute of Geography and Statistics (IBGE, 2024) were used. and the City of Maringá for demographic basis. According to the IBGE estimate for 2024, the population of the municipality was 425,983 inhabitants, of which approximately 74 thousand were elderly people aged 60 or over (IBGE, 2024). Leisure and sports infrastructure was analyzed based on the number of Senior Citizens' Academies (ATI), academies conventional and sports centers provided by the City of Maringá (Maringá, 2024).

According to the City of Maringá, the city had 76 ATIs, 171 gyms bodybuilding, including private gyms registered with the Regional Council of Physical Education (CREF9/PR) and inspected by Procon, in addition to 15 sports centers distributed in different regions, which offered 33 sports and served more than 13 thousand students (Maringá, 2024).

Participants accessed the online questionnaire, where they first read and agreed to the TCLE. They then responded to the MEEM, the questionnaire sociodemographic and perception, to the IPAQ-FI and QBPAFI. The average time to completing the form took approximately 40 minutes. The data was automatically stored in a spreadsheet on Google Drive, with restricted access to

researchers, ensuring the confidentiality and security of information.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 29.0 (IBM CORPORATION, 2022). Statistical analysis included: descriptive statistics, frequencies, percentages, means and standard deviations were calculated to characterize the sociodemographic profile of the sample and the perception of the practice of physical activity. Pearson correlation, used to investigate the correlation between variables continuous variables, such as health perception and physical activity levels. Multiple Regression, employed to determine whether perceived barriers predict motivational factors for physical activity. Bootstrapping, to increase the reliability of the results and To correct possible deviations from normality, bootstrapping procedures were performed with 1000 resamplings and 95% confidence interval (CI BCa), as recommended by Haukoos and Lewis (2005).

4. RESULTS AND DISCUSSION

In this section, the results obtained from the data analysis are presented. collected from the 100 elderly participants in the study. The results are organized into profiles sociodemographic, level of physical activity and perceptions about the practice.

Table 1 presents the sociodemographic characterization of the sample. There was a predominance female (68%), with a mean age of 68.5 (\pm 6.2) years. Most participants was married (55%) and had completed primary education or incomplete higher education (45%).

Table 1 – Sociodemographic Characterization of the Sample

Variable	Category	n	%
Sex	Feminine	68	68
	Masculine	32	32
Age Range	60-69 years old	62	62
	70-79 years old	31	31
	≥ 80 years old	7	7
Marital status	Single	12	12
	Married	55	55
	Divorced	15	15
	Widower	18	18
Education	Illiterate	5	5

Incomplete Elementary Education	25	25
Complete Elementary Education / Incomplete Higher Education	45	45
Complete Higher Education	20	20
Postgraduate studies	5	5
Monthly Income Below 1 MW	15	15
1-2 SM	65	65
> 2 SM	20	20

Source: Prepared by the authors (2025). SM = Minimum Wage.

Table 2 details the elderly's perception of health and the frequency of exercise. Most seniors rated their health as "Good" (48%) and reported practice physical activity weekly (75%). Walking was the most prevalent activity (65%), followed by gymnastics (25%) and pilates (15%).

Pearson correlation analysis indicated a positive and significant correlation between health perception and level of physical activity measured by the IPAQ-FI ($r = 0.45$; $p < 0.01$). This suggests that older adults with a more positive perception of their health tend to be more active physically.

The main barriers to the practice of physical activity, identified through the QBPAFI, were the "fear of getting hurt, falling or harming your health" (42%), the "lack of energy" (35%) and "lack of company" (28%). Multiple regression analysis showed that these three barriers were significant predictors of physical inactivity ($R^2 = 0.38$; $p < 0.001$).

Table 2 – Health Perception and Frequency of Physical Activity

Variable	Category	n	%
Health Perception	Excellent	10	10.0
	Very good	25	25.0
	Good	48	48.0
	Regular	15	15.0
	Bad	2	2.0
Frequency of Physical Activity	Daily	15	15.0
	Weekly	75	75.0
	Rarely	8	8.0
	Never	2	2.0
Type of Physical Activity	Walk	65	65.0
	Gymnastics	25	25.0

	Pilates	15	15.0
	Swimming	10	10.0
	Others	8	8.0
Dedicated Weekly Time	< 1 hour	5	5.0
	1-3 hours	55	55.0
	3-5 hours	30	30.0
	> 5 hours	10	10.0

Source: Prepared by the authors (2025).

Table 3 shows the correlations between all study variables. The values vary from -1 to +1, where: - Values close to +1 indicate a strong positive correlation. Values close to -1 indicate strong negative correlation. Values close to 0 indicate weak correlation or non-existent. Fear of injury has a strong negative correlation with self-efficacy (-0.51) - Motivation for health correlates positively with health perception (0.62). Lack of company has strong negative correlation with social motivation (-0.52).

Table 3 – Pearson Correlation Matrix between Barriers and Motivation Factors.

Variables	1	2	3	4	5	6	7	8
1. Fear of injury	1							
2. Lack of energy	0.42**	1						
3. Lack of company	0.28*	0.35**	1					
4. Lack of time	0.15	0.22*	0.31**	1				
5. Health motivation	-0.38**	-0.45**	-0.25*	-0.18	1			
6. Social motivation	-0.22*	-0.28*	-0.52**	-0.35**	0.48**	1		
7. Self-efficacy	-0.51**	-0.39**	-0.31**	-0.20*	0.56**	0.41**	1	
8. Health perception	-0.33**	-0.48**	-0.19	-0.12	0.62**	0.35**	0.58**	1

Source: Prepared by the authors (2025). Note: * $p < 0.05$; ** $p < 0.0$

Table 4 presents 10 different models testing which variables best predict the motivating factors: - R^2 : Indicates how much of the variation is explained by the model (0 to 1) - R^2 adjusted: R^2 corrected for the number of variables - F: F statistic for model significance - p: Significance level. Model 10 explains 58% of the variation in physical activity level - Model 9 explains 42% of the variation in self-efficacy. All models are statistically significant ($p < 0.001$).

Table 4 – Multiple Regression Models: Barriers as Predictors of Factors Motivation

Model	Variable Dependent	Independent Variables	R ²	R ² adjusted	F	p
1	Motivation for health	Fear of injury	0.14	0.13	16.42	< 0.001
2	Motivation for health	Fear of injury + Lack of energy	0.28	0.27	18.95	< 0.001
3	Motivation for health	Fear of injury + Lack of energy + Lack of company	0.32	0.3	15.12	< 0.001
4	Social motivation	Lack of company	0.27	0.26	36.48	< 0.001
5	Social motivation	Lack of company + Lack of time	0.35	0.33	26.15	< 0.001
6	Social motivation	Lack of company + Lack of time + Fear of injury	0.38	0.36	19.62	< 0.001
7	Self-efficacy	Fear of injury	0.26	0.25	34.21	< 0.001
8	Self-efficacy	Fear of injury + Lack of energy	0.35	0.33	26.08	< 0.001
9	Self-efficacy	Fear of injury + Lack of energy + Health perception	0.42	0.4	23.15	< 0.001
10	Physical activity level	All barriers + All motivating factors Source: Prepared by the	0.58	0.54	14.82	< 0.001

authors (2025).

Table 5 validates the robustness of the main correlations using resampling: 95% CI: Range where the true value is likely to lie. If the range does not include 0, the correlation is significant. All main correlations are robust. The intervals confirm the statistical significance. The bootstrap methodology increases the reliability of the results.

Table 5 – Bootstrap Confidence Intervals (95% CI BCa) for Main Correlations

Correlation	r observed	95% CI Lower	95% CI Superior	p
Fear of injury × Self-efficacy	-0.51	-0.65	-0.34	<0.001
Lack of energy × Health perception	-0.48	-0.62	-0.31	<0.001
Health motivation × Health perception Lack of company × Social motivation Source:	0.62	0.47	0.74	<0.001
	-0.52	-0.66	-0.35	<0.001

Prepared by the authors (2025).

The results of this study corroborate existing literature and provide new understandings about the relationship between health perception and physical activity practice in the elderly. The sociodemographic profile of the sample, with a predominance of females, confirms the phenomenon of the feminization of aging described in Brazil and other countries (Sobrinho *et al.*, 2024). This greater female participation may be related to a greater concern accentuated by health and increased adherence to community wellness programs as described

by Dias *et al.*, 2024 who analyzed the social and health profile of elderly women in a city metropolitan area of São Paulo/Brazil.

The identified barriers to physical activity are fear of injury, lack of energy and lack of company, are in line with findings from previous research (Weng *et al.*, 2022; Paiva *et al.*, 2022). The fear of falling or getting hurt, in particular, is a barrier impactful, which associate this fear with an increased risk of falls and fractures (Papalia *et al.*, 2020). The lack of energy and company, in turn, reinforce the relevance of factors psychological and social factors in the motivation of the elderly. In this sense, physical activity programs in groups, enjoyable and adapted to individual conditions, can be effective strategies for overcome these obstacles (Nogueira *et al.*, 2023; Mendes *et al.*, 2023).

Walking, highlighted as the most practiced activity, reflects its accessibility, low cost and low risk perception. This finding has relevant practical implications for public policies, which can prioritize investments in safe urban infrastructure, such as accessible sidewalks and well-lit parks, further encouraging adherence to this practice, as presented in the study by Lima *et al.*, (2022) which describes walking as accessible, cheap and safe, being the most common practice. Favoring public policies aimed at creating of adequate sidewalks and illuminated parks, encouraging their adoption.

The positive correlation between health perception and physical activity level ($r = 0.45$) was one of the central findings. Older adults who perceive themselves as healthier tend to be more active, creating a virtuous cycle in which exercise improves health, reinforcing positive perception and encouraging the continuation of the practice. Barbosa *et al.* (2021) point out that elderly people who rate their health positively tend to remain physically active, strengthening a cycle in which regular exercise improves health and reinforces this perception, encouraging the continuity of the activity.

Correlation analyses also highlighted relevant patterns between barriers and motivational factors. The strong negative correlation between fear of injury and self-efficacy ($r = 0.51$; $p < 0.01$) indicates that the greater the fear of getting hurt, the lower the elderly's confidence in their ability to exercise safely. Silva and Cezário, (2024) and Niyazi *et al.*, (2024) highlight that exercise programs focused on balance and strength reduce the fear of falling and increase functional confidence, while reinforcing that interventions Supervised and structured activities are effective in preventing falls and strengthening self-efficacy, a crucial aspect for long-term adherence.

The significant correlation between lack of energy and perceived health ($r = -0.48$; $p < 0.01$) indicates that elderly people who perceive themselves as having less energy tend to evaluate their health in a

more negative way. This result suggests a potentially damaging cycle, where the low energy leads to inactivity, which in turn can further deteriorate health perception and the actual energy levels, which is in agreement with the study by Hu *et al.*, (2025) suggesting that routine assessment can help identify this low energy in elderly people who are vulnerable to a greater than expected functional decline.

Multiple regression models provided robust evidence on the factors that predict motivation for physical activity in older adults. Model 9, which explained 42% of the variance in self-efficacy, demonstrates that fear of injury is the strongest predictor ($\beta = -0.38$; $p < 0.001$), followed by health perception ($\beta = 0.31$; $p < 0.001$). These results suggest that interventions focused on reducing fear of injury and improving health perception can be particularly effective in increasing older adults' self-efficacy in relation to activity physics, pointed out in the study by Savvakis; Adamakidou; Kleisiaris, (2024) which demonstrates that physical activity interventions, such as muscle strengthening and balance training, are effective in reducing the fear of falling (fear of injury). Reducing this fear is a step essential for the elderly to feel safer and more confident, that is, with greater self-efficacy to practice physical activities.

Model 10, which included all variables and explained 58% of the variance in the level of physical activity, demonstrates the multifactorial complexity of physical activity behavior in the elderly. This high R^2 value indicates that the set of barriers and motivational factors investigated captures a substantial portion of the determinants of physical activity in this population, the article by Stehr *et al.* (2021) provides strong scientific support for the claim that physical activity behavior in the elderly is a complex and multifactorial phenomenon, demonstrating that a set of psychosocial determinants can explain a proportion significant part of its variance.

The use of bootstrapping procedures with 1000 resamplings strengthened significantly increase the reliability of the results. The bootstrap confidence intervals confirmed that all main correlations maintained their statistical significance even after correction for possible violations of normality, increasing the robustness of the conclusions. This procedure is particularly important in studies with samples of elderly, where the distribution of variables may not follow normal patterns due to factors such as comorbidities and functional heterogeneity, as described in the research by Wu *et al.* (2025) who not only mentions but rigorously applies the bootstrapping procedure to strengthen the validity of their conclusions in a large sample of elderly people, serving as excellent scientific evidence that supports your claim about the robustness and importance

of this method in gerontological research.

Lack of companionship emerged as a particularly strong predictor of motivation social ($\beta = -0.42$; $p < 0.001$), highlighting the importance of social support in maintaining physical activity. This finding is consistent with social theories of aging that emphasize the role of social networks in maintaining health and well-being, as in the research by SOUSA *et al.* (2019) which corroborates suggesting that greater perceived social support is positively associated with a higher level of physical activity in the elderly, highlighting the importance of company and social encouragement to maintain active behaviors.

It is important to emphasize that, although this study used a robust methodology, including the use of bootstrapping to increase the reliability of the results, it has limitations. The cross-sectional design does not allow establishing cause-and-effect relationships, and the convenience sample may not be representative of the entire elderly population of Maringá. Future studies, with longitudinal design and probabilistic sampling, are needed to deepen the understanding of the dynamics between health perception, physical activity and aging.

FINAL CONSIDERATIONS

The study showed that, among elderly people in Maringá, the positive perception of health is strongly associated with the practice of physical activity, highlighting the influence of factors subjective factors in adopting healthy habits. Barriers such as fear of injury and lack of energy reinforce the importance of supervised, safe, motivating and adapted programs needs of this population. Public policies for active aging must go beyond offering spaces for exercise, including health education activities, combating beliefs negative and encourage social support through collective activities. When facing barriers physical and psychosocial, it is possible to increase adherence and continuity of the practice, promoting quality of life, functional autonomy and healthy aging, offering subsidies relevant to professionals, managers and the community.

REFERENCES

BARBOSA, Renata da Costa; SOUSA, Ana Luiza Lima; et al. Association of self-perceived quality of life and health, physical activity, and functional performance among older adults in rural Brazil. **Brazilian Journal of Geriatrics and Gerontology**, Rio de Janeiro, v. 24, n. 4, e210141, 2021. Available at: <<https://www.scielo.br/j/rbgg/a/r6CkxgGtknjQvjGFsS8SrHF/>>. Accessed: September 13, 2025.

BRAZIL. Secretariat of Social Communication. 2022 Census: number of elderly people in the country's population grew 57.4% in 12 years. Brasília, DF: Secom, October 27, 2023. Available at: <<https://www.gov.br/secom/pt-br/assuntos/noticias/2023/10/censo-2022-numero-de-idosos-na-populacao-do-pais-cresceu-57-4-em-12-anos>>. Accessed on: September 13, 2025.

BRAZIL. Ministry of Human Rights and Citizenship. The growth of Brazil's elderly population highlights the urgent need for public policies to combat violations and inequalities. Brasília, DF, June 28, 2024. Available at: <<https://www.gov.br/mdh/pt-br/assuntos/noticias/2024/junho/crescimento-da-populacao-idosabrasileira-expoe-urgencia-de-politicas-publicas-para-combater-violacoes-e-desigualdades>>. Accessed on: March 9, 2025.

DIAS, Alyne de Souza; PERNÉ, Jaqueline Estelita de Paiva; ALVES, Leiliane Naves Dias; *et al.* Social and health profile of elderly women in a metropolitan city of São Paulo, Brazil.

DELOS MAGAZINE, v. 17, no. 61, p. e2648, 2024. DOI: 10.55905/rdelosv17.n61-086.

Available at: <https://ojs.revistadelos.com/ojs/index.php/delos/article/view/2648>. Accessed on: September 13, 2025.

ECKSTROM, Elizabeth; NEUKAM, Suvi; KALIN, Leah; *et al.* Physical activity and healthy aging. **Clinics in Geriatric Medicine**, [SI], v. 36, no. 4, p. 671-683, 2020. DOI: <https://doi.org/10.1016/j.cger.2020.06.009>.

Available at: <<https://pubmed.ncbi.nlm.nih.gov/33010902/>>. Accessed on: 13 September. 2025.

FOLSTEIN, Marshal F.; FOLSTEIN, Susan E.; MCHUGH, Paul R. "Mini-mental state": a practical method for grading the cognitive state of patients for the clinician. **Journal of Psychiatric Research**, [SI], v. 12, no. 3, p. 189-198, 1975. DOI: [https://doi.org/10.1016/0022-3956\(75\)90026-6](https://doi.org/10.1016/0022-3956(75)90026-6). Available at: <<https://pubmed.ncbi.nlm.nih.gov/1202204/>>. Accessed on: 13 September. 2025.

HIRAYAMA, Marcio Sussumu. **Physical activity and Parkinson's disease: behavior change, self-efficacy, and perceived barriers.** 2006. 152 p. Dissertation (Master's in Human Movement Sciences) – São Paulo State University, Rio Claro, 2006.

Available at: <http://www.athena.biblioteca.unesp.br/exlibris/bd/brc/33004137062P0/2006/hirayama_ms_me_rcla.pdf>. Accessed on: September 13, 2025.

HAUKOOS, Jason ; LEWIS, Roger. Advanced Statistics: Bootstrapping Confidence Intervals for Statistics with "Difficult" Distributions. **Academic Emergency Medicine**, vol. 12, no. 4, p. 360-365, 2005. Accessed on: April 25, 2025.

HU, Ting; WANG, Feiling; DUAN, Qiuchen; ZHAO, Xueyang; Yang, Fen. Prevalence of fatigue and perceived fatigability in older adults: a systematic review and meta-analysis.

Scientific Reports, [SI], v. 15, no. 1, p. 4818, 2025. DOI: <https://doi.org/10.1038/s41598-025-88961-x>.

Available at: <<https://pubmed.ncbi.nlm.nih.gov/39924533/>>. Accessed on: September 13, 2025.

IBGE. Brazilian Institute of Geography and Statistics. Population estimate of Maringá, 2024. Available at: www.ibge.gov.br. Accessed on: April 4, 2025.

IBM CORPORATION. IBM SPSS Statistics for Windows, version 29.0. Armonk, NY: IBM Corporation, 2022. Available at: <<https://www.ibm.com/products/spss-statistics>>. Accessed on: March 15, 2025.

KACHOURI, Hajer; FAY, Séverine; ANGEL, Lucie; ISINGRINI, Michel. Influence of current physical exercise on the relationship between aging and episodic memory and fluid

intelligence. **Acta Psychologica**, [SI], v. 227, p. 103609, Jul. 2022. DOI: <https://doi.org/10.1016/j.actpsy.2022.103609>.

LIMA, Fernando de; ALMEIDA, Maria Deisyelle Sibaldina da Silva; MELO, Taynara Poliana Gonçalves de; et al. Work process of the Physical Education professional in primary care in rural territories. **Brazilian Journal of Physical Activity & Health**, [SI], v. 27, n. 1, p. 1-9, 2022. DOI: <https://doi.org/10.12820/rbafs.27e0278>.

MACHADO, Jean Marlon; SANTOS, Keyla Mara dos; BUENO João, Carlos Alves; CAROLINA OLIVEIRA, Machado de; FERNANDES, Sany; NASCIMENTO, Iramar Baptistella do. Physical exercise practice in cognitive impairment and neuromuscular complications in elderly care: a systematic review. **Medicine (Ribeirão Preto)**, Ribeirão Preto, Brazil, v. 56, n. 4, p. e-212061, 2023. DOI: 10.11606/issn.2176-7262.rmrp.2023.212061. Available at: <https://revistas.usp.br/rmrp/article/view/212061>. Accessed on: September 13, 2025.

MARINGÁ. Maringá City Hall. Data on sports infrastructure, 2024. Available at: www.maringa.pr.gov.br. Accessed on: April 4, 2025.

MATSUDO, Sandra M.; ARAÚJO, Timóteo L.; MATSUDO, Victor KR; ANDRADE, Douglas R.; ANDRADE, Erinaldo; OLIVEIRA, Luís C.; BRAGGION, Gláucia. International Physical Activity Questionnaire (IPAQ): validity and reproducibility study in Brazil. **Brazilian Journal of Physical Activity & Health**, [SI], v. 6, n. 2, p. 5-18, 2001. DOI: <https://doi.org/10.12820/rbafs.v6n2p5-18>. Available at: <https://periodicos.ufpel.edu.br/index.php/RBAFS/article/view/931>. Accessed on: April 4, 2025.

MONTI, Elena; TAGLIAFERRI, Sara; ZAMPIERI, Sandra; SARTO, Fabio; SIRAGO, Giuseppe; FRANCHI, Martino Vladimiro; TICINESI, Andrea; LONGOBUCCO, Yari; ADORNI, Elisa; LAURETANI, Fulvio; VON HAEHLING, Stephan; MARZETTI, Emanuele; CALVANI, Riccardo; BERNABELI, Roberto; CESARI, Matteo; MAGGIO, Marcello; NARICI, Marco Vincenzo. Effects of a 2-year exercise training on neuromuscular system health in older individuals with low muscle function. **Journal of Cachexia, Sarcopenia and Muscle**, [SI], v. 14, no. 2, p. 794-804, 2023. DOI: <https://doi.org/10.1002/jcsm.13173>.

NIYAZI, Arghavan; MIR, Ehsan; NEGIN, Ghasemi Kahrizangi; et al. The effect of functional exercise program on physical functioning in older adults aged 60 years or more: a systematic review and meta-analysis of randomized controlled trials. **Geriatric Nursing**, [SI], v. 60, p. 548-559, 2024. DOI: <https://doi.org/10.1016/j.gerinurse.2024.10.019>. Available at: <https://www.sciencedirect.com/science/article/pii/S0197457224003422>. Accessed on: September 13, 2025.

NOVAES, Areta Dames Cachapuz; BIANCO, Otávio Augusto Fernandes Marques; SILVA, Débora Bernardo da; et al. Accidents due to falls in the elderly population: time trend analysis from 2000 to 2020 and the estimated economic impact on the Brazilian health system in 2025. **Ciência & Saúde Coletiva**, [SI], v. 28, n. 11, p. 3101-3110, 2023. DOI: <https://doi.org/10.1590/1413-812320232811.16502023>. Available at: <https://www.scielo.br/j/csc/a/y3H93qVXYZHtjRpNm4ykdd/>. Accessed on: September 13, 2025.

WORLD HEALTH ORGANIZATION (WHO). WHO Guidelines for Physical Activity and Sedentary Behavior: At a Glance. Translated by Edina Maria de Camargo and Ciro Romelio Rodriguez Añez. Geneva: World Health Organization, 2020. ISBN 978-65-00-15021-6 (digital version). Available at:



<<https://iris.who.int/bitstream/handle/10665/337001/9789240014886-por.pdf>>. Accessed on: September 13, 2025.

PAPALIA, Giuseppe Francesco; PAPALIA, Rocco; DIAZ BALZANI, Lorenzo Alirio; TORRE, Guglielmo; ZAMPOGNA, Biagio; VASTA, Sebastiano; FOSSATI, Chiara; ALIFANO, Anna Maria; DENARO, Vincenzo. The effects of physical exercise on balance and prevention of falls in older people: a systematic review and meta-analysis. **Journal of Clinical Medicine**, [SI], v. 9, no. 8, p. 2595, 2020. DOI: <https://doi.org/10.3390/jcm9082595>.

PAIVA, Elenir Pereira de; COSTA, Maira Amorim da; SOUZA, Tamara Costa; ALMEIDA, Meire Cavalieri de; SILVA, Monalisa Cláudia Maria Novaes da; LOURES, Fabiano Bolpato. Association between falls in older adults and prevention group. **Revista Brasileira de Enfermagem**, [SI], v. 75, suppl. 4, e20200207, 2022. DOI: <https://doi.org/10.1590/0034-7167-2020-0207>. . Available at: <<https://www.scielo.br/j/reben/a/HhHFvdMFRyv6FcHGjJtPwDy/>>. Accessed on: September 13, 2025.

RODRIGUES, Filipe; DOMINGOS, Christophe; MONTEIRO, Diogo; MOROUÇO, Pedro. A review of aging, sarcopenia, falls, and resistance training in community-dwelling older adults. **International Journal of Environmental Research and Public Health**, [SI], v. 19, n. 2, p. 874, 2022. DOI: <https://doi.org/10.3390/ijerph19020874>.

RODRIGUES, Susana Lúcia da Silva; SILVA, Jamily Matias da; SANTANA, Charleny Mary Ferreira de; et al. Physical exercise as a non-pharmacological strategy for reducing behavioral and psychological symptoms in elderly people with mild cognitive impairment and dementia: a systematic review of randomized clinical trials. **Arquivos de Neuro-Psiquiatria**, [SI], v. 79, p. 1129-1137, 2021. DOI: <https://doi.org/10.1590/0004-282X-ANP-2020-0539>. Accessed on: February 8, 2025.

SAVVAKIS, Ioannis; ADAMAKIDOU, Theodoula; KLEISIARIS, Christos. Physical-activity interventions to reduce fear of falling in frail and pre-frail older adults: a systematic review of randomized controlled trials. **European Geriatric Medicine**, [SI], v. 15, no. 2, p. 333-344, 2024. DOI: <https://doi.org/10.1007/s41999-024-00944-9>.

SHERRINGTON, Catherine; FAIRHALL, Nicola; KWOK, Wing; et al. Evidence on physical activity and falls prevention for people aged 65+ years: systematic review to inform the WHO guidelines on physical activity and sedentary behavior. **International Journal of Behavioral Nutrition and Physical Activity**, [SI], v. 17, n. 1, p. 144, 2020. DOI: <https://doi.org/10.1186/s12966-020-01041-3>. . Available at: <<https://ijbnpa.biomedcentral.com/articles/10.1186/s12966-020-01041-3>>. Accessed on: February 8, 2025.

Shi, Jiaming; JIANG, Chaoxin; ZHAO, Qi. The benefits of physical exercise on older adults' cognitive function: a cohort study exploring potential mechanisms. **Psychology of Sport and Exercise**, [SI], v. 74, p. 102685, 2024. DOI: <https://doi.org/10.1016/j.psychsport.2024.102685>. . Available at: <<https://www.sciencedirect.com/science/article/pii/S1469029224000967>>. Accessed on: 8 Feb. 2025.

SILVA, Nárlon C. Boa Sorte; BARHA, Cindy K.; ERICKSON, Kirk I.; et al. Physical exercise, cognition, and brain health in aging. **Trends in Neurosciences**, [SI], v. 47, n. 6, p. 421-435, 2024. DOI: <https://doi.org/10.1016/j.tins.2024.04.005>. Available at: <<https://pubmed.ncbi.nlm.nih.gov/38811309/>>. Accessed on: February 8, 2025.

SILVA, Fábio Gomes da; CEZÁRIO, Pâmela Regina. Effectiveness of exercise programs

physiotherapeutic treatments for fall prevention in the elderly. **IPEDSS Scientific Journal**, [SI], v. 4, n. 2, 2024. e-ISSN 2764-4006. DOI: <https://doi.org/10.55703/27644006040204>.

Available at: <https://www.revistacientificaipedss.com/eficacia-de-programas-de-exercicios-fisioterapeuticos-para-prevencao-de-quedas-em-idosos>. Accessed on: September 13, 2025.

Population aging and feminization of old age in the context of health care for the elderly in Brazil.

Brazilian Journal of Health Review, [SI], v. 7, n. 2, e68369, 2024. DOI: <https://doi.org/10.34119/bjhrv7n2-207>.

STEHR, Paula; ROSSMANN, Constanze; KREMER, Tabea; GEPPERT, Johanna.

Determinants of physical activity in older adults: integrating self-concordance with the theory of planned behavior. **International Journal of Environmental Research and Public Health**, [SI], v. 18, n. 11, p. 5759, 2021.

DOI: <https://doi.org/10.3390/ijerph18115759>.

SOUSA, Bianca Andrade de; LEMES, Ítalo Ribeiro; VERARDI, Carlos Eduardo Lopes; LUZA, Lisiane Piazza; SILVA, Franciele

Cascaes da; SILVA, Rudney. Social support and physical activity of elderly people: a systematic review of observational studies.

Brazilian Journal of Health Promotion, [SI], v. 32, 2019. DOI: <https://doi.org/10.5020/18061230.2019.8635>. Available at: <https://ojs.unifor.br/RBPS/article/view/8635>.

Accessed on: September 13, 2025.

WENG, Wei Han; CHENG, Yun Hui; YANG, Tzu Shih; et al. Effects of strength exercises combined with other training on physical performance in frail older adults: a systematic review and meta-analysis. **Archives of Gerontology and Geriatrics**, [SI], v. 102, p. 104757, 2022. DOI: <https://doi.org/10.1016/j.archger.2022.104757>.

Available at: <https://www.sciencedirect.com/science/article/pii/S0167494322001388>.

Accessed on: 8 Feb. 2025.

WU, Haichen; DONG, Pengxin; CHAI, Yidan; HUANG, Ping; LAI, Lichong; PENG, Jie; CAO, Xiaoying; FENG, Xiaoling; HUANG, Dongmei; HUANG, Huiqiao. The role of chronic disease numbers in the relationship

between living alone and depression: a four-way decomposition analysis in a cross-sectional study of older adults.

Clinical Interventions in Aging, [SI], v. 20, p. 1429-1438, 2025. DOI: <https://doi.org/10.2147/CIA.S536619>.