Social inequalities in the practice of leisure physical activity among older adults in Brazil: Evidence from the 2019 national health survey

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Abstract

Purpose: The study aimed to investigate the association between social inequalities, represented by demographic and socioeconomic characteristics, and leisure-time physical activity among older adults in Brazil.

Method: This is a cross-sectional observational study using data from the 2019 National Health Survey. The data of individuals aged 60 years or older who responded to the individual questionnaire were used, resulting in a final sample of 22,728 individuals. The outcome variable in this study was leisure-time physical activity, according to sex, age group, skin color, marital status, education, household income per capita, and residential area. Prevalence ratios and confidence intervals were calculated using Poisson regression.

Results: The results showed that the overall prevalence of leisure-time physical activity in the sample of older adults was 19.4%. Higher prevalence of the outcome was observed among men, those aged 60 to 69 years, married individuals, those with higher education and income, and living in urban areas.

Conclusion: The study found significant associations between demographic and socioeconomic factors and leisure-time physical activity among older adults in Brazil, reinforcing the need for public policies aimed at withstanding both educational and income inequalities in this population.

Introduction

Population aging is occurring in several countries, and is particularly accelerated in middle-income countries such as Brazil. According to the 2022 Brazilian Census, older adults represented about 16% of the total population. Projections indicate that this segment of the population will continue to grow, and the national estimate is that by 2070, the country will have about 75 million older adults, which is close to 37.8% of the population [1].

In view of these changes, projections indicate that health spending could increase by 30% of the Gross Domestic Product by 2050 due to population aging [2]. One of the main factors for this increase is the greater susceptibility to chronic Noncommunicable Diseases (NCDs), such as cardiovascular disease, diabe-

tes, high blood pressure, obesity, among others, which accompany advancing age [3]. However, active aging, which involves practices such as participation in physical activities and the creation of appropriate physical and social environments, can slow down these pathological processes, benefiting the health of individuals aged 60 and over [6].

Physical activity in older adults provides significant health benefits, improving physical and mental health, reducing the risk of all-cause mortality and the risk of developing NCDs, as well as reducing the risk of falls and improving functional capacity [5]. Aerobic activities, such as walking, have been shown to be effective in reducing cardiovascular risk factors, improving insulin action, and decreasing plasma lipid concentrations [6]. Growing evidence indicates that physical activities performed in the domains of leisure and commuting offer significant protec-

tion against health problems and diseases compared to other domains [7,8].

Despite these benefits, the prevalence of physical activity decreases with advancing age, especially among older adults. A study conducted in the US indicated that 27.5% of adults aged 50 years or older reported physical inactivity, a percentage that increases to 35.2% among people aged 75 years or older [5. In Brazil, the prevalence of physical inactivity among people aged 60 years or older can reach 60%, with an increasing trend over the years [9].

Studies on the cultural, environmental, and individual determinants of physical activity suggest that policies and actions to promote physical activity should consider sociodemographic distribution, especially in population groups with lower levels of physical activity [10-12].

Furthermore, epidemiological studies document consistent differences in the prevalence of physical activity according to demographic and socioeconomic conditions. It has been observed that women, people with lower levels of education and income, older age, and individuals from minority groups are less physically active than those in better socioeconomic conditions, such as men and people with higher levels of education and income [12-14].

Given the low prevalence of leisure-time physical activity among older adults liked to its potential of chronic diseases prevention and improving quality of life, it is crucial to investigate its association with demographic and socioeconomic inequalities, especially in middle-income countries such as Brazil, where social inequalities are significant and directly impact the health of the population [15,16]. Such information can inform policies to promote healthy behaviors that are effective and targeted at this population subgroup, promoting healthy aging. Thus, this study aims to investigate the association between social inequalities, represented by demographic and socioeconomic factors, and leisure-time physical activity among older adults in Brazil.

Methods

This is a cross-sectional observational study that used data from the 2019 National Health Survey (PNS). The PNS is a household-based health survey conducted by the Brazilian Health Surveillance Secretariat of the Ministry of Health. The first edition took place in 2013, and although planned to be conducted every five years, its second edition was held in 2019. The main objective of the PNS is to collect information on the determinants, conditions, and health needs of the Brazilian population [17,18]. PNS data are available for free access on the Fiocruz portal: https://www.pns.icict.fiocruz.br/.

The 2019 PNS included the assessment of individuals aged 15 years or older residing in permanent private households [18]. The study sample consisted of clusters in three selection stages: (I) selection of primary sampling units consisting of census tracts or sets of tracts; (II) selection of households in each census tract selected; and (III) in each household, one resident aged 15 years or older was selected by simple random sampling to respond to the individual questionnaire [17,18]. The total number of UPAs sampled was 8,036; households 108,525, and the final sample consisted of 94,114 interviews, with a non-response rate of 6.4% [18]. More information on methodology and sample size definition can be found in a previous publication [18].

This study used information from individuals aged 60 years or older of both sexes who responded to the individual questionnaire, resulting in a final sample of 22,728 individuals.

The outcome variable in this study was leisure-time physical activity, assessed using the following questions: *"In the last three months, have you practiced any type of physical exercise or sport?"; "What is the main type of physical exercise or sport you have practiced?"; "Do you exercise at least once a week?"; "How many days a week do you usually practice physical exercise or sports?"; "On the days you practice exercise or sports, how long does this activity last?".* The weekly score was calculated considering the time, weekly frequency, and type of activity. Activities such as running, aerobics/spinning/step/jump, soccer, basketball, or tennis were classified as vigorous, and the weekly time spent on these activities was multiplied by two. This methodology follows the recommendations of 150 minutes per week for moderate activity, 75 minutes for vigorous activity, or an equivalent combination. Participants who reported practicing 150 minutes or more per week of leisure-time physical activity were classified as active, while those with less than 150 minutes per week were considered insufficiently active [19].

To substantiate and verify the associations between the outcome and exposure variables in the present study, studies in the literature [20] that identified the complexity of variables associated with physical activity in older adults were considered, the most frequently associated being sociodemographic characteristics (age and sex) and poor socioeconomic conditions, among others [21,22]. Thus, the variables investigated in the present study are presented below.

The demographic variables evaluated were gender (male and female); age group (60 to 69, 70 to 79, and 80 years or older), race/skin color (white and black/brown), and marital status (married, divorced/single, or widowed). The socioeconomic variables analyzed were education level (incomplete elementary school or without formal instruction, complete elementary school or incomplete high school, complete high school or incomplete university education, complete university education); per capita family income, classified in minimum wages (up to 1 MW, more than 1 to 3 MW, more than 3 MW), assuming that the minimum wage in 2019 was approximately $200 (R$ 998); and area of residence (urban and rural).

The statistical analyses were performed with the statistical program Stata SE version 14.0, using the *survey* module for complex sample data analysis. A sample description was performed using absolute and relative frequencies. The prevalence and respective 95% confidence intervals (95% CI) of leisure-time physical activity were also estimated according to exposure variables (chi-square test). Finally, crude and adjusted Prevalence Ratios (PR) and their respective 95% CI were calculated using Poisson regression [23,24]. For the adjusted analyses, the variables were included by levels, considering a hierarchical model [25] with gender, age group, skin color, and marital status at the first level, and education, *per capita* income, and area of residence at the second level. A statistical significance level of 5% was considered. All variables were considered at the same level of determination, with selection performed using the *backward elimination* method. Thus, all variables were included in the model, and those with the highest p-value were excluded. This adjustment was performed until no variables with a p-value>0.20 remained in the model. Variables with a p-value>0.20 were described in (Table 3) with information on effect measures, 95% CI, and p- value of the model containing the

variable before it was excluded. All analyses took into account the effect of the study design and sample weights.

Results

Data from 22,728 individuals with a mean age of 70.1 years (±8.9) were analyzed, most of whom were female (56.7%), with more than half aged between 60 and 69 years (56.3%). The majority of the individuals identified themselves as white (51.4%) and were married (50.7%). Furthermore, 63.3% of the elderly had no formal education or incomplete elementary school education, while approximately one-tenth had completed higher education (11.3%) and 42.7% had an income of up to three minimum wages. In addition, the vast majority of older adults lived in urban areas (85.5%) (Table 1).

Table 1: Distribution of demographic, socioeconomic, and health characteristics of older adults.

Variables	n	%	95% CI
Gender			
Male	10,193	43.2	42.3-44.4
Female	12,535	56.7	55.6-57.7
Age group			
60 - 69	12,555	56.3	55.2-57.4
70 - 79	7,157	30.1	29.9-31.1
≥ 80 years	3,016	13.6	12.8-14.3
Skin color			
White	9,901	51.4	50.3-52.6
Brown/black	12,456	48.6	47.4-49.7
Marital status			
Married	9,946	50.7	49.5-51.8
Separated/single	6,698	24.3	23.4-25.2
Widowed	6,084	25	24.1-26.0
Education			
No education/incomplete elementary school	14,987	63.3	62.1-64.4
Complete elementary education/incomplete secondary education	2,011	9.5	8.9-10.2
Complete secondary education/incomplete higher education	3,322	15.9	15
Higher education completed	2,408	11.3	10.5-12.1
Per capita household income			
Up to 1 minimum wage	10,250	41.7	40.6-42.9
From 1 to 3 MW	8,904	42.7	41.6-43.8
More than 3 MW	3,571	15.6	14.7-16.6
Area of residence			
Urban	17,313	85.5	84.9-86.1
Rural	5,415	14.5	13.9-15.1

The average time spent on leisure-time physical activity among the elderly was 70 min/week (standard deviation: 165.9) (median = 0 min/week). The overall prevalence of leisure-time physical activity in the sample of elderly people investigated was 19.4% (95% CI: 18.5; 20.4). (Table 2) shows the prevalence of leisure-time PA according to the categories of exposure variables. The outcome was more prevalent among men, older

adults aged 60 to 69 years, those who were married, individuals with higher education and income, as well as those who lived in urban areas.

Table 2: Prevalence of engagement in leisure-time physical activity according to demographic and socioeconomic variables in older adults (n=22,728).

Variables	Leisure PA (≥150 min) %	95% CI
Gender		
Male	21.49	20.15-22.90
Female	17.91	16.76-19.13
Age group		
60 - 69	23	21.7-24.30
70 - 79	17.6	16.1-19.20
≥ 80 years	9	7.3-11.10
Skin color		
White	21.21	19.90-22.59
Brown/black	17.49	16.29-18.76
Marital status		
Married	21.9	20.50-23.36
Separated/single	18.87	17.32-20.52
Widowed	15.12	13.63-16.74
Education		
No education/incomplete elementary school	13.48	12.52-14.51
Complete elementary education/incomplete secondary education	22.28	19.40-25.45
Complete secondary education/incomplete higher education	26.37	23.88-29.03
Complete higher education	40.84	37.61-44.15
Per capita household income		
Up to 1 minimum wage	13.42	12.30-14.61
From 1 to 3 MW	20.29	18.84-21.82
More than 3 SM	33.42	31.04-35.90
Area of residence		
Urban	21.04	20.03-22.10
Rural	10.16	8.60-11.97

(Table 3) shows the crude and adjusted analyses for the association between leisure-time PA and exposure variables. In the crude analysis, all demographic and socioeconomic variables were associated with the outcome. The adjusted analysis revealed that women had a 14% lower prevalence of leisure-time PA (PR: 0.86; 95% CI 0.78; 0.95). Increasing age was associated with lower prevalence of the outcome (PR: 0.83, 95% CI: 0.75-0.92; PR: 0.46, 95% CI: 0.37-0.58). Regarding socioeconomic characteristics, older adults with higher levels of education had a higher prevalence of leisure-time PA, with those who had completed higher education having twice the prevalence of this outcome (PR: 2.18, 95% CI: 1.88-2.52). Similarly, as income increased, there was an increase in the prevalence of leisure-time PA (PR: 1.26, 95% CI: 1.12; 1.43; PR: 1.45; 95% CI: 1.25-1.67). Finally, older adults living in rural areas had a lower prevalence of leisure-time PA (PR: 0,64; 95% CI: 0.54-0,77).

Table 3: Crude and adjusted association between leisure-time physical activity and demographic and socioeconomic variables older adults (n=22,728).

	Crude model	p-value	Adjusted model*	p-value
	PR (95% CI)		OR (95% CI)	
Variables				
Gender		<0.001		0.005
Male	1		1	
Female	0.83 (0.76-0.91)		0.86 (0.78-0.95)	
Age group		<0.001		<0.001
60-69	1		1	
70-79 years	0.77 (0.69-0.84)		0.83 (0.75-0.92)	
≥ 80 years	0.39 (0.32-0.49)		0.46 (0.37-0.58)	
Skin color		<0.001		0.286
White	1		1	
Brown/black	0.82 (0.75-0.91)		1.06 (0.96-1.17)	
Marital status		<0.001		0.082
Married	1		1	
Divorced/single	0.86 (0.77-0.96)		0.87 (0.79-0.98)	
Widowed	0.69 (0.61-0.78)		0.92 (0.81-1.06)	
Education		<0.001		<0.001
No education/incomplete elementary school	1		1	
Complete elementary/incomplete middle school	1.65 (1.42-1.92)		1.35 (1.15-1.58)	
Complete secondary education/incomplete higher education	1.96 (1.73-2.21)		1.54 (1.34-1.77)	
Complete higher education	3.03 (2.71-3.38)		2.18 (1.88-2.52)	
Per capita income		<0.001		<0.001
Up to 1 MW	1		1	
>1 to 3 SM	1.51 (1.35-1.69)		1.26 (1.12-1.43)	
>3 SM	2.49 (2.23-2.78)		1.45 (1.25-1.67)	
Area of residence		<0.001		<0.001
Urban	1		1	
Rural	0.48 (0.41-0.57)		0.64 (0.54-0.77)	

95% CI: 95% confidence interval; PR: Prevalence Ratio

*The final adjusted model consisted of gender, age group, skin color, marital status, education level, per capita income, and area of residence. The total sample size of the final model corresponds to that of the variable with the lowest n included.

Discussion

The results of this study demonstrate significant social inequalities in the prevalence of leisure-time physical activity among older adults. These inequalities were expressed by differences in the prevalence of this outcome by gender, age group, educational level, income, and place of residence.

The picture painted by the present data or the elderly population is similar to those analyzing other age groups. In Brazil, young people are more likely to engage in Leisure-Time Physical Activity (LTPA), with a reduction in this prevalence over the decades [26]. Among older adults, this decline in prevalence is even more pronounced: while individuals aged 70 to 79 are 17% less likely to engage in LTPA, this rate rises to 54% among older adults over 80 years of age [26].

In this context, it was observed that the overall prevalence of leisure-time physical activity among older adults was relatively low, with about one-fifth classified as active. Data from the 2013 PNS indicated a prevalence of 13.1% of physical activity during leisure time among older adults, showing an improvement in this indicator, although still modest [27]. This was not an isolated improvement, it was however accompanied by an increase in healthy behaviors among Brazilian older adults. In addition to LPA, there was an increase in the consumption of fruits and vegetables, as well as an increase in smoking cessation [28].

The lower outcome frequencies observed among women corroborate national and international literature [29,30] that shows a wide variation in the prevalence of LPA between the sexes. Studies have shown that the relationship between sex and LPA depends on the domain of physical activity investigated [11,29,31]. Older men and women differ in several socioeconomic (such as education, family income, culture, and social norms) and biological factors, which influence their health behaviors. A better understanding of gender differences in physical activity patterns and determinants can support the development of actions to promote this practice that meet the specific needs of both sexes [29].

In contrast to women's lower adherence to Leisure-Time Physical Activity (LTPA), the literature shows that women seek health services more frequently than men [32], suggesting more active health care. LTFA is a relevant factor in this context, as observed in a study that relates greater physical activity among older adults to a lower probability of dependence in performing activities of daily living [33]. This scenario points to an opportunity for intervention in this context, focused on health promotion and education among this group.

The widely observed lower physical active among the older [26,34-36], as established in the present study, can be attributed to greater opportunities for leisure-time physical activity among younger individuals [34]. In addition, biological factors intrinsic to aging, such as reduced physical capacity, mobility, and muscle strength, may contribute to lower engagement in physical activity with advancing age [37-39]. Aspects of the physical and social environment, such as infrastructure for leisure activities and safety, as well as social support, are also associated with lower physical activity in the elderly population [22,40,41]. Physical activity promotion programs that consider environmental characteristics, which have been shown to be effective in maximizing physical activity, especially leisure activities, are to be reinforced for older adults.

Single or divorced and widowed individuals are less likely to engage in leisure-time physical activity compared to those who were married [42,43]. Research indicates that involvement in activities with social interaction, such as travel, volunteer work, and physical activities, is essential to maintain a sense of purpose and promote healthy aging [44]. Marital relationships are especially relevant for older adults, who, due to factors such as retirement, relocation, and loss of friends and family, tend to have fewer social connections and support networks outside of marriage [45].

The increase in the prevalence of LTPA according to educational level, where individuals with a college degree had a 118% higher prevalence of being active in leisure time compared to those with lower educational levels are consistent with previous researched [12-14,46]. Inequalities in leisure-time physical activity reflect the impact of education on both knowledge of the health benefits of physical activity and financial conditions, which facilitate access to environments with better infrastructure and safety for this practice [46].

In addition, a higher educational level is described as a fundamental cause of health inequalities, acting as a protective factor, especially for the elderly population, and as a basis for a healthy lifestyle, where unhealthy behaviors tend to be more prevalent among individuals with lower educational attainment [47-49].

The data from the present study demonstrate that the practice of LPA is unequal among Brazilian older adults, given that a positive association was also observed between income level and the prevalence of leisure-time physical activity, with a progressive increase in practice as income increased. Social groups with higher income, education, and professional qualifications tend to have higher levels of leisure-time physical activity [12,13], just as impoverishment was the most frequently cited barrier to participation in LPA among low-income individuals [50].

These data suggest that greater financial resources may favor access to adequate environments and opportunities for leisure-time physical activity, whether through greater access to appropriate locations, equipment, or health incentive programs. This relationship reflects an important social inequality that directly influences engagement in healthy behaviors, highlighting the need for interventions that promote leisure-time physical activity in an inclusive and accessible manner for all income groups.

The significant association observed between area of residence (urban or rural) and the prevalence of leisure-time physical activity among older adults, could be related to work and domestic physical activities being predominate over LPA in these areas. These results reflect long working hours, lack of motivational incentives, and lack of adequate spaces for leisure physical activities [51].

The main strength of this study is the analysis of a national database with a representative sample of Brazilian older adults from all states. However, some limitations should be considered when interpreting the results. First, the use of a cross-sectional design limits the identification of a causal link between the exploratory variables and the outcomes investigated, however allowing to estimate the magnitude of the associations, contributing to new approaches in the study field. In addition, the use of self-reported measures for leisure-time physical activity may overestimate the prevalence of this outcome.

These disparities reflect the impact of socioeconomic and structural factors on the health behavior of the elderly population. Although there has been a slight increase in the prevalence of leisure-time physical activity compared to previous studies, this index is still low, which highlights the need for health promotion policies aimed at this group. Older adults represent a growing portion of the population and are essential in public health interventions, as physical activity is fundamental to preserving their health and functionality, helping prevent functional limitations and disabilities. Inclusive programs tailored to the specific needs of older adults—especially those of lower socioeconomic status and those living in rural areas—are essential to promote a more active lifestyle and reduce observed inequalities.

Conclusion

This study highlighted significant inequalities in the prevalence of leisure-time physical activity among older adults, associated with gender, age, educational level, income, and area of residence. Physical activity was more frequent among men, younger individuals, those with higher education and income, and residents of urban areas. These findings reinforce that the quest to reduce social inequalities is an essential part of the strategy to promote and implement more active aging and, consequently, a better quality of life. Thus, it is possible to plan tailored solutions for the different groups observed for personalized active aging with more feasible practical results.

Declarations

Authorship and ethical considerations: All co-authors approved the final version of the manuscript entitled "Social inequalities in the practice of leisure physical activity among older adults in brazil: evidence from the 2019 national health survey" before submission and declared no conflict of interest.

The research was approved by the Brazilian Research Ethics Committee (approval number 10853812.7.0000.0008).

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