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## ORIGINAL

### PHYSICAL INACTIVITY AND ASSOCIATED FACTORS IN ELDERLY PEOPLE IN BRAZIL

### INACTIVIDAD FÍSICA Y FACTORES ASOCIADOS EN PERSONAS MAYORES EN BRASIL

Menezes, A.S.<sup>1</sup>; dos-Santos-Silva, R.J.<sup>2</sup>; Tribess, S.<sup>3</sup>; Romo-Perez, V.<sup>4</sup> & Virtuoso-Júnior, J.S.<sup>5</sup>

<sup>1</sup>Professor. Federal Institute of Education, Science and Technology of Sergipe, Aracajú. [aldemirsmith@yahoo.com.br](mailto:aldemirsmith@yahoo.com.br)

<sup>2</sup>Professor. Department of Physical Education of the Federal University of Sergipe, Aracajú, Brazil. [rjeronimoss@gmail.com](mailto:rjeronimoss@gmail.com)

<sup>3</sup>Professor. Department of Sport Sciences, Federal University of Triângulo Mineiro, Uberaba, Brazil. [sheilla@ef.ufm.edu.br](mailto:sheilla@ef.ufm.edu.br)

<sup>4</sup>Professor and Head of Department of Special Didactics of the Faculty of Education and Sport Sciences, University of Vigo, Campus a Xunqueira, Pontevedra, P.C. 36005, Spain. [vicente@uvigo.es](mailto:vicente@uvigo.es)

<sup>5</sup>Professor. Department of Sport Sciences, Federal University of Triângulo Mineiro, Uberaba, Brazil. [jair@ef.ufm.edu.br](mailto:jair@ef.ufm.edu.br)

**Spanish-English translator:** Carlos Rubén Romo Rey, [cromor2009@gmail.com](mailto:cromor2009@gmail.com)

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#### ABSTRACT

The aim was to analyse factors associated with physical inactivity in elderly Brazilians. The study was carried out by using a cross-sectional design and it comprised a representative sample of 909 subjects. Physical inactivity was defined as fewer than 150 minutes per week. In order to identify socio-demographic factors and behavioural and health aspects, which may be associated with physical inactivity, we carried out a multivariate analysis through the Poisson regression.

Results suggest that physical inactivity has a prevalence of 39.1%. Physical inactivity presents a higher prevalence with an increase in age, a lack of regular physical activity practice in the past, depressive symptoms and disability in the instrumental activities of daily living.

An increase in age, a lack of regular physical activity practice in the past, depressive symptoms and disability in the instrumental activities of daily living are shown as causes of physical inactivity.

**KEY WORDS:** physical activity, health, elderly people, Brazil.

## RESUMEN

El objetivo fue analizar los factores asociados a la inactividad física en personas mayores en Brasil. Se utilizó un diseño transversal, con una muestra representativa de 909 sujetos de 60 años o más. Fueron clasificados como físicamente inactivos los individuos con menos de 150 de minutos de actividad física semanales. La identificación de los factores sociodemográficos, aspectos comportamentales y de salud asociados con la Inactividad física se realizó con un análisis multivariable, a través de una regresión de Poisson.

Los resultados sugieren una prevalencia del 39,1% para la inactividad física. La inactividad física presenta una mayor prevalente con o el incremento de la edad; la falta de práctica de actividad física regular en el pasado; los síntomas de depresión y la discapacidad en las Actividades Instrumentales de la Vida Diaria.

El aumento de la edad, la falta de práctica regular de actividad física en el pasado, los síntomas depresivos y la discapacidad en las actividades instrumentales de la vida diaria se evidencian como factores asociados la inactividad física.

**PALABRAS CLAVE:** actividad física, salud, personas mayores, Brasil.

## INTRODUCTION

The benefits of physical activity practice in health for the different age groups are deeply analyzed in scientific literature. In these studies, whether they are experimental clinical or epidemiological, the inverse relationship between physical activity and the concepts of morbidity and mortality is clear<sup>1,2</sup>.

The current challenge consists on analyzing the level of physical activity practiced by the population, broken down into age, gender and location, as well as identifying socio-demographic factors and clinical and behavioural aspects that are related to physical activity, with the aim of implementing intervention programmes in order to help these people to adopt a more active physical behaviour.

One of the age groups that is more characterized by complexity is the elderly, due to the huge intergroup differences in relation with experiences, habits and lifestyle, being all this related to pathological processes. Furthermore, the population is growing rapidly, both in developed and developing countries<sup>3</sup>.

In 1982, during the First World Assembly on Ageing, the United Nations (resolution 39/125) established that the beginning of the old age varies in developed countries compared to developing countries<sup>4</sup>. In the first case, a person is considered old at 65 years or more, whereas in the second case, such as Brazil, the minimum age is 60.

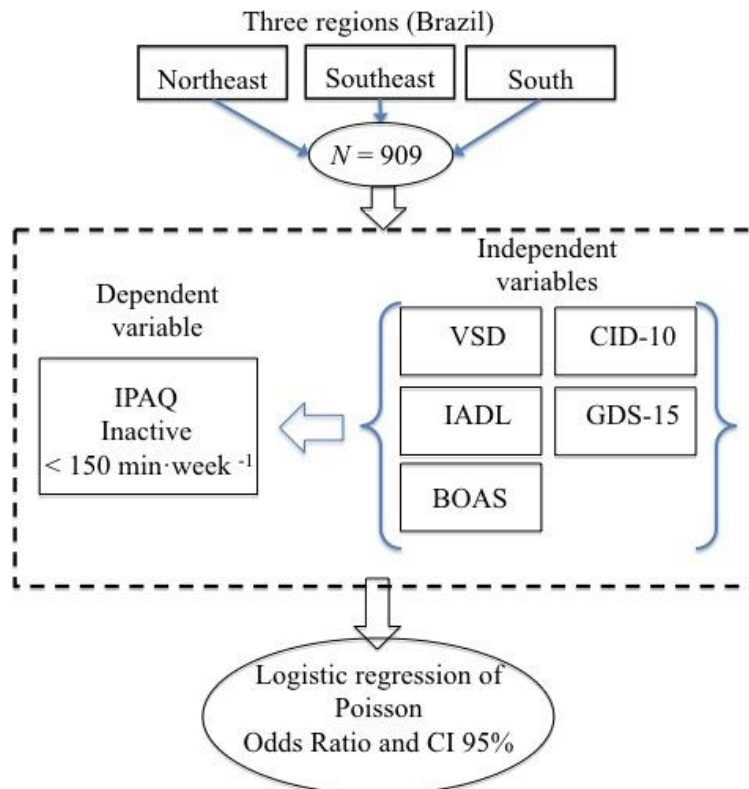
Population-based studies have been carried out in Brazil, in order to identify the level of physical activity and associated factors<sup>5,6,7,8</sup>. Nevertheless, because of the large size of this country, these studies were done only in one region. Therefore, the execution of a study that includes three urban centres in three different regions of Brazil would strengthen a generalization of results, not only in the country, but also in other similar Latin American states. As a consequence, the aim of this study was to identify the level of physical inactivity and the associated factors to this behaviour in the elderly of Brazil.

## **MATERIAL AND METHOD**

A cross-sectional study was carried out through a multidimensional survey, which was applied individually, between March and May 2009, on each domicile, in three cities of Brazil. These cities are representatives of the northeast, southeast and southern regions: (1) Ilhéus, BA; (2) Caratinga, MG; (3) Nova Santa Rosa, PR. A final sample of 909 subjects was established with the following inclusion criteria: (a) be 60 years or more<sup>4</sup> and (b) do not present symptoms of marked mental impairment, for which the results of the mental health section of the Brazil Old Age Schedule Survey (BOAS)<sup>14</sup> have been taken into account, with a cut-off level of four points for the presence of severe cognitive alterations.

A random stratified sampling that was proportional to the population structure, according to gender, age and geographic area (neighbourhood) was carried out. All data is in accordance with the Ministry of Health - Municipal Secretary of Health, for each municipality. The domiciles were selected by using a map of each district, which was provided by the different Municipal Secretaries of Health. The selection criteria of the sample and other data collection procedures are described in more detail in Silva et al.<sup>9</sup>

Figure 1. Description of the model and statistical analysis.



IPAQ: International Physical Activity Questionnaire; VSD: Questionnaire about socio-demographic variables; CID-10: Physical and mental health dimension: self-reported health, pathologies in accordance with the International Classification of Diseases; IADL: Instrumental Activities of Daily Living; GDS-15: Geriatric Depression Scale; BOAS: Cognitive Assessment Questionnaire (Brazil Old Age Schedule).

The following instruments were used in this study: (a) Socio-demographic questionnaire: age, gender, skin colour, education, civil status, occupation, family members and socio-economic level (VSD)<sup>10</sup>; (b) Physical and mental health dimension<sup>12</sup>: self-reported health, pathologies in accordance with the International Classification of Diseases (CID-10)<sup>11</sup>; (c) The Lawton Instrumental Activities of Daily Living (IADL)<sup>12</sup>. A 12 point cut-off was established for the presence of functional dependence of severe or moderate type; (d) Depression symptoms are assessed through the Geriatric Depression Scale (GDS-15)<sup>13</sup>, with a cut-off of five points for the presence of depression symptoms; (e) Mental health issues: for assessing the cognitive function, the Brazil Old Age Schedule (BOAS)<sup>14</sup> was used, with a cut-off of four points for the presence of severe cognitive alterations.

In order to assess the level of activity vs. physical inactivity (dichotomy dependent variable), the International Physical Activity Questionnaire adapted for the elderly (IPAQ) was used<sup>15</sup>. The IPAQ analyzes the physical activity practiced during a week, focusing on five domains: occupational, transportation,

household, leisure and recreation and sitting time<sup>15</sup>. Subjects were classified in two levels: physically inactive (<150 minutes·week<sup>-1</sup>) and physically active (≥150 minutes·week<sup>-1</sup>)<sup>16</sup>.

In order to identify the associated factors with physical inactivity, a multivariate analysis was used, through the Poisson regression. Three explanatory models were elaborated, by introducing the variables in blocks; block 1: gender, skin colour and age; block 2: civil status, level of education, socio-economic level, occupation, current source of income and monthly income; block 3: diet, tobacco consumption, alcohol consumption, physical activity in the past, cognitive assessment, depression symptoms and functional capacity in the IADL. The data analysis was carried out with the statistical programme SPSS (V. 15).

The study followed the Ethical Principles of the Declaration of Helsinki. Research protocols have been revised and approved by the Ethics Committee for Human Research of the State University of Santa Cruz, Brazil (Report n. 32/08).

## RESULTS

Prevalence in the physically inactive elderly was 39.1%, 42.1% for men and 37.1 for women. The average age was 71.47 years (SD=8.01), ranging from 60 to 91. More than the half of the population was classified as white skin (55.9%). The average monthly income (minimum monthly wage in Brazil) among active elder people was 6.53 and 2.54 for the physically inactive. The minimum wage in Brazil is equivalent to 266 U.S. dollars (\$266).

Table 1 shows the sample characteristics by level of physical activity. The average age was higher among the physically inactive, showing a relevant difference ( $p < 0.001$ ). The majority of the group consisted on married or widowed people, the latter showing a higher level of sedentary behaviour. Most of the elderly had the elementary education. People with a lower level of education, were less active as well.

Subjects with higher purchasing power, as well as those who were retired, are the most active. Among married people, 77.9% are retired and 6.9% are still working, despite being retired too. Two thirds of the elderly show an adequate nutritional status. Furthermore, there is an inverse relationship between nutritional status and the level of physical activity.

Three fourths of the sample does not consume alcohol or tobacco. About two thirds of the people did not practiced physical activity in the past. 75% of the subjects who practiced physical activity in the past are currently active.

**Table 1.** Socio-demographic and behavioural characteristics to the level of physical activity in the elderly

Variables	Level of physical activity			
	Active		Inactive	
	n	%	%	$\chi^2$ (p)*
<b>Gender**</b>				
Male	354	57.9	42.1	<b>2.246</b> <b>(0.077)</b>
Female	555	62.9	37.1	
<b>Civil status*</b>				
Single	47	66.7	33.7	<b>32.029</b> <b>(&lt;0.001)</b>
Married	515	67.7	32.3	
Widowed	291	47.8	52.2	
Divorced	46	63.0	37.0	
<b>Education*</b>				
Illiterate	159	50.3	49.7	<b>20.972</b> <b>(&lt;0.001)</b>
Incomplete elementary	398	57.8	42.2	
Complete elementary/Incomplete secondary	263	67.3	32.7	
Complete secondary	48	75.0	25.0	
≥ Incomplete higher education	40	75.0	25.0	
<b>Socio-economic condition**</b>				
Class A/B	106	67.0	33.0	<b>5.533</b> <b>(0.019)</b>
Class C	448	63.2	36.8	
Class D/E	355	56.3	43.7	
<b>Occupation*</b>				
Retired (still working)	54	81.5	19.5	<b>19.082</b> <b>(0.001)</b>
Retired	705	58.6	41.4	
Housewife	56	75.0	25.0	
Pensioner	55	50.9	49.1	
Employed earner	38	68.4	31.6	
<b>Current source of income*</b>				
Work	75	70.7	29.3	<b>9.291</b> <b>(0.054)</b>
Pension	765	59.5	40.5	
Family support	6	83.3	16.7	
No income	31	77.4	22.6	
Other	32	53.1	46.9	
<b>Nutrition*</b>				
Undernourished	25	12.0	88.0	<b>44.628</b> <b>(&lt;0.001)</b>
Risk of malnutrition	182	48.4	51.6	
Normal	650	66.2	33.8	
<b>Current alcohol consumption*</b>				
Consuming	102	76.5	23.5	<b>9.999</b> <b>(0.002)</b>
Not consuming	529	59.9	40.1	
<b>Physical activity in the past*</b>				
Practiced	305	74.4	25.6	<b>35.426</b> <b>(&lt;0.001)</b>
Did not practice	600	54.0	46.0	
<b>Cognitive alterations*</b>				
No alterations	794	66.0	34.0	<b>67.215</b> <b>(&lt;0.001)</b>
Alterations	115	26.1	73.9	
<b>Depression symptoms*</b>				
No symptoms	795	64.3	35.7	<b>29.544</b>

Symptoms	114	37.7	62.3	<b>(&lt;0.001)</b>
<b>Functional capacity in the IADL*</b>				
No functional capacity	439	77.9	22.1	<b>102.584</b>
Functional capacity	470	45.1	54.9	<b>(&lt;0.001)</b>

\* Analysis of the probability relation; p<0.05. \*\* Association tendency

Table 2 shows data from a brute and adjusted analysis between physical inactivity and the different explanatory variables. The prevalence of physical inactivity is more obvious, as age increases. In the behavioural variables block, nutrition and alcohol consumption present statistical significance in the brute analysis. The practical variable of regular physical activity in the past remained significant in the socio-demographic and behavioural block, within the adjusted analysis. In the third block, depression symptoms and functional capacity variables in IADL were significant both in the brute and in the adjusted analysis, for the socio-demographic, behavioural and health blocks.

**Table 2.** Brute and adjusted prevalence reason (PR), based on the level of physical activity for both genders.

Variables	Sedentarism (< 150 min/week.)			
	Brute analysis		Adjusted analysis*	
	PR (CI 95%)	Wald (p-value)	PR (CI 95%)	Wald (p-value)
<b>Gender</b>				
Male	1	<b>1.367</b>		
Female	0.88 (0.71-1.09)	<b>(0.242)</b>		
<b>Age</b>				
	1.05 (1.04-1.06)	<b>62.024</b>	1.04 (1.03-1.06)	<b>35.210</b>
		<b>(&lt;0.001)</b>		<b>(&lt;0.001)<sup>1</sup></b>
<b>Civil status</b>				
Single	1		1	
Married	0.97 (0.58-1.62)	<b>19.171</b>	1.02 (0.61-1.72)	<b>1.292</b>
Widowed	1.57 (0.94-2.62)	<b>(0.000)</b>	1.17 (0.69-1.98)	<b>(0.731)<sup>1</sup></b>
Divorced	1.11 (0.56-2.19)		1.18 (0.59-2.35)	
<b>Education</b>				
Illiterate	1		1	
Incomplete elementary	0.85 (0.65-1.11)		1.10 (0.83-1.45)	
Complete elementary/Incomplete secondary	0.66 (0.49-0.89)	<b>12.547</b>	0.95 (0.68-1.32)	<b>3.604</b>
		<b>(0.014)</b>		<b>(0.462)<sup>1</sup></b>
Complete secondary	0.50 (0.27-0.92)		0.65 (0.34-1.24)	
≥ Incomplete higher education	0.50 (0.26-0.97)		0.79 (0.37-1.66)	
<b>Socio-economic condition</b>				
Class A/B	1		1	
Class C	1.11 (0.78-1.61)	<b>9.820</b>	0.84 (0.56-1.28)	<b>1.016<sup>1</sup></b>
Class D/E	1.32 (0.92-1.91)	<b>(0.007)</b>	0.92 (0.60-1.42)	<b>(0.602)</b>
<b>Occupation</b>				
Retired (still working)	1		1	
Retired	2.24 (1.19-4.20)		1.70 (0.90-3.21)	<b>3.629</b>
Housewife	1.35 (0.60-3.04)	<b>11.175</b>	1.36 (0.60-3.08)	<b>(0.458)<sup>1</sup></b>

			<b>(0.025)</b>		
	Pensioner	2.65 (1.28-5.48)		1.62 (0.77-3.43)	
	Employed earner	1.71 (0.74-3.95)		2.00 (0.86-4.65)	
<b>Current source of income</b>					
	Work	1			
	Pension	1.38 (0.90-2.13)			
	Family support	0.57 (0.08-4.22)	<b>5.522</b>		
	No income	0.77 (0.33-1.80)	<b>(0.238)</b>		
	Other	1.60 (0.83-3.08)			
<b>Monthly wage</b>					
		0.94 (0.88-1.00)	<b>0.329</b>		
			<b>(0.566)</b>		
<b>Nutrition</b>					
	Undernourished	1		1	
	Risk of malnutrition	1.53 (1.20-1.94)	<b>25.893</b>	1.41 (0.78-2.53)	<b>5.904</b>
	Normal	2.60 (1.68-4.03)	<b>(&lt;0.001)</b>	1.45 (1.06-1.97)	<b>(0.052)<sup>2</sup></b>
<b>Current alcohol consumption</b>					
	Consuming	1	<b>6.114</b>	1	<b>0.871</b>
	Not consuming	1.70 (1.12-2.60)	<b>(0.013)</b>	1.25 (0.78-2.00)	<b>(0.351)<sup>2</sup></b>
<b>Smoker</b>					
	Yes	1	<b>0.217</b>		
	No	1.09 (0.76-1.55)	<b>(0.642)</b>		
<b>Physical activity in the past</b>					
	Practiced	1	<b>20.960</b>	1	<b>10.878</b>
	Did not practice	1.80 (1.40-2.31)	<b>(&lt;0.001)</b>	1.71 (1.24-2.34)	<b>(0.001)<sup>2</sup></b>
<b>Cognitive alterations</b>					
	No alterations	1	<b>38.968</b>	1	<b>1.723</b>
	Alterations	2.17 (1.70-2.77)	<b>(&lt;0.001)</b>	1.23 (0.90-1.69)	<b>(0.189)<sup>3</sup></b>
<b>Depression symptoms</b>					
	No symptoms	1	<b>17.549</b>	1	<b>5.426</b>
	Symptoms	1.74 (1.34-2.26)	<b>(&lt;0.001)</b>	1.43 (1.06-1.94)	<b>(0.020)<sup>3</sup></b>
<b>Functional capacity in the IADL</b>					
	No functional capacity	1	<b>58.380</b>	1	<b>22.279</b>
	Functional capacity	2.48 (1.97-3.14)	<b>(&lt;0.001)</b>	1.93 (1.47-2.54)	<b>(&lt;0.001)<sup>3</sup></b>

\* Adjusted for the same level and/or higher; p<0.05.

<sup>1</sup> socio-demographic block; <sup>2</sup> behavioural block; <sup>3</sup> health block

## DISCUSSION

In the present study, prevalence and physical inactivity, as well as the associated factors to that condition have been described in a population of elderly people who reside in three municipalities of three different regions (northeast, southeast and southern) of Brazil. The few losses of the sample provide an excellent response rate for the study (97.7%). The sampling selection method contributes to the validation of the data of the study.

The general prevalence of physical inactivity was 39.1%, well below the figures verified in other studies (70.9%), in which the low level of physical activity during leisure time were analyzed, although they were similar to the data obtained in a



study performed in the city of Florianópolis (40.7%). This study used the same indicator for measuring physical activity<sup>6</sup>.

Our data confirm that physical inactivity increases with age, a fact that concurs with other recent studies<sup>2,7,17</sup>. Furthermore, in scientific literature it is ascertained that all the elder people who have limited purchasing power and a low access to goods and services, are also less physically active. This fact suggests that it may exist an economic relationship between these variables<sup>18,19</sup>. This hypothesis is strengthened once the direct relationship between physical inactivity and the lowest economic and education strata are observed<sup>5,20</sup>.

Those behaviours that are negative for health have been associated with the low participation of the elderly in physical activity practices or social activities, like smoking<sup>21</sup>, inadequate eating habits<sup>21</sup>, obesity<sup>22</sup> and low weight<sup>23</sup>. The variables low weight and obesity were not assessed in this study. Although the variables smoking and alcohol consumption do not show a link with physical inactivity, there is a need to adopt measures in order to reduce the number of elderly people who have these negative habits for health.

Subjects with risk of malnutrition are less physically active. The unbalance of essential nutrients for the organism favours the rapid decline of the muscle mass and ageing, and therefore, sarcopenia<sup>24</sup>. The fact that in the final model, the risk of malnutrition has barely remained as an associated variable to physical inactivity should be taken into account for programme designs.

We have to consider the proof of interaction between the benefits of physical activity practice and mental health<sup>25</sup>. The conservation of the functional parameters improves vascularisation, neuromotor units and the development of functional attitudes<sup>26</sup>, e.g. reaction time<sup>27</sup>. Furthermore, social activity is stimulated as communication between individuals is favoured<sup>19</sup>. This is a link between home and the community.

Those variables related to Instrumental Activities of Daily Living and with physical activity in the past remained associated with physical activity. The elderly who did not present functional incapacity in the instrumental activity, as well as those who practiced physical activity in the past, are the most physically active. This suggests that the conservation of healthy lifestyle habits in the different stages of life favours a more active and independent old age<sup>28</sup>.

Constraints of this study include: (a) The IPAQ may underestimate or overestimate the results of the research with the elderly. (b) The behaviour of physical activity practice is complex, and implies multiple variables. Some of these variables may have been excluded in this study, e.g.: nutritional status, overweight or obesity. (c) Other variables, such as alcohol and tobacco consumption need a deeper analysis, considering the amount of them, as they can affect the results. (d) The cross-sectional design does not allow to progress in the analysis, regarding those factors that precede or succeed the facts, e.g.: there is no detailed information about whether depression symptoms and

cognitive alterations were originated before or after the physical inactivity of the elderly began.

The possibility of bias in this study has been minimized, as the sample is representative for the selected municipalities. In addition, the reviewers received previous training before conducting the surveys. Nevertheless, there is a chance that the results of the auto-related averages may be influenced by cultural and social factors, which is the case of the low level of education present in the sample.

## CONCLUSION

40% of the elderly show physical inactivity. This behaviour has more prevalence in men (42.1%) than in women (37.1%). Age increase, the lack of regular practice of physical activity in the past, depression symptoms and the incapacity in the IADL are clearly the variables associated with physical inactivity. Therefore, these behaviours must be taken into account when implementing programmes that favour and active life in the elderly.

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