

## Leisure-time physical activities and their association with active behavior in other domains and sociodemographic aspects: a population-based study with adults residing in the Brazilian state capitals and the Federal District

Atividades físicas no tempo de lazer e sua associação com comportamentos ativos em outros domínios e com aspectos sociodemográficos: um estudo de base populacional com adultos residentes nas capitais dos estados brasileiros e no Distrito Federal

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**Abstract** *This study aimed to identify the types of leisure-time physical activity (LTPA) most practiced and their association with active behavior in other domains and the sociodemographic aspects in Brazilian adults ( $\geq 18$  years old). It was a cross-sectional study, using data from a population-based system (Vigitel, 2017). Binary logistic regression was used. In the 29,323 LTPA practitioners (51.3% men), the five types of activities most performed were: walking (36.6%), weight training (17.7%), soccer (11.7%), jogging (8.3%), and aerobics (6.7%). The LTPA that had the greatest associations with sociodemographic variables were soccer, walking, and aerobics, all with  $p$ -value  $\leq 0.01$ . When considering the other domains of physical activity, participants who reported doing household physical activity were more likely to walk and less likely to practice weight training, soccer and aerobics. Those who did active commuting had more of a chance to walking and less of a chance to weight train, while individuals who practiced occupational physical activity were less likely to walk and more likely to play soccer. Important differences in sociodemographic aspects and active behavior in the other domains were found according to the LTPA type.*

**Key words** *Motor activity, Leisure activities, Life-style*

**Resumo** *Este estudo teve como objetivo identificar os tipos de atividade física de lazer (AFL) mais praticados e sua associação com o comportamento ativo em outros domínios e aspectos sociodemográficos em adultos brasileiros ( $\geq 18$  anos). Foi um estudo transversal, com dados de um sistema de base populacional (Vigitel, 2017). Utilizou-se regressão logística binária. Nos 29.323 praticantes de AFL (51,3% homens), os cinco tipos de atividades mais realizadas foram: caminhada (36,6%), musculação (17,7%), futebol (11,7%), corrida (8,3%) e ginástica (6,7%). As atividades que tiveram maiores associações com as variáveis sociodemográficas foram o futebol, a caminhada e a ginástica, todas com valor  $p \leq 0,01$ . Ao considerar os demais domínios de atividade física, os participantes que relataram fazer atividade física doméstica tiveram mais chance de realizar a caminhada e menos chance de praticar musculação, futebol e ginástica. Aqueles que faziam deslocamentos ativos tiveram mais chance de caminhada e menos chance de musculação, enquanto os indivíduos que realizavam atividade física no trabalho apresentaram menos chance para a caminhada e mais chance para o futebol. Diferenças importantes nos aspectos sociodemográficos e no comportamento ativo nos demais domínios foram encontradas de acordo com o tipo de AFL.*

**Palavras-chave** *Atividade motora, Atividades de lazer, Estilo de vida*

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## Introduction

The increasing global prevalence<sup>1</sup> of insufficient practice of physical activity (PA) is a concern for public health, as it demands costly medications, consultations, and hospital admissions<sup>2,3</sup>. In addition, this risky behavior is responsible for the occurrence of a considerable proportion of non-communicable chronic diseases, such as diabetes, obesity, and hypertension<sup>4</sup>, which correspond to 70% of mortality worldwide<sup>5</sup>.

Against the stability of the global indicator of insufficient PA<sup>1</sup>, there is a substantial tendency to increase its practice in the leisure-time domain, both in high-income<sup>6-8</sup> and middle-income countries<sup>9</sup>. Therefore, this can be important information to consider for the achievement of one of the World Health Organization (WHO) goals, regarding the relative reduction of 15% in the prevalence of insufficient PA by the year 2030<sup>10</sup>.

In view of the different domains of PA – commuting, household, leisure, and occupational – leisure-time contributes to a significant reduction in the risk of mortality from all causes and cardiovascular diseases<sup>11</sup>. As leisure-time is the domain most explored by researchers in the field, this suggests its significant role in meeting the recommendations of PA and, consequently, in the acquisition of health benefits<sup>12,13</sup>. However, few studies have sought to identify the types of PA performed by individuals in this context, their particularities in terms of frequency, duration and intensity, as well as the profile of those who practice it<sup>12,13</sup>.

Active behavior and its varied options for practice in leisure-time can be chosen and influenced according to a set of personal and environmental motivations<sup>14,15</sup>. According to a systematic review<sup>15</sup>, among the personal factors, it is possible to consider characteristics such as age, education, and sex. Environmental issues, such as geographical location, safety aspects of practitioners in activities, and physical spaces available for good practices can also be seen as barriers or facilitators for the practice of PA<sup>15</sup>. Thus, these combined elements can contribute to engagement and continuity in practicing PA.

Additionally, inequalities in the health conditions of the general population are widely known and research has shown that they occur in behaviors and life habits, such as active behavior<sup>16,17</sup>. In this sense, a greater understanding of the different PA types performed during leisure-time can provide information about the disparities in their participation<sup>18</sup>. Its understanding will grant

advancement in the elaboration and execution of public policies. As a result, specific strategies, along with adequate and well-accepted mechanisms by the population, will allow the recognition of the characteristics and main interests of individuals<sup>19</sup> for the promotion of PA in leisure<sup>18</sup>.

Besides, this study advances in relation to previous studies by considering other sociodemographic variables, such as macro-regions of the country where the subjects lived, as well as other domains of PA, in addition to exploring other equally relevant aspects as duration, frequency, and intensity of activities performed. Therefore, the proposal of this manuscript impacts the understanding of how voluntary activity, carried out during leisure-time, can be associated with the practice of PA in other domains and, thus, contribute to an increase in the individual's total PA volume. Hence, the objective of the present study was to identify the types of leisure-time PA most practiced and their association with active behavior in other domains as well as the sociodemographic characteristics in adults residing in the Brazilian state capitals and the Federal District.

## Methods

This study has a cross-sectional design, derived from the Vigitel system (Telephone-based Surveillance of Risk and Protective Factors for Chronic Diseases), conducted in 2017. The target population was composed of individuals aged 18 years or older, living in the 26 Brazilian capitals and the Federal District who had at least one fixed telephone line in their homes.

The sampling process was first based on the drawing of at least 5,000 telephone lines per city, systematically carried out and stratified by postal code. Subsequently, one of the adults living in the household was elicited to participate in the interview. Corporate lines, which no longer existed or were out of service, as well as those that did not answer six call attempts were ineligible for the survey. Additional information regarding methodological aspects can be found in a technical report<sup>20</sup>.

The total sample of the Vigitel project was composed of 53,034 individuals, obtaining a response percentage of 70.0%. However, as an eligibility criterion, the present study only considered individuals who practiced leisure-time PA ( $n = 29,323$ ).

The practice of PA during leisure-time was defined by the question: "Do you practice exercise

or sports at least once a week?'. All participants with an affirmative answer were asked about the main type of PA practiced, weekly frequency, and duration. The intensity of each PA was determined by the compendium of Ainsworth *et al.*<sup>21</sup>. The sociodemographic characteristics investigated were sex, age, current marital status, education, and region of residence in Brazil. Active behavior in other domains (commuting – walking or cycling to and from work or school, household, and occupational) was investigated as well and treated equally in the analysis, considering only the fact of performing these activities or not, regardless of frequency, duration, and intensity. The indicators of PA seemed reliable and sufficiently accurate<sup>22</sup>.

Data analysis relied on data weighting, based on three factors: the inverse of the number of telephone lines in the participant's home; the number of adults in the respondent's home; and the post-stratification weight, respecting the characteristics of sex, age and education of the sample and the total population of Brazilian capitals. In descriptive statistics, absolute and relative frequency (%), and the respective 95% confidence interval (95%CI) were used. In inferential statistics, crude and adjusted binary logistic regression was applied to estimate five models of the most practiced leisure-time PA, with results expressed as odds ratio (OR). The first set of models estimated associations between sociodemographic characteristics and these five types of PA. The second set of models examined associations between commuting, household and occupational PA domains in the five leisure PA, while controlling sociodemographic factors. Significant results were expressed from the p value  $\leq 0.05$ , resulting from the Wald heterogeneity test and linear trend test. The adjusted analysis considered a hierarchical model with demographic variables at the first level (sex, age, marital status, and regions of Brazil), and the social variable (education) at the second level. In statistical modeling, the backward selection strategy was employed at a critical level of  $p \leq 0.20$  for permanence in the model, controlling potential confounding factors. The data were analyzed using the statistical software Stata® Standard Edition, version 13.0 (StataCorp LP, United States).

The Vigitel project was approved by the National Commission for Ethics in Research for Human Beings of the Ministry of Health (CAAE: 65610017.1.0000.0008).

## Results

Among the 53,034 survey respondents, 29,323 (53.4%) reported practicing PA during leisure time. Of this amount, a predominant proportion was composed of men (51.3%), adults (85.8%), with a mean age of 39.9 ( $\pm 17.9$ ) years old, individuals who lived without a partner (56.5%), schooling of nine years or more (78.4%) with an average of 11.5 ( $\pm 5.3$ ) years of study, and residents in the Southeast of the country (41.7%). In addition, 53.2%, 49.9% and 47.9% reported practicing PA in the commuting, household, and occupational domains, respectively.

The main types of PA practiced during leisure-time were walking (36.6%), weight training (17.7%), soccer (11.7%), jogging (8.3%) and aerobics (6.7%). Complementary details regarding the main types of PA in leisure-time practiced in the capitals of Brazil and the Federal District can be seen in Table 1.

The sociodemographic characterization of practitioners of the main types of leisure-time PA is shown in Table 2. Women reported practicing more walking and aerobics, while men related soccer and jogging. Adults were more likely to practice weight training, soccer, and jogging, while the elderly opted for walking and aerobics. As for marital status, individuals with a partner

**Table 1.** Physical activities practiced during leisure-time among practitioners residing in the capitals of Brazil and the Federal District, 2017 (n = 29,323).

Physical activities	%	95%CI
Walking	36.6	35.4; 37.8
Weight training	17.7	16.7; 18.7
Soccer	11.7	10.8; 12.7
Jogging	8.3	7.6; 9.1
Aerobics	6.7	6.2; 7.3
Other options	5.1	4.6; 5.7
Cycling	4.5	4.0; 5.0
Martial arts	2.3	1.9; 2.8
Dance	2.0	1.6; 2.3
Water aerobics	1.8	1.6; 2.0
Swimming	1.5	1.2; 1.9
Volleyball	1.1	0.9; 1.4
Basketball	0.4	0.2; 0.8
Tennis	0.3	0.2; 0.5

%; percentage of the weighted sample; 95% CI: 95% confidence interval; aerobics consist of activities such as stretching, pilates, yoga, spinning, step, and jump.

**Table 2.** Sociodemographic characterization of practitioners of the most practiced physical activities during leisure-time in the capitals of Brazil and the Federal District, 2017 (n = 29,323).

Variables	Most practiced physical activities during leisure-time																			
	Walking			Weight training			Soccer			Jogging			Aerobics							
	%	OR	95%CI	Value p	%	OR	95%CI	Value p	%	OR	95%CI	Value p	%	OR	95%CI	Value p				
Sex				<0.001				<0.001				<0.001				<0.001				
Female	45.9	2.23	2.00; 2.49		17.5	1.05	0.91; 1.21		0.9	0.32	0.20; 0.50		5.2	0.45	0.36; 0.55		10.8	4.06	3.25; 5.08	
Male	27.8	1.00			17.8	1.00			22.1	1.00			11.3	1.00			2.8	1.00		
Age				<0.001				<0.001				<0.001				<0.001				<0.001
Adults (≤ 59 years)	32.9	1.00			19.8	1.00			13.4	1.00			9.3	1.00			5.7	1.00		
Elderly (≥ 60 years)	59.0	2.00	1.77; 2.26		4.5	0.31	0.25; 0.38		1.9	0.13	0.09; 0.20		2.4	0.30	0.22; 0.42		12.9	2.48	2.08; 2.96	
Marital status				<0.001				<0.001				0.010				0.604				0.761
With a partner	46.2	1.00			11.8	1.00			9.6	1.00			7.5	1.00			7.1	1.00		
Without a partner	29.1	0.55	0.49; 0.61		22.3	1.74	1.50; 2.01		13.5	1.31	1.07; 1.60		8.9	1.06	0.86; 1.29		6.4	0.97	0.81; 1.16	
Education				<0.001				<0.001				0.014				0.001				0.001
≤ 8 years of study	54.6	1.00			5.7	1.00			10.9	1.00			4.6	1.00			6.6	1.00		
≥ 9 years of study	31.7	0.50	0.44; 0.58		21.0	3.16	2.43; 4.11		12.0	0.72	0.55; 0.93		9.3	1.69	1.23; 2.31		6.7	1.43	1.15; 1.78	
Regions of Brazil				0.076				0.104				0.001				0.220				<0.001
North	34.4	0.99	0.83; 1.17		17.2	0.84	0.69; 1.03		15.2	1.94	1.43; 2.63		9.0	0.84	0.63; 1.11		4.6	0.67	0.51; 0.89	
Northeast	38.5	1.13	0.99; 1.30		18.4	0.95	0.79; 1.13		11.6	1.49	1.13; 1.97		8.1	0.79	0.60; 1.03		5.2	0.71	0.56; 0.91	
Midwest	35.2	1.00			20.0	1.00			8.0	1.00			9.8	1.00			7.3	1.00		
Southeast	36.7	1.00	0.85; 1.18		17.0	0.88	0.71; 1.10		12.2	1.70	1.24; 2.33		8.1	0.81	0.60; 1.10		7.2	0.97	0.74; 1.28	
South	35.8	0.98	0.83; 1.17		15.9	0.77	0.61; 0.97		11.6	1.68	1.18; 2.38		6.8	0.68	0.50; 0.95		10.2	1.39	1.07; 1.82	

OR: odds ratio; 95% CI: 95% confidence interval; value p resulting from adjusted analysis for sex, age, marital status, and regions of Brazil (first level); education (second level). Aerobics consist of activities such as stretching, pilates, yoga, spinning, step, and jump.

Source: Authors.

practiced more walking and less weight training and soccer, compared to their peers. Education showed a positive relationship with weight training, jogging and aerobics and a negative relationship with walking and soccer. For the regions of Brazil, the most expressive results were observed for soccer, in which subjects from all regions were more likely to practice when compared to those in the Midwest, and for aerobics, where the Southern region had the highest proportion and probability of practicing than other locations.

In Table 3, it is possible to observe the characteristics of weekly frequency, duration, and intensity of PA during leisure-time, according to sociodemographic characteristics. Women reported doing more PA lasting between 30 and 59 minutes, with light/moderate intensity compared to men. Elderly people had a higher weekly frequency for PA in relation to adults and, in turn, were more likely to practice activities of longer duration and intensity. Subjects without a partner reported practicing PA more frequently and with greater intensity than their peers. Partici-

pants with higher levels of education performed practices with longer durations, however, there were no significant differences in frequency and intensity in those with less education. It was also found that, for all regions of Brazil, most subjects reported practicing PA one to four times a week, especially in the Southeast and South, lasting  $\geq 60$  minutes and with light/moderate intensity. Figures have been added as supplementary materials to facilitate the understanding of these results (available from: <https://doi.org/10.48331/scielodata.N8RZ2V>).

In the association between PA in the other domains and the main leisure practices (Table 4), it was found that participants who practiced commuting PA were more likely to walk and less likely to perform weight training compared to their peers. The practice of household PA was directly associated with walking, and inversely associated with weight training, aerobics, and soccer. The probability of playing more soccer and less walking was identified among those who performed some active behavior at occupational domain.

**Table 3.** Characteristics of weekly frequency, duration, and intensity of physical activities during leisure-time, according to sociodemographic factors, among practitioners residing in the capitals of Brazil and the Federal District, 2017.

Variables	Frequency (days/week)				Duration (minutes/day)						Intensity			
	1 to 4		5 to 7		$\leq 29$		30 to 59		$\geq 60$		Light/Moderate		Vigorous	
	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI	%	95%CI
Sex														
Male	64.3	62.5; 66.2	35.7	33.8; 37.5	3.8	3.2; 4.6	20.3	18.8; 21.7	75.9	74.4; 77.5	63.3	61.4; 65.2	36.7	34.8; 38.6
Female	65.4	63.8; 67.0	34.6	33.0; 36.2	3.3	2.8; 3.8	26.5	25.1; 28.1	70.2	68.6; 71.7	90.0	88.8; 91.1	10.0	9.0; 11.2
Age														
Adults	65.1	63.7; 66.4	34.9	33.6; 36.3	2.7	2.2; 3.2	21.7	20.5; 22.9	75.6	74.4; 76.9	73.2	71.9; 74.6	26.8	25.4; 28.1
Elderly	63.7	61.6; 65.7	36.3	34.3; 38.4	8.8	7.6; 10.1	33.0	31.1; 35.0	58.2	56.2; 60.3	93.6	92.4; 94.7	6.4	5.3; 7.6
Marital status														
Married	66.5	64.8; 68.2	33.5	31.8; 35.3	4.0	3.4; 4.6	26.6	25.0; 28.2	69.4	67.7; 71.1	79.9	78.2; 81.5	20.1	18.6; 21.8
Single	63.7	61.9; 65.4	36.6	34.6; 38.1	3.2	2.7; 3.9	20.7	19.3; 22.1	76.1	74.6; 77.5	73.2	71.4; 74.9	26.8	25.1; 28.6
Education														
$\leq 8$ years	64.1	61.5; 66.6	35.9	33.4; 38.6	6.9	5.8; 8.2	27.9	25.6; 30.2	65.2	62.7; 67.7	81.9	79.3; 84.2	18.1	15.8; 20.7
$\geq 9$ years	65.1	63.7; 66.5	34.9	33.5; 36.2	2.6	2.2; 3.1	22.1	20.9; 23.3	75.3	74.1; 76.5	74.5	73.2; 75.9	25.5	24.1; 26.8
Regions of Brazil														
North	60.6	58.2; 63.1	39.4	36.9; 41.8	3.9	3.1; 4.8	19.6	17.8; 21.5	76.5	74.5; 78.4	72.2	69.9; 74.4	27.8	25.6; 30.1
Northeast	62.3	60.7; 63.8	37.7	36.2; 39.3	3.8	3.2; 4.4	24.4	23.1; 25.8	71.8	70.4; 73.3	77.0	75.5; 78.4	23.0	21.6; 24.5
Midwest	62.6	59.6; 65.5	37.4	34.5; 40.4	3.3	2.5; 4.5	25.0	22.7; 27.5	71.7	69.1; 74.2	78.2	76.0; 81.3	21.2	18.7; 24.0
Southeast	67.2	64.7; 69.6	32.8	30.4; 35.3	3.2	2.4; 4.1	22.8	20.7; 25.0	74.0	71.8; 76.3	75.7	73.2; 78.0	24.3	22.0; 26.9
South	69.6	66.9; 72.2	30.4	27.8; 33.1	4.6	3.6; 6.0	24.9	22.7; 27.3	70.5	67.9; 72.9	76.7	73.8; 79.5	23.3	20.5; 26.1

Adults:  $\leq 59$  years old; elderly:  $\geq 60$  years old; married: individuals who live with a partner; single: individuals who live without a partner; 95%CI: 95% confidence interval; value p resulting from adjusted analysis for sex, age, marital status, and regions of Brazil (first level); education (second level).

**Table 4.** Practice of active behavior in other domains among practitioners of different physical activities during leisure-time in the capitals of Brazil and the Federal District, 2017.

Variables	Most practiced physical activities during leisure-time															
	Walking			Weight training			Soccer			Jogging			Aerobics			
	%	OR	95%CI	Value p	%	OR	95%CI	Value p	%	OR	95%CI	Value p	%	OR	95%CI	Value p
Commuting PA				0.004				0.844				0.614				0.517
Yes	38.1	1.24	1.07; 1.44		14.4	0.69	0.56; 0.85		13.6	0.98	0.77; 1.24		8.4	0.93	0.71; 1.22	
No	36.2	1.00			18.5	1.00			11.3	1.00			8.3	1.00		
Household PA				< 0.001				0.036				0.254				0.009
Yes	45.6	1.58	1.41; 1.77		15.0	0.77	0.66; 0.90		7.4	0.79	0.64; 0.99		7.7	1.13	0.92; 1.39	
No	29.9	1.00			19.7	1.00			15.0	1.00			8.7	1.00		
Occupational PA				0.001				0.266				0.083				0.170
Yes	27.8	0.75	0.63; 0.89		16.6	0.89	0.72; 1.10		23.8	1.90	1.53; 2.37		8.1	0.77	0.58; 1.04	
No	38.4	1.00			17.9	1.00			9.4	1.00			8.4	1.00		

PA: physical activity; OR: odds ratio; 95% CI: 95% confidence interval; value p resulting from adjusted analysis for sex, age, marital status, and regions of Brazil (first level); education (second level). Aerobics consist of activities such as stretching, pilates, yoga, spinning, step, and jump.

Source: Authors.

## Discussion

When analyzing representative data of adults residing in the 26 capitals of Brazil and the Federal District, this study identified the PA practiced during leisure-time and their association with active behavior in other domains and sociodemographic characteristics. It was found that the most practiced PA were walking, followed by weight training, and soccer. Important differences in sociodemographic characteristics and active behavior in other domains were observed according to the type of PA, especially soccer (associated with five sociodemographic variables) and walking (associated with the other three domains of PA).

The report of the main PA performed during leisure-time in individuals from the Brazilian capitals is similar to the results found in a systematic review and meta-analysis<sup>18</sup>, where walking, cycling, jogging, soccer, and weight training were the top choices of the adult population in the Americas. Walking has been identified as the most practiced PA on different continents. It consists of a simple practice, accessible to most people<sup>12</sup> and commonly included in health surveillance or monitoring systems<sup>23</sup>. Weight training emerged as the second option among leisure-time PA and may be related to public initiatives that have gained prominence with the implementation of outdoor gyms, providing equipment for their practice<sup>13</sup>. Another factor for engaging in this type of PA may be related to the immense concern of individuals with aesthetics and body image<sup>12,24</sup>. Soccer also occupied an important position due to its popularity, making it a social norm in many countries and, as a consequence, favoring the provision of spaces and facilities that also support the adoption of this activity at the population level<sup>18</sup>.

Women were more likely to practice walking, aerobics, activities of shorter duration and less intensity, when compared to men. These findings are in line with research carried out in the national<sup>12,25</sup> and international context<sup>26,27</sup>, in which walking and other aerobic activities were the most performed. This perspective may still be historically related to the greater concern of women with respect to self-care and health<sup>28</sup>, as it is unnecessary to perform vigorous PA to achieve such goals<sup>29</sup>.

In the case of men, there was a choice of vigorous PA, such as soccer and running. It is possible to note that the activities most practiced by this subgroup are associated with higher meta-

bolic equivalents<sup>21,27</sup>, which may be related to the fact that men are more engaged in competitive activities, usually demanding greater physical effort<sup>25</sup>. Regarding the activity type, it must be recognized that the practice of soccer corresponds to the cultural context, especially in Brazil, in which men are encouraged to play and follow this sport from childhood<sup>25</sup>, unlike women, who tend to be discouraged from a historically male practice, suffering prejudice and discrimination<sup>30</sup>.

Adults reported practicing more vigorous activities than the elderly. Similar results have been previously stated, in which young people practiced more activities, such as soccer and strength training than the elderly<sup>13,26</sup>, who reported practicing more walking and aerobics<sup>31</sup>. The options of PA can vary due to age-related motivations<sup>18</sup>, in which elderly people tend to choose activities that involve health maintenance, whereas adults have interests that may be related to aesthetics and recreation<sup>12,32</sup>. Even though the elderly practice fewer leisure activities with lighter intensity and shorter duration, they had a higher weekly frequency of practice. This result may be related to the opportunity for socialization and group activities<sup>33</sup>, and the formulation of environments that promote the well-being and quality of life of the elderly, such as walking groups<sup>34</sup>, gymnastics<sup>35</sup>, and PA organized by extension programs at Brazilian universities<sup>36</sup>. Another explanation can be attributed to retirement, which provides more time for the elderly to practice leisure activities<sup>27</sup>.

Regarding marital status, previous studies observed that married individuals exercised less than those who were single<sup>37,38</sup>. The practice of PA requires concentrated energy and, in some cases, cannot be combined with other activities, such as childcare and occupational activities<sup>38</sup>, which would explain the choice of less intense activities by those who live with a partner. In relation to the type of PA, walking can be a practice performed together, which would make it more enjoyable for those with a partner<sup>12</sup>, while weight training and soccer can be connected to aesthetic and recreational aspects<sup>24</sup>, more attractive for those without a partner.

In this study, it was observed that individuals with less education were more likely to practice walking and soccer as opposed to those more educated, who were more likely to do weight training, jogging and aerobics. Researchers identified a positive association between weight training and education and a negative association for soccer<sup>12</sup>. In countries like Brazil, the education level may be closely related to income, which could

justify greater opportunities for cultural activities and access to clubs<sup>39</sup>, favoring the practice of PA in this context. According to Silva *et al.*<sup>40</sup> the benefits of PA are widely available to the general population, but access to private places and more attractive public areas in Brazil may be some of the main factors that prevent the diversified practice of leisure-time PA among the less educated, who often tend to have lower incomes<sup>41</sup>.

The extreme cultural, social, and economic differences in Brazil present a decisive role in the distribution of sports and PA, affecting the opportunities and experiences that the population may have throughout their lives<sup>42</sup>. According to data released by the Global Human Development Report of the UNPD (United Nations Development Programme), Brazil is among the ten nations with the highest index of social inequality in the world, among a group of 143 countries<sup>42</sup>. Thus, the most developed regions of the country invest in the establishment of clubs and foundations that enable the preservation of cultural, artistic, and sporting traditions<sup>42</sup>.

It was found that commuting PA was directly associated with walking during leisure-time, and inversely associated with weight training. Possibly, the fact that individuals carry out active commuting can contribute to intrapersonal aspects, such as knowledge, attitude and enjoyment for walking, motivating the continuity of this type of practice during leisure time. On the other hand, lack of time, considered one of the main barriers of practicing a physical activity<sup>44</sup>, can be more easily perceived as an obstacle to the practice of weight training by subjects who actively commute, since these two practices tend to take a high volume of time on a daily basis.

Individuals who performed household PA were more likely to walk and less likely to do weight training, soccer, and aerobics. As researchers report, the domestic domain has the highest prevalence for meeting the PA recommendations in women<sup>44,45</sup>, suggesting that those who practice walking also carry out domestic duties. Environmental characteristics, such as organization, structure and policies related to programs and interventions, can also favor walking during leisure-time. In addition, after a strenuous period of the day spent on household chores, it is plausible that outdoor and moderate intensity practices, such as walking, are prioritized, while those with greater intensity, such as weight training, soccer and aerobics are avoided.

Lack of motivation and preference for other leisure activities can be considered possible ex-

planations for the reduced probability of walking by subjects who practiced occupational PA. In different circumstances, soccer is seen as an activity with greater opportunities for recreation, in which friendship networks are observed, and even competition<sup>42,46</sup>, unlike the work context, where some situations demand greater seriousness and formality.

In view of the aforementioned, it is worth noting that the present study had several strengths, such as the sampling method, sample size and its representativeness, involving the five major regions of the country. Besides, the Vigitel system had a great response rate for a phone survey. Likewise, these findings provide important information for understanding the particularities of the PA performed in the leisure domain, which involves individual choice, consequently differing from the other domains. The investigation of multiple characteristics of leisure-time PA (type, frequency, intensity, and duration) indicates ways to recognize more democratic and elite practices, serving greater equity in different practices according to sociodemographic characteristics. However, the measures related to the levels of PA were self-reported, which may have generated inaccuracies in the data collected. Even so, it should be noted that activities performed during leisure-time usually require intention and planning, in contrast to those executed in the occupational domain or in the home environment, making the recordation more accurate<sup>46</sup>. Another aspect concerns the PA types performed during leisure-time, in which the participants could indicate only one alternative, making it difficult to understand all PA practiced in this domain.

The present study addresses relevant data for a greater understanding of the different types of leisure-time PA and their associated factors, giving information about the disparities in their participation and providing advances and reflections in collective health knowledge. Consequently, the achieved results may assist in the development and implementation of mechanisms that aim to stimulate, increase and maintain PA levels in the Brazilian population, according to their interests and preferences. For example, the benefits of weight training for the elderly are diverse, however, this subgroup is the one that least performs this type of PA, as well as the least educated. Thus, disseminating knowledge about the positive aspects of these practices, in addition to encouraging participation in existing programs can be viable alternatives for people to engage

in healthy and active behaviors. The construction and repair of public spaces, such as walking paths or bicycle paths, can be another measure to motivate people to accomplish these practices. Therefore, the combination of educational and environmental strategies is necessary to facilitate the diversity of active practices and inspire this behavior in less favored subgroups.

Finally, the obtained results allow a better understanding of the relationships of different PA types practiced during leisure-time with PA in other domains. This is promising from the point of view of public health, since the main volume of PA practiced daily does not come from this context. Thus, it is perceived that these practices can stimulate or contribute to the relationship with active behavior in different contexts, which add up to the individual's weekly total PA. Consequently, the chances of these individuals meeting the PA recommendations and achieving additional benefits for health and quality of life become even greater.

In conclusion, walking, weight training, soccer, jogging, and aerobics were the most leisure-time PA practiced by adults residing in the Brazilian capitals and the Federal District. Sociodemographic factors differently influenced the participation of these five PA, especially age and education. These same aspects were associated with the weekly frequency, duration, and intensity of these PA. Finally, PA in the commuting and household domains were associated with greater participation in walking, while occupational PA was related to soccer.

## Collaborations

C Bertuol worked on the conception, design, analysis, interpretation of data, drafting the article, and revising it critically, as well as approving the version to be published. SN Oliveira and AVB Tozetto operated on the design, interpretation of data, and final text. GF Del Duca worked to critically revise and approve the final version.



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