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Sociodemographic differences in walking for leisure and for commuting in Brazilian workers

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Abstract—Walking is a great health promotion strategy due to its beneficial effects. Objective: To identify the prevalence of walking for leisure and for commuting to work and its association with sociodemographic factors among 47,477 Brazilian workers. Walking and sociodemographic factors were obtained from a self-reported questionnaire. Poisson regression was used. Among men, walking for leisure was more frequent in those who were older, live with a partner, had a higher level of education and income, and worked in the Southeastern region of Brazil. When commuting, it was more prevalent among single men, who had a lower level of education and income and worked in the Southern region of this country. Among women, walking for leisure was more common in those who lived with a partner, had no children, and worked in the Southern region. There was an association between the outcome and age, education and family income. Regarding commuting, it was more prevalent among older individuals, without a partner, with a lower level of education and income, and working in the Southern region. Walking was associated with sociodemographic characteristics, with differences between sexes.

Keywords: leisure activities, occupational health, social class, cross-sectional studies

Introduction

The negative consequences of physical inactivity to health is considered of the most important risk behaviors for morbidity and mortality (Hallal *et al.*, 2007; World Health Organization, 2009; Lee *et al.*, 2012). The current physical activity recommendations have encouraged its practice during leisure time, domestic activities, transportation and work (WHO, 2009). In this context, walking is highly emphasized as a health promotion strategy, increasing the level of physical activity, due to its high rate of adherence, low cost, feasibility for the majority of the population, convenience, and beneficial health effects (Hallal *et al.*, 2005; Janssen *et al.*, 2010; Kruger, Ham, Berrigan & Ballard-Barbash, 2008; Lee & Buchner, 2008; Turi, Codogno, Fernandes & Monteiro, 2015; WHO, 2009).

Especially for leisure time, national and international studies indicate that walking is the main physical activity in adult populations (Lee, Sesso, Oguma, & Paffenbarger, 2004; Hallal *et al.*, 2005) with prevalence ranging from 8.8% to 35% (Gomes *et al.*, 2011; Parra *et al.*, 2011). This activity can provide better health perception, prevent disease, promote psychological well-being (Lee *et al.*, 2004; Gomes *et al.*, 2011), reduce expenses on medication (Codogno *et al.*, 2015; Turi *et al.*, 2015) and reduce mortality risk (Barros & Nahas, 2001; Lee *et al.*, 2004; Autenrieth *et al.*, 2011).

Concerning commuting to work among adults, walking is an alternative mode of transportation that is economically viable in both high-income countries, with effective public transport, and in low- and middle-income countries, where populations face more difficulties with public and private transport. The national prevalence of walking for commuting is 53% (Instituto Brasileiro de Opinião e Estatística, 2011). There is evidence that people who commute to work by walking have many health benefits (WHO, 2009; Lee *et al.*, 2004), a better health perception (Tassitano, Feitosa & Tenório, 2013), lower risk of chronic diseases, especially obesity (Gordon-Larsen *et al.*, 2009) and lower health expenses (Codogno *et al.*, 2015).

Understanding the differences in sociodemographic factors associated with walking during leisure time and commuting to work is very important for the development of public policies that helping to increase this behavior in society (Thomaz, Costa, Silva & Hallal, 2010), aiming to a more active and healthy lifestyle. In addition, it should be highlighted that women and men have different attitudes towards active behavior, especially walking (Hallal *et al.*, 2005; Kruger *et al.*, 2008), and that there are few studies addressing simultaneously walking during leisure time and commuting to work (Humpel, Owen, Iverson, Leslie, & Bauman, 2004; Teixeira, Nakamura & Kokubun, 2014; Turi *et al.*, 2015). Therefore, the objective of the study was to identify the prevalence of walking for leisure and for commuting

to work and their association with socio demographic factors among Brazilian workers.

Method

This study is part of the survey entitled “Lifestyle and leisure activities of Brazilian industry workers”. Data were collected between 2006 and 2008 and the survey included workers from 24 states of Brazil. Only the states of Rio de Janeiro, Sergipe and Piauí did not participate in the investigation, because they had not completed data collection in time.

Sample size calculation was performed independently for each state, according to the following parameters: prevalence of leisure-time physical inactivity of 45%, acceptable error of three percentage points, 95% confidence interval, an addition of 50% in the sample size to account for design effect and of 20% to account for possible losses and refusals. The planned sample size was 52,774 workers.

Sampling procedures included two stages. In the first stage, companies were randomly selected, according to the distribution of employees in large (≥ 500), medium (100-499) and small (<100) companies. In the second stage, the selection of workers was random and proportional to the size of the company. The industries that refuse to participate in the study were replaced by others that were similar in size and in the type of activity and that were located within the same geographical region.

The information used to develop the sampling plan and perform the random selection of companies and participating workers was provided by SESI’s Regional Departments themselves. The number of companies selected in each stage can be consulted in the General Research Report (Nahas, Barros, Oliveira & Aguiar, 2009).

The instrument used was a questionnaire validated by Barros (1999). The workers answered the questions in groups of three to 15 individuals, under the supervision of evaluators, who were previously trained by videoconference. This instrument was previously tested for logic, content, clarity and reproducibility (Barros, 1999). A total of two senior researchers participated in the validation of logic and content. A pilot study was performed to assess clarity and to identify and resolve possible problems of interpretation. Analyses of reproducibility showed moderate to high levels of agreement in the physical activity section, with an interclass correlation coefficient varying from 0.60 to 0.84.

Study outcomes were walking for leisure and for commuting to work, which were self-reported by the workers as their main physical activity in each respective domain through the following questions: “Do you regularly perform some kind of physical activity in your leisure time, such as physical exercise (gymnastics, walking, running), sports, dance, or martial arts?”; and “How do you get to work from your home on most days of the week?” The answer options were walking, cycling, riding the bus, and taking a car/motorcycle. Those who selected the first option were categorized as practitioners walk.

The exposures investigated were sex (male and female), age (≤ 29 , 30-39, 40-49 and ≥ 50 years), current marital status (with or without a partner), number of children (none,

1-2, ≥ 3), schooling (incomplete elementary education, complete elementary school, complete high school and complete under-graduation), gross family income in US dollars at the time of the study ($\leq \$280$, \$281-700, \$701-1400, $\geq \$1,401$) and country region of the company (North, Northeast, Midwest, Southeast and South).

Data analysis was performed using Stata software, version 13.0 (Stata Corporation, College Station, USA). The results were expressed as absolute, relative frequencies and prevalence ratios with confidence intervals of 95% (95% CI), using Poisson regression with robust variance. Crude and adjusted analyses stratified by sex were carried out, using the following hierarchical model of analysis: Level 1 - age and region of the company; Level 2 - marital status and number of children; Level 3 - education and family income. The backward selection strategy was adopted and the variables in the same level were adjusted for each other and for the variables in subsequent levels. Variables with p value ≤ 0.20 were maintained in the model in order to control for confounding. Results with p value ≤ 0.05 were considered statistically significant.

Results

Among the 52,774 eligible workers, 47,477 participated in the study (89.90% response rate), mostly men (69.85%). Overall, the socio-demographic characteristics of the sample were similar for both sexes: most of the workers were ≤ 29 years old (45.31% men and 47.94% women), had one or two children (45.21% of men and 44.75% women), had completed high school (49.47% of men and 54.64% women) and had a gross family income equivalent to 281-700 US dollars at the time of the study (42.11% of men and 39.75% of women). By contrast, concerning marital status, most men (60.83%) reported having partners, while 54.18% of women reported being single. All variables showed statistical differences when sexes were compared. Further details on the workers’ characteristics are shown in Table 1.

The prevalence of walking was 13.59% (95% CI: 13.27, 13.92) for leisure and 11.44% (95% CI: 11.16, 11.73) for commuting to work. 11.65% (95% CI: 11.30, 12.02) of men and 18.16% (95% CI: 17.51, 18.83) of women practiced walking during leisure time. Walking for commuting to work was reported by 10.18% (95% CI: 9.85, 10.51) of men and 14.38% (95% CI: 13.81, 15.00) of women. There was a significant difference between males and females for the two outcomes investigated ($p < 0.001$).

Table 2 displays the results of the crude and adjusted analyses concerning walking for leisure and for commuting to work among males. There was an increasing trend of walking during leisure time among males with increasing age. However, age was not associated with walking for commuting to work. Workers with partners were 13% more likely to walk in leisure time and 14% less likely to walk for commuting to work. In addition, it was found that increasing education level and gross family income were associated with higher prevalence of walking in leisure time. Walking for commuting to work was significantly

higher among socioeconomically disadvantaged workers. While workers from the Southeast region had the highest prevalence of walking for leisure (OR = 1.53), workers from the South had the highest prevalence of commuting to work (PR = 1.95).

Table 3 shows the crude and adjusted analyses of walking for leisure and for commuting to work among females. Increasing age was associated with walking for leisure and for commuting to work. Female workers with partners were 13% more likely to walk during leisure time and 9% less likely to walk for commuting to work compared to single female workers. The number of children was associated with lower prevalence of walking in leisure time ($p = 0.05$), i.e. working women with three or more

children were 16% less likely to walk for leisure. However, the number of children was not significantly associated with walking for commuting to work. There was a positive trend between education level and the prevalence of walking for leisure, while the reverse occurred in the relation between education level and walking for commuting to work, i.e. less educated women were more likely to walk to commute to work. In relation to family income, women with lower income had higher prevalence of walking for both leisure and commuting. When compared with the North region, working in the South of Brazil was associated with higher prevalence of walking in both leisure time (OR = 1.32) and commuting to work (PR = 2.80).

Table 1. Characteristics of industry workers Brazilian according to sex. Brazil, 2008.

Variable	Male (n=33161)			Female (n=14316)		
	n	%	95% CI	n	%	95% CI
Age (years)						
≤29	14965	45.31	44.78; 45.85	6836	47.94	47.12; 48.76
30-39	10085	30.54	30.04; 31.04	4554	31.94	31.18; 32.71
40-49	5678	17.19	16.79; 17.60	2265	15.88	15.29; 16.49
≥50	2298	6.96	6.69; 7.24	604	4.24	3.92; 4.58
Marital status						
With partner	20117	60.83	60.31; 61.36	6547	45.82	45.00; 46.64
Without partner	12952	39.17	38.64; 39.69	7742	54.18	53.36; 55.00
Number of children						
None	11576	35.77	35.25; 36.30	6059	43.68	42.86; 44.51
1-2	14630	45.21	44.69; 45.75	6207	44.75	43.92; 45.58
3 or more	6154	19.02	18.59; 19.45	1605	11.57	11.05; 12.11
Education level						
Incomplete elementary school	7274	21.98	21.54; 22.43	1695	11.87	11.35; 12.41
Complete elementary school	5666	17.12	16.72; 17.53	1759	12.32	11.79; 12.87
Complete high school	16372	49.47	48.93; 50.01	7801	54.64	53.83; 55.46
Complete undergraduation	3782	11.43	11.09; 11.78	3021	21.16	20.50; 21.84
Family income						
≤280	10810	32.94	32.43; 33.45	4259	30.07	29.32; 30.83
281-700	13821	42.11	41.58; 42.65	5630	39.75	38.95; 40.56
700-1400	5337	16.26	15.87; 16.67	2879	20.33	19.67; 21.00
≥1401	2850	8.68	8.38; 8.99	1395	9.85	9.37; 10.35
Region of the company						
North	8722	26.30	25.83; 26.78	2918	20.38	19.73; 21.05
Northeast	10308	31.08	30.59; 31.59	4227	29.53	28.78; 30.28
Midwest	5815	17.54	17.13; 17.95	2335	16.31	15.71; 16.92
Southeast	4050	12.21	11.87; 12.57	1954	13.65	13.10; 14.22
South	4266	12.86	12.51; 13.23	2882	20.13	19.48; 20.80

Note: The variable number of children had the highest amount of missing information for both sexes (1246 missings in total, of which 801 were men and 445 were women). 95% CI: confidence intervals of 95%. p value <0,001 to comparison male and female.

Table 2. Descriptive and adjusted analysis of habitual practice walking for leisure and commuting to work among Brazilian male industry workers. Brazil, 2008.

Variable	Walking for leisure				Walking for commuting to work			
	Descriptive analysis		Adjusted analysis		Descriptive analysis		Adjusted analysis	
	%	95% CI	PR (95% CI)	P value	%	95% CI	PR (95% CI)	P value
Age (years)				<0.001**				0.689**
≤29	6.39	6.00; 6.81	1.00		10.60	10.11; 11.10	1.00	
30-39	11.10	10.48; 11.76	1.75 (1.60; 1.90)		9.38	8.83; 9.97	0.86 (0.82; 0.96)	
40-49	20.30	19.24; 21.41	3.18 (2.93; 3.46)		10.02	9.27; 10.84	0.94 (0.87; 1.04)	
≥50	26.57	24.75; 28.49	4.17 (3.80; 4.59)		11.30	10.06; 12.67	1.07 (0.94; 1.22)	
Marital status				<0.001*				<0.001*
With partner	13.70	13.21; 14.20	1.13 (1.05; 1.22)		9.70	9.30; 10.12	0.86 (0.80; 0.92)	
Without partner	8.44	7.99; 8.96	1.00		10.87	10.35; 11.42	1.00	
Number of children				0.794**				0.615**
None	8.22	7.71; 8.76	1.00		10.60	10.05; 11.17	1.00	
1-2	12.86	12.31; 13.43	1.06 (0.97; 1.16)		9.54	9.07; 10.03	0.95 (0.87; 1.04)	
3 or more	15.64	14.72; 16.60	1.00 (0.89; 1.12)		9.95	9.23; 10.73	0.98 (0.87; 1.09)	
Education level				<0.001**				<0.001**
Incomplete elementary school	9.68	9.00; 10.41	1.00		12.98	12.23; 13.78	1.00	
Complete elementary school	10.22	9.43; 11.07	1.29 (1.16; 1.44)		10.81	10.03; 11.65	0.80 (0.72; 0.88)	
Complete high school	11.22	10.73; 11.73	1.44 (1.31; 1.59)		9.81	9.37; 10.28	0.75 (0.69; 0.82)	
Complete undergraduation	19.73	18.43; 21.10	1.90 (1.68; 2.15)		5.22	4.56; 5.98	0.48 (0.40; 0.57)	
Family income				<0.001**				<0.001**
≤280	7.69	7.19; 8.23	1.00		11.99	11.39; 12.62	1.00	
281-700	11.50	10.96; 12.07	1.20 (1.10; 1.31)		10.69	10.18; 11.21	0.90 (0.83; 0.97)	
700-1400	15.46	14.48; 16.50	1.27 (1.14; 1.40)		8.30	7.59; 9.07	0.72 (0.64; 0.81)	
≥1401	20.26	18.75; 21.86	1.32 (1.17; 1.50)		4.34	3.64; 5.15	0.42 (0.35; 0.51)	
Region of the company				<0.001*				<0.001*
North	9.40	8.78; 10.06	1.00		8.16	7.60; 8.76	1.00	
Northeast	11.79	11.17; 12.44	1.12 (1.03; 1.22)		10.66	10.08; 11.28	1.31 (1.19; 1.43)	
Midwest	12.65	11.80; 13.55	1.31 (1.19; 1.44)		7.04	6.41; 7.73	0.86 (0.76; 0.97)	
Southeast	14.85	13.73; 16.04	1.53 (1.38; 1.69)		11.74	10.78; 12.77	1.44 (1.28; 1.62)	
South	11.53	10.52; 12.64	1.24 (1.10; 1.38)		15.93	14.86; 17.07	1.95 (1.76; 2.17)	

Note: PR: Prevalence ratio; 95% CI = 95% Confidence Interval; * = Heterogeneity test; ** = Linear trend.

Table 3. Descriptive and adjusted analysis of habitual practice walking for leisure and commuting to work among Brazilian female industry workers. Brazil, 2008.

Variable	Walking for leisure				Walking for commuting to work			
	Descriptive analysis		Adjusted analysis		Descriptive analysis		Adjusted analysis	
	%	95% CI	PR (95% CI)	P value	%	95% CI	PR (95% CI)	P value
Age (years)				<0.001**				0.004**
≤29	15.16	14.28; 16.08	1.00		13.97	13.16; 14.81	1.00	
30-39	19.01	17.84; 20.23	1.28 (1.18; 1.40)		13.55	12.58; 14.57	0.97 (0.89; 1.07)	
40-49	23.21	21.44; 25.08	1.60 (1.45; 1.77)		15.99	14.54; 17.57	1.12 (1.00; 1.25)	
≥50	25.44	22.01; 29.20	1.81 (1.55; 2.11)		19.43	16.44; 22.81	1.34 (1.12; 1.59)	
Marital status				<0.001*				0.029*
With partner	19.97	18.97; 21.01	1.13 (1.05; 1.22)		14.21	13.38; 15.08	0.91 (0.84; 0.99)	
Without partner	16.64	15.79; 17.52	1.00		14.52	13.75; 15.32	1.00	
Number of children				0.053**				0.444**
None	16.66	15.69; 17.67	1.00		13.34	12.51; 14.22	1.00	
1-2	19.10	18.11; 20.14	0.96 (0.88; 1.06)		14.01	13.17; 14.90	0.92 (0.84; 1.02)	
3 or more	18.70	16.79; 20.77	0.84 (0.72; 0.97)		17.89	16.08; 19.85	0.97 (0.84; 1.13)	

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Table 3. Continued.

Variable	Walking for leisure				Walking for commuting to work			
	Descriptive analysis		Adjusted analysis		Descriptive analysis		Adjusted analysis	
	%	95% CI	PR (95% CI)	P value	%	95% CI	PR (95% CI)	P value
Education level				<0.001**				<0.001**
Incomplete elementary school	17.41	15.56; 19.42	1.00		24.96	22.94; 27.08	1.00	
Complete elementary school	18.96	17.08; 20.99	1.20 (1.03; 1.40)		21.13	19.28; 23.11	0.85 (0.75; 0.96)	
Complete high school	17.30	16.44; 18.19	1.23 (1.08; 1.40)		13.87	13.12; 14.66	0.66 (0.59; 0.74)	
Complete undergraduation	20.33	18.87; 21.88	1.49 (1.28; 1.74)		5.80	5.02; 6.69	0.35 (0.29; 0.43)	
Family income				0.002**				<0.001**
≤ 280	17.75	16.57; 18.99	1.00		19.99	18.81; 21.22	1.00	
281-700	17.98	16.95; 19.05	0.92 (0.84; 1.01)		15.11	14.19; 16.07	0.82 (0.75; 0.90)	
700-1400	18.98	17.52; 20.53	0.89 (0.79; 0.99)		8.59	7.62; 9.68	0.52 (0.45; 0.61)	
≥ 1401	18.38	16.34; 20.62	0.81 (0.69; 0.94)		5.46	4.38; 6.79	0.38 (0.30; 0.48)	
Region of the company				<0.001*				<0.001*
North	17.25	15.87; 18.72	1.00		7.26	6.37; 8.26	1.00	
Northeast	15.20	14.13; 16.34	1.00 (0.74; 1.03)		17.33	16.21; 18.50	2.34 (2.02; 2.70)	
Midwest	19.14	17.54; 20.84	1.11 (0.99; 1.25)		10.36	9.18; 11.66	1.42 (1.19; 1.69)	
Southeast	19.64	17.85; 21.56	1.13 (1.00; 1.28)		14.45	12.96; 16.09	1.97 (1.67; 2.33)	
South	22.45	20.78; 24.22	1.32 (1.18; 1.48)		20.47	19.03; 21.99	2.80 (2.40; 3.25)	

Note: PR: Prevalence ratio; 95% CI = 95% Confidence Interval; *= Heterogeneity test; **= Linear trend.

Discussion

This study identified the prevalence and factors associated with walking during leisure time and commuting to work among Brazilian male and female workers. Walking prevalence, as the main physical activity in leisure time and in commuting to work, was considered low. In Brazil, there are few studies that have specifically assessed physical activity in adult workers simultaneously in both domains (Humpel *et al.*, 2004; Teixeira, Nakamura & Kokubun, 2014). This result can be partly explained by various environmental factors such as the rapid growth of cities, which could result in diminished opportunities for performing physical activity during leisure time, as well as greater difficulties for active commuting (Robroek *et al.*, 2011). In addition, issues such as working hours, high technological facilities (Robroek, Berg, Plat & Burdorf, 2011) and adverse weather conditions (Adamoli, Silva & Azevedo, 2011) tend to decrease regular physical activity in general (Robroek *et al.*, 2011), including walking.

The prevalence of walking for leisure was slightly higher than walking for commuting to work in the study population, a result that is in agreement with other studies which show that, in Brazil, the prevalence of walking for leisure is usually higher than that for commuting to work (Gomes *et al.*, 2011; Parra *et al.*, 2011).

It is speculated that this finding can be explained by the worldwide increase in urban violence and insecurity (Handy, 2005). Some studies (Florindo, Salvador, Reis, & Guimarães, 2011; Gomes *et al.*, 2011; Parra *et al.*, 2011) showed that walking for leisure and commuting to work are influenced by the environment in different ways. Safety is one such way and it seems to have a greater influence on commuting to work.

Regarding sex, we observed that the prevalence of walking in both domains was higher among women than men. One possible explanation for this may be related to the fact that men practice more moderate and vigorous activities (Azevedo *et al.*, 2007; Thomaz *et al.*, 2010) and women, more walking and domestic activities (Thomaz *et al.*, 2010). In addition, men usually engage in collective activities such as football, while women opt for individual activities such as walking or gymnastics (Del Duca, Nahas, Hallal, & Peres, 2014).

In this study, it was shown that walking for leisure was more prevalent in older workers from both sexes. Similar results were found in other Brazilian studies (Del Duca *et al.*, 2014; Pitanga, Beck, Pitanga, Freitas, & Almeida, 2014). One explanation for this is that young and middle-aged adults engage in other more vigorous activities in their leisure time, while older adults engage in milder or moderate activities, such as walking (Hallal *et al.*, 2005). However, concerning walking for commuting to work, older age was positively associated with the outcome in women only. This result may be related to the fact that older women are more concerned about health issues, quality of life and aesthetics when compared to younger people, making them more involved with the practice of physical activities regardless of domain, intensity and duration (Azevedo *et al.*, 2007).

Concerning marital status, workers of both sexes who lived without a partner were more likely to walk for commuting to work. Similar results were found in another study involving adult residents of a Brazilian city (Dumith, Domingues & Gigante, 2009). On the other hand, walking for leisure was more common among men and women who had a partner. According to authors (Del Duca *et al.*, 2014) that observed similar findings, this relationship may be explained in part by the possibility of

a joint practice, making physical activity more pleasant and enjoyable for those who live together.

In this study, having no children was associated with higher prevalence of walking for leisure in women only. Other studies (Barros & Nahas, 2001; Florindo *et al.*, 2009) have shown that, regardless of sex, the number of children influences physical activities during leisure time. It is possible that this discrepancy can be explained by existing family compositions. Typically, women are primarily responsible for taking care of their children during leisure time, which can reduce the time spent in walking in this domain (Florindo *et al.*, 2009).

In this study, walking for commuting to work was significantly higher among workers with lower levels of education and income, in both sexes. While in leisure time, walking was higher in individuals of higher educational levels for both sexes, men with higher income and women with lower income. It is possible that women with higher income choose other activities instead of walking, however there is no way to test this hypothesis with our data.

Kruger *et al.* (2008) also found that walking in leisure time was more frequent among educated people and higher family income, while walking for commuting to work was more frequent in individuals of lower socioeconomic status. In Brazilian studies (Barros & Nahas, 2001; Tassitano, Feitosa & Tenório, 2013; Pitanga *et al.*, 2014), the same trend of physical activity in leisure time, including walking (Barros & Nahas, 2001), or commuting is observed (Tassitano, Feitosa & Tenório, 2013; Pitanga *et al.*, 2014). It seems that the higher the educational level of Brazilian adults, the more physical activity is practiced for leisure and the less for commuting and for domestic purposes (Engbers, Poppel, Paw, & Mechelen, 2005). Possibly, this reality is most striking in middle and low income countries compared to high income countries, where the educational disparity is not so evident in the population. Among men, walking for leisure was more frequent in the Southeast, while walking for commuting was more frequent in the South. Among women, walking for both purposes was more frequent in those living in the South. Thus, walking was more common among workers of the richest regions of Brazil (South and Southeast). In the literature, wealthy regions with higher education levels tend to have more physically active people in leisure (Janssen *et al.*, 2010) but less in commuting (Kruger *et al.*, 2008; Tassitano, Feitosa & Tenório, 2013). Importantly, companies located in richer regions tend to have more financial resources, and consequently, better infrastructure and facilities (Matson-Koffman, Brownstein, Neiner & Greaney, 2005; Mutrie *et al.*, 2002) to perform physical activity in leisure time. It is believed that programs that encourage physical activity, as well as the availability of spaces suitable to the practice of these activities, are favorable aspects, and that companies could invest in this environment, by providing lectures on the benefits of regular physical activity, building sports courts, walking tracks, gyms and etc (Saelens & Handy, 2008).

On the other hand, the higher frequency of walking for commuting to work in less developed regions of Brazil can be explained by the absence of public transport in some localities and also by lower levels of violence compared to

more developed regions and populated regions of the country. Studies (Dumith, Domingues & Gigante, 2009; WHO, 2009) show that there are many reasons that may hinder physical activity, among which are the increase in crime and high levels of traffic congestion.

This study had some limitations, such as the cross-sectional design, which restricts inferences about causal relationships between variables associated with walking for leisure and for commuting to work. The replacement of some companies, that refused to participate, by others of the same size and the replacement of selected workers, who were not at work at the time of collection or refused to participate, by the next name on the list of workers may have negative implications for the sampling procedure (non-respondent bias). One should also consider seasonal bias since data collection in each state occurred in different periods. The positive points of the study include the size and probability sample selection procedure, since this study was conducted with a large sample, sufficient for statistical analysis and representative of industry workers from 23 Brazilian states and the Federal District. Another important point was the high response rate.

Conclusion

Walking prevalence, as the main physical activity in leisure time and in commuting to work, was considered low. Sociodemographic factors associated with walking differ between the sexes, with different patterns for each domain. These differences may result in affirmative action for a physically active lifestyle, in which initiatives that support physical activity in different domains take into account some socio-demographic aspects of workers. Conducting cohort studies is important to better understand the “directionality” of these associations.

References

- Adamoli, A.N.; Silva, M.C.; Azevedo, M.R (2011). Prática da caminhada no lazer na população adulta de Pelotas, RS. *Revista Brasileira de Atividade Física e Saúde*, 16(2), 113-119.
- Autenrieth, C.S., Baumert, J., Baumeister, S.E., Fischer, B., Peters, A., Döring, A., & Thorand, B. (2011). Association between domains of physical activity and all-cause, cardiovascular and cancer mortality. *European Journal of Epidemiology*, 26(2), 91-99.
- Azevedo, M.R., Araújo, C.L.P., Reichert, F.F., Siqueira, F.V., Silva, M.C., & Hallal, P.C. (2007). Gender differences in leisure-time physical activity. *International Journal of Public Health*, 52(1), 8-15.
- Barros, M.V.G., & Nahas, M.V. (2001). Comportamentos de risco, auto-avaliação do nível de saúde e percepção de estresse entre trabalhadores da indústria. *Revista de Saúde Pública*, 35(6), 554-563.
- Barros, M.V.G. (1999). *Atividades físicas no lazer e outros comportamentos relacionados à saúde dos trabalhadores da indústria no estado de Santa Catarina, Brasil*. Dissertação de mestrado, Programa de Pós-Graduação em Educação Física, Universidade Federal de Santa Catarina, Florianópolis, Santa Catarina, Brasil.

- Codogno, J.S.; Turi, B.C.; Kemper, H.C.G.; Fernandes, R.A.; Christofaro, D.G.D.; Monteiro, L.H. (2015). Physical inactivity of adults and 1-year health care expenditures in Brazil. *International Journal of Public Health*, 60(3), 309-316.
- Del Duca, G.F., Nahas, M.V., Hallal, P.C., & Peres, K.G. (2014). Atividades físicas no lazer entre adultos de Florianópolis, Santa Catarina, Brasil: estudo populacional sobre as características das práticas e de seus praticantes. *Ciência & Saúde Coletiva*, 19(11), 4595-4604.
- Dumith, S.C., Domingues, M.R., & Gigante, D.P. (2009). Epidemiologia das atividades físicas praticadas no tempo de lazer por adultos do Sul do Brasil. *Revista Brasileira de Epidemiologia*, 12(4), 646-658.
- Engbers, L.H., Poppel, M.N., van., Paw, M.J.C.A., & Mechelen, W. van. (2005). Worksite health promotion programs with environmental changes: a systematic review. *American Journal of Preventive Medicine*, 29(1), 61-70.
- Florindo, A.A., Guimarães, V.V., Cesar, C.L.G., Barros, M.B.A., Alves, M.C.G.P., & Goldbaum, M. (2009). Epidemiology of leisure, transportation, occupational, and household physical activity: prevalence and associated factors. *Journal of Physical Activity & Health*, 6(5), 625-632.
- Florindo, A.A., Salvador, E.P., Reis, R.S., & Guimarães, V.V. (2011). Percepção do ambiente e prática de atividade física em adultos residentes em região de baixo nível socioeconômico. *Revista de Saúde Pública*, 45(2), 302-310.
- Gomes, G.A.O., Reis, R.S., Parra, D.C., Ribeiro, I., Hino, A.A.F., Hallal, P.C., Malta, D.C., & Brownson, R.C. (2011). Walking for leisure among adults from three Brazilian cities and its association with perceived environment attributes and personal factors. *International Journal of Behavioral Nutrition and Physical Activity*, 8(1), 111-118.
- Gordon-Larsen, P., Boone-Heinonen, J., Sidney, S., Sternfeld, B., Jacobs, D. R., & Lewis, C.E. (2009). Active commuting and cardiovascular disease risk: the CARDIA study. *Archives of Internal Medicine*, 169(13), 1216-1223.
- Hallal, P.C., Azevedo, M.R., Reichert, F.F., Siqueira, F.V., Araújo, C.L., & Victora, C.G. (2005). Who, when, and how much? Epidemiology of walking in a middle-income country. *American Journal of Preventive Medicine*, 28(2), 156-161.
- Hallal, P.C., Dumith, S.C., Bastos, J.P., Reichert, F.F., Siqueira, F.V., Azevedo, M.R. (2007). Evolução da pesquisa epidemiológica em atividade física no Brasil: uma revisão sistemática. *Revista de Saúde Pública*, 41(3): 453-460.
- Handy, S. (2005). Critical assessment of the literature on the relationships among transportation, land use, and physical activity [Working paper Resource paper for TRB Special Report 282: 87]. *Transportation Research Board and Institute of Medicine Committee on Physical Activity, Health, Transportation, and Land Use*. Washington, USA.
- Humpel, N., Owen, N., Iverson, D., Leslie, E., & Bauman, A. (2004). Perceived environment attributes, residential location, and walking for particular purposes. *American Journal of Preventive Medicine*, 26(2), 119-125.
- Instituto Brasileiro de Opinião e Estatística – IBGE (2011). *Retratos da sociedade Brasileira: locomoção urbana*. Brasília: Confederação Nacional da Indústria (CNI).
- Janssen, E., Sugiyama, T., Winkler, E., de Vries, H., te Poel, F., & Owen, N. (2010). Psychosocial correlates of leisure-time walking among Australian adults of lower and higher socio-economic status. *Health Education Research*, 25(2), 316-324.
- Kruger, J., Ham, S.A., Berrigan, D., & Ballard-Barbash, R. (2008). Prevalence of transportation and leisure walking among US adults. *American Journal of Preventive Medicine*, 47(3), 329-334.
- Lee, I.M., & Buchner, D.M. (2008). The importance of walking to public health. *Medicine and Science in Sports and Exercise*, 40(7 Suppl), S512-S518.
- Lee, I.M., Sesso, H.D., Oguma, Y., & Paffenbarger, R.S. (2004). The “weekend warrior” and risk of mortality. *American Journal of Epidemiology*, 160(7), 636-641.
- Lee, I.M., Shiroma, E.J., Lobelo, F., Puska, P., Blair, S.N., Katzmarzyk, P.T. (2012). Effect of physical inactivity on major non-communicable diseases worldwide: an analysis of burden of disease and life expectancy. *The Lancet*, 380(9838), 219-229.
- Matson-Koffman, D.M., Brownstein, J.N., Neiner, J.A., & Greaney, M.L. (2005). A site-specific literature review of policy and environmental interventions that promote physical activity and nutrition for cardiovascular health: what works? *American Journal of Health Promotion*, 19(3), 167-193.
- Mutrie, N., Carney, C., Blamey, A., Crawford, F., Aitchison, T., & Whitelaw, A. (2002). “Walk in to Work Out”: a randomised controlled trial of a self help intervention to promote active commuting. *Journal of Epidemiology and Community Health*, 56(6), 407-412.
- Nahas, M. V.; Barros, M. V. G.; Oliveira, E. S. A.; Aguiar, F. S. (2009). *Estilo de vida e hábitos de lazer dos trabalhadores das indústrias brasileiras: relatório geral*. Brasília: Serviço Social da Indústria/ Departamento Nacional, 2009, 163.
- Parra, D.C., Hoehner, C.M., Hallal, P.C., Ribeiro, I.C., Reis, R., Brownson, R.C., Pratt, M., & Simoes, E.J. (2011). Perceived environmental correlates of physical activity for leisure and transportation in Curitiba, Brazil. *American Journal of Preventive Medicine*, 52(3), 234-238.
- Pitanga, F.G., Beck, C.C., Pitanga, C.P.S., Freitas, M.M., & Almeida, L.A.B. (2014). Prevalência e fatores sociodemográficos e ambientais associados à atividade física no tempo livre e no deslocamento em adultos. *Motricidade*, 10(1), 3-13.
- Robroek, S.J., Berg, T.I. van den, Plat, J.F., & Burdorf, A. (2011). The role of obesity and lifestyle behaviours in a productive workforce. *Occupational and Environmental Medicine*, 68(2), 134-139.
- Saelens, B.E., & Handy, S.L. (2008). Built environment correlates of walking: a review. *Medicine and Science in Sports and Exercise*, 40(7 Suppl), S550-S566.
- Tassitano, R.M., Feitosa, W.M.N., & Tenório, M.C.M. (2013). Fatores associados ao deslocamento ativo e indicadores de saúde em trabalhadores da indústria. *Revista Brasileira de Atividade Física & Saúde*, 18(4), 483-484.
- Teixeira, I.P., Nakamura, P.M., & Kokubun, E. (2014). Prática de caminhada no lazer e no deslocamento e associação com fatores socioeconômicos e ambiente percebido em adultos. *Revista Brasileira de Cineantropometria & Desempenho Humano*, 16(3), 345-358.
- Thomaz, P.M.D., Costa, T.H.M., Silva, E.F., & Hallal, P.C. (2010). Fatores associados à atividade física em adultos, Brasília, DF. *Revista de Saúde Pública*, 44(5), 894-900.

Turi, B.C.; Codogno, J.S.; Fernandes, R.A.; Monteiro, H.L (2015). Caminhada e gastos com saúde em adultos usuários do sistema public de saúde brasileiro: estudo transversal retrospectivo. *Ciência e Saúde Coletiva*, 20(11), 3561-1568.

World Health Organization - WHO (2009). *Global health risks: mortality and burden of disease attributable to selected major risks*. Geneva: World Health Organization.

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