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ORIGINAL RESEARCH

Trends in Leisure-Time Physical Activity in a Southern Brazilian City: 2003-2010

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***Background*:** Most of physical activity surveillance data are derived from high-income countries. The aim of the current study was to report time trends in leisure-time physical activity. ***Methods*:** Population-based surveys were conducted in the city of Pelotas, Brazil in 2003 and 2010, including individuals aged 20+ years. Physical activity was assessed using the leisure-time section of the long version of the IPAQ. A cut-off point of 150 min/wk was used in the analyses. Methodologies were virtually identical in both surveys. ***Results*:** In 2003, 26.8% (95% CI 24.3; 29.2) of the participants were classified as active in leisure-time, as compared with 24.4% (95% CI 22.6; 26.2) in 2010. The proportion of subjects reporting 0 minutes per week of walking, moderate- and vigorous-intensity physical activity practice also did not vary between 2003 and 2010. However, the proportion of active adults decreased from 39.9% (95% CI 33.0; 42.7) in 2003 to 29.7% (95% CI 24.9; 34.5) in 2010 among high-income participants. Males were more active than females in both surveys. ***Conclusions*:** Leisure-time physical activity is stable among adults living in the South of Brazil, but high-income participants are becoming less active over time. Scaling up effective and promising physical activity interventions is urgently needed in Brazil.

***Keywords*:** temporal trends, adults, South America, surveillance, motor activity

Surveillance of physical activity has progressed substantially in recent years.[1] While until the mid 90's, no standardized instruments were available for international use, comparable data on physical activity levels of adults from 122 countries were compiled in 2012.[1] In spite of this progress, some gaps are still observed. First, availability of data on time trends of physical activity is limited, particularly in low and middle-income countries. Second, studies using short surveillance questionnaires, such as the Short Version of the International Physical Activity Questionnaire (IPAQ) make it impossible to compare the trends of physical activity in different domains, because the short IPAQ does not discriminate activities practiced in different life domains (ie, leisure-time, transportation, occupation and homework). This is particularly relevant because current evidence suggests that while occupational physical activity tends to be declining, leisure-time physical activity appears to be increasing, at least in high-income countries.[1,2] Finally, data gaps are not randomly distributed; lack of data are more frequent in low and middle income countries.

Particularly in Brazil, a rapid economic growth was observed in recent years. Implications of this growth on physical activity levels are still unknown. The Brazilian phone surveillance system is a relevant strategy to evaluate national trends in physical activity in different domains. The most recent publication using data from 2006 to 2009 reported an increase in transport-related physical activity and a decrease (only among women) in household physical activity. However, no major changes in occupational and leisure physical activity levels were observed in this period, a finding that might be explained by the short interval between the first and last surveys.[3]

Pelotas, a city in the South of Brazil, has been home for several studies addressing physical activity in the last decades; previous studies indicate that over 50% of the adults in the city do not reach 150 minutes per week of physical activity when all domains are considered. This proportion is around 80% when only leisure-time activities are considered.[4–6] In terms of physical activity trends, a survey revealed an increase in the prevalence of physical inactivity in all domains from 2002 to 2007, but no data on time trends for specific domains are available.[6] In this paper we report time trends in leisure-time physical activity in the Southern city of Pelotas, Brazil, by comparing population-based surveys conducted in 2003 and 2010, using comparable methodologies.

Methods

Population-based cross-sectional studies were conducted in the city of Pelotas, in the South of Brazil, in 2003 and 2010. Pelotas is a medium-sized city (~320,000 inhabitants) near the border with Uruguay. The city is less developed than the average of the South region of the country, but more developed than the average of the North, Northeast and Midwest regions (according Brazilian Institute of Geography and Statistics—IBGE). In both surveys, self-reported physical activity was assessed with a 7-day recall using the leisure-time section of the long version of the IPAQ. The 2 surveys were conducted in the summer to minimize the role of seasonality. Further methodological details and summary results of each survey are available elsewhere.[4,7]

Sampling strategies were virtually identical in the 2 surveys. Cities in Brazil are divided into census tracts, delimited areas comprising approximately 300 households each. In each survey, the 404 census tracts of the city of Pelotas were sorted by mean family income of the household heads (IBGE). In the 2003 survey,

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144 tracts were sampled, and in the 2010 survey, 130 tracts were sampled. In each sampled tract, households were listed and systematically sampled. In each sampled household, all residents aged 20 years or more were eligible for the survey.

In all analyses, we considered to be physically active in leisure-time individuals achieving 150 minutes per week in the physical activity score which was built by adding up the weekly time spent walking + the weekly time spent on moderate-intensity physical activity + twice the weekly time spent on vigorous-intensity physical activity.[8] In addition, physical inactivity was defined as the proportion of subjects reporting 0 minutes per week of walking, moderate- and vigorous-intensity physical activity practice. We used the following covariates in our analyses: sex, age, and socioeconomic position. We administered a standardized socioeconomic questionnaire, including questions on household assets, the presence of maid and education level, and classified families into 5 categories: from A (wealthiest) to E (poorest).[9]

Data were collected by means of face-to-face interviews in the subjects' households. In both surveys, interviewers were trained for 40 hours in the administration and codification of the questionnaire, and a field supervisor repeated 10% of the interviews to check the quality of the information collected.

Statistical analyses were conducted using Stata 11.2. We initially compared the 2 samples in terms of sociodemographic characteristics. We then calculated the prevalence of physical inactivity in each subgroup of covariates. To compare the prevalence of leisure-time physical activity in 2003 and 2010, we used the chi-squared test. In both surveys, Poisson regression models were employed to evaluate the association between leisure-time physical activity and its correlates. All analyses took the clustering of the samples into account by using the *survey* (svy) group of commands in Stata.

The Federal University of Pelotas Medical School Ethics Committee approved both surveys and subjects provided written informed consent before the interview.

Results

Table 1 describes the sociodemographic characteristics of the 2 samples and the changes in the structure of the population over the 6-year period. The 2003 and 2010 surveys were conducted with 3100 (3.5% response-rate) and 2732 (10.7% response rate) participants, respectively. We highlight the increase in the proportion of individuals aged 30 to 39 years. We also found an increase in the proportion of families classified in the intermediate socioeconomic strata with a consequent decrease in the proportion of families in the extreme socioeconomic groups.

In 2003, 26.8% (95% CI 24.3; 29.2) of the participants were classified as active in leisure-time, as compared with 24.4% (95% CI 22.6; 26.2) in 2010. The difference was not statistically significant ($P = .13$). In addition, the proportion of subjects reporting 0 minutes per week of walking, moderate- and vigorous-intensity physical activity practice (physical inactivity) also did not vary significantly between 2003 and 2010 (Figure 1).

Although the prevalence of leisure-time physical activity practice remained unaltered in 2010 as compared with 2003, different trends were observed according to socioeconomic position. The proportion of active adults from groups A and B (wealthier groups) decreased from 39.9% (95% CI 33.0; 42.7) in 2003% to 29.7% (95% CI 24.9; 34.5) in 2010. In the remaining economic groups, no significant differences were observed when comparing 2003 and 2010 (Table 2).

Further analyses showed that physical activity was significantly associated with sociodemographic indicators both in 2003 and 2010 (Table 3). After adjustment for confounding, males, younger adults and wealthier subjects were more likely to be active in 2003. In 2010, the associations with sex and socioeconomic position were similar as those observed in 2003, but the association between leisure-time physical activity and age was no longer significant.

Table 1 Sample Description According to the Year of the Survey; Pelotas, RS—2012

Indicators	2003	2010
Number of eligible people	3214	3059
Number of respondents	3100	2732
Nonresponse rate	3.5%	10.7%
Male % (95% CI)	43.4 (42.2–44.6)	42.1 (40.7–43.6)
Age % (95% CI)		
20–29	24.5 (22.8–26.2)	21.8 (20.0–23.5)
30–39	20.8 (18.9–22.7)	16.9 (15.3–18.5)
40–49	21.9 (20.2–23.7)	20.0 (18.2–21.7)
50–59	15.9 (14.5–17.3)	18.1 (16.9–19.3)
60 or older	16.9 (15.1–18.6)	23.2 (21.2–25.3)
Social economic class % ($CI_{95\%}$)[a]		
A	4.8 (3.2–6.5)	1.1 (0.3–1.9)
B	20.3 (16.8–23.8)	16.4 (13.1–19.7)
C	33.0 (30.1–35.9)	48.4 (45.5–51.3)
D	35.4 (31.6–39.2)	28.3 (25.2–31.3)
E	6.5 (4.7–8.2)	5.9 (4.5–7.3)

[a] Based on household assets, the presence of maids and education level [from A (wealthiest) to E (poorest)].

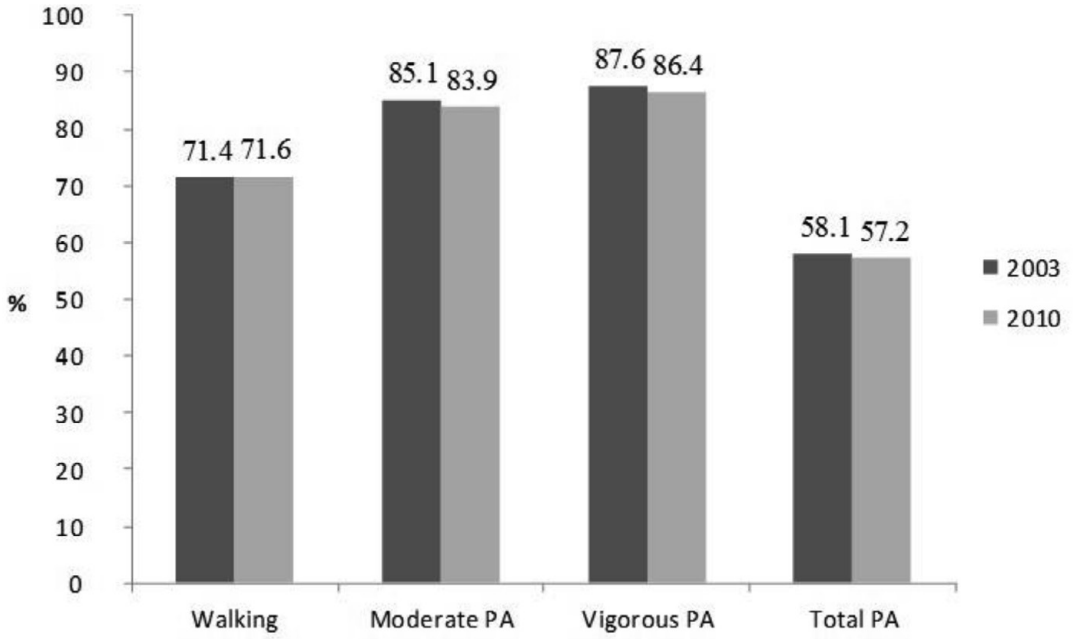

Figure 1 — Trends of physical inactivity. Proportion of individuals with a 0 minute score of leisure-time physical activity.

Table 2 Comparison Between Prevalence of Leisure-Time Physical Activity According to Demographic Variables in the 2003 and 2010 Surveys; Pelotas, RS—2012

	2003 survey		2010 survey		
Variables	**% (95% CI)**	***P*-value**	**% (95% CI)**	***P*-value**	**Temporal *P*-value**
Gender		<0.001		<0.001	
Male	33.0 (29.8–36.1)		31.8 (28.9–34.8)		0.61
Female	22.0 (19.3–24.7)		19.0 (17.0–21.0)		0.08
Socioeconomic class[a]		<0.001		0.02	
A/B	39. 9 (33.0–42.7)		29.7 (24.9–34.5)		0.02
C	24.6 (21.3–28.0)		24.1 (21.7–26. 6)		0.82
D/E	21.5 (19.0–24.0)		22.0 (18.9–25.2)		0.78
Age		<0.001		0.03 (0.01**)	
20–29	35.2 (31.0–39.3)		29.0 (24.4–33.5)		0.05
30–39	24.2 (20.4–28.0)		25.0 (20.5–29.5)		0.79
40–49	23.1 (19.8–26.4)		23.0 (19.1–26.9)		0.96
50–59	26.0 (21.5–30.5)		25.2 (21.1–29.3)		0.79
60 or older	23.3 (18.8–27.8)		20.1 (16.8–23.5)		0.26

Note. χ^2 for heterogeneity.

** Linear trends.

[a] Based on household assets, the presence of maids and education level [from A (wealthiest) to E (poorest)].

Discussion

In Brazil, until some years ago, no publications on time trends of physical activity were available. With the establishment of a national phone surveillance system,[10] we are now able to learn about trends in physical activity practice in the whole country. Available data suggest that there were only minor changes from 2006 to 2009, probably due to the short interval between the first and last surveys.[3] Here we report on time trends in leisure-time physical activity practice over a 6-year period using a standardized international questionnaire. Some years ago, it was reported a dramatic decrease in all-domains (ie, leisure-time, occupational, housework and transport-related) physical activity levels of adults from 2002 to 2007 in the same city of the current study.[6] As the short IPAQ was

Table 3 Comparison of the Adjusted Analysis Between Sociodemographic Variables and Leisure-Time Physical Activity in 2003 and 2010 Surveys; Pelotas, RS—2012

	2003 survey		2010 survey	
	PR (95% CI)	*P*-value	PR (95% CI)	*P*-value
Gender		<0.001		<0.001
Male	1.0		1.00	
Female	0.68 (0.61–0.77)		0.60 (0.52–0.68)	
Socioeconomic class[a]		<0.001		0.03
A/B	1.00		1.00	
C	0.65 (055–0.78)		0.80 (0.66–0.96)	
D/E	0.56 (0.48–0.66)		0.75 (0.60–0.93)	
Age		<0.001		0.05
20–29	1.00		1.00	
30–39	0.69 (0.58–0.83)		0.86 (0.70–1.07)	
40–49	0.64 (0.55–0.76)		0.79 (0.62–0.99)	
50–59	0.72 (0.60–0.85)		0.87 (0.69–1.10)	
60 or older	0.68 (0.55–0.83)		0.72 (0.57–0.90)	

Wald test for heterogeneity.

[a] Based on household assets, the presence of maids and education level [from A (wealthiest) to E (poorest)].

used in that occasion, we were unable to establish which domains were responsible for the changes reported. By evaluating 2 surveys using very similar methodology, we were now able to report time trends in leisure-time physical activity. In summary, similarly to the patterns reported in the national surveillance system,[3] no changes in the prevalence of leisure-time physical activity were observed. Therefore, we are now confident to say that the declines reported in our previous publication, with population-based samples from the same city, were due to decrease in physical activity in other domains, and not leisure time.

On the other hand, the stagnation of leisure-time physical activity prevalence may be due to factors such as safety concerns and limited access to public facilities and locations, like cycle paths and walking trails, as well as open green areas with good quality and adequate to sports and physical activity practice.[11]

The only study showing increases in physical activity practice over time in Brazil was conducted in the state of São Paulo, using data from 2002 and 2008,[12] but findings from this publication are not comparable to ours for 2 main reasons: (a) time trends in the São Paulo study might have been affected by the existence of a physical activity intervention in the state; and (b) the São Paulo study used the short IPAQ, therefore not reporting data on leisure-time physical activity alone.

Time trends in physical activity might also vary in different population groups and geographical locations. In Canada, 2 studies presented leisure-time physical activity temporal trends since 1973 and showed increases in physical activity levels.[13,14] In the United States, the Centers for Disease Control and Prevention (CDC) showed a modest increase in the prevalence of physical activity from 18% to 20% between 1998 and 2004.[15] On the other hand, data from other places showed either stabilization or reductions in leisure-time physical activity practice over time.[16–18]

Evaluating trends in leisure-time physical activity is particularly relevant because participation in leisure-time physical activity reflects the voluntary decision to exercise as part of daily life, differently from physical activity practice in other domains, which is often compulsory instead of a personal choice. Improvements on the knowledge about the benefits of physical activity based on simplified messages such as "doing physical activity is good for your health" are probably not enough to induce changes in the behavior of the population, particularly in low and middle income settings. Promising interventions are reported in a systematic review from the Guide for Useful Interventions for Activity in Brazil and Latin America (GUIA Project).[19] Scaling up such interventions is essential, particularly the ones that tackle the issues of equity and lack of access to physical activity practice.

Some local characteristics need to be discussed to understand our findings. Physical activity promotion needs to be linked to policies and sociocultural demands of the population. Unfortunately, physical activity is not included in the primary health care system in Pelotas, and access to public facilities for physical activity practice is extremely limited. The public health structure of the city has been almost the same for the last few years. The Gross National Product is mainly on services and commerce, followed by industry and agriculture. The amount of cars and motorcycles increased by 34% and 63%, respectively, between 2005 and 2010.[20] With the absence of public policies toward physical activity promotion, the access to leisure practices is probably stable in private institutions such as clubs or gyms. Our findings therefore suggest that no improvements in leisure-time physical activity will likely happen if no public health action is triggered.

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