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Clustering of physical inactivity in leisure, work, commuting and household domains among Brazilian adults

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ABSTRACT

Objectives: To identify the clustering of physical inactivity in leisure, work, commuting and household contexts, and the sociodemographic factors associated with the clustering of inactive behaviour in different domains among Brazilian adults.
Study design: Cross-sectional population-based study.
Methods: The study was performed in Florianopolis, capital of Santa Catarina, one of the southern states of Brazil, from September 2009 to January 2010. Adults aged 20–59 years were interviewed. Physical inactivity in each domain was defined as non-participation in specific physical activities, using a validated Brazilian questionnaire. Clustering of physical inactivity was identified by the ratio between observed prevalence and expected prevalence of 16 different combinations. Multinomial logistic regression was used in the analysis of sociodemographic factors associated with clustering of physical inactivity.
Results: Of the 1720 interviewees, the greatest differences between the observed and expected proportions were observed in simultaneous physical inactivity in the leisure and household domains for men, and physical inactivity in the leisure domain alone for women (59% and 88%, respectively); these differences were higher than expected if the behaviours were independent. Physical inactivity in two or more domains was observed more frequently in men and in individuals with a higher per-capita family income. Ageing was associated with physical inactivity in three or four domains.
Conclusions: Physical inactivity was observed in different domains according to gender. Men and older individuals with a higher per-capita family income were more likely to exhibit physical inactivity when all domains were considered together.

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Introduction

Total physical activity has decreased significantly among adult populations of both developed[1] and middle-income[2] countries. This observation has strengthened the possibility of a fourth epidemiological model: together with epidemiologic, demographic and nutritional transitions is emerging a transition in physical activity.[3] Worldwide, it is estimated that physical inactivity is responsible for 6% of cases of coronary artery disease, 7% of cases of type 2 diabetes, and 10% of cases of breast and colon cancer.[4]

Adults can benefit from a physically active lifestyle in four different domains: during leisure; during work; during commuting and when performing household chores. Physical activity in different domains was highlighted in recent recommendations proposed by international agencies[5,6] as a way to achieve satisfactory levels of physical activity. Individuals who are active in different domains have a lower risk of all-cause mortality, cardiovascular disease and cancer compared with inactive individuals.[7,8]

Evidence[9–11] exists for clustering of physical activity (or inactivity) in different domains. Consequently, encouraging physical activity in different domains can be an effective way to promote health. However, studies on the clustering of physical activity in different domains have mainly been undertaken in developed countries, and have focused on the relationship between physical activity during leisure and in the other domains.[9,11–13] This focus is due (among other reasons) to the higher intensity of physical activity in the leisure domain. However, Levine[14] highlighted that energy expended in everything we do, excluding sleeping, eating or sports-like exercise, is important for health. Furthermore, in the dose–response curve between physical activity and health benefits, outcomes such as reduction in morbidity and mortality indicators from all causes are achieved effectively by light to moderate physical activity.[15,16]

The objective of this study was to identify the clustering of physical inactivity in the leisure, work, commuting and household domains, and the sociodemographic factors associated with the clustering of inactive behaviour in different domains in adults living in Florianópolis, the capital of one of the states of Brazil.

Methods

This was a cross-sectional population-based study. The data were derived from 'EpiFloripa', which investigated health and quality-of-life indicators in a representative sample of adults from Florianópolis, the capital of Santa Catarina state in Brazil. The municipality consists of mainland and island areas, and has the fourth highest human development index in Brazil.[17]

The sample size was calculated to estimate the prevalence of several physical activity outcomes, using the following parameters: unknown prevalence (50%); 95% confidence level; a sample error of 3.5% points; a design effect of 2 due to the cluster sample design; and the addition of 10% to compensate for refusals. An oversample of 15% was included to control for confounding in the adjusted analysis. After rounding, the final sample size was 2016 adults.

Sampling was performed in two phases. First, the census sectors were selected in the urban area of Florianópolis. Census sectors are territorial units defined by the Brazilian Institute of Geography and Statistics, representing an average of 300 households. The 420 urban census sectors were listed in ascending order of average income of the head of the household. This procedure was adopted because people with different socio-economic conditions can live in the same census tract. Sixty of the census sectors were selected at random, and the number of households in each of the selected sectors was updated. This process was useful to assess changes in the number of households, as the most recent data were published in 2000.[18] After the occupied domiciles were listed, 18 were selected systematically in each census sector, aiming to reach the predicted sample size. For this, the total number of households in each sector was divided by 18. A number between one and the value obtained by dividing was selected, and the remaining 17 households were selected by systematic jumps. All residents of the selected households aged 20–59 years were included, except those who were institutionalized or incapable of responding autonomously to the questionnaire at the time of the interview.

Data were collected from September 2009 to January 2010 by 36 trained interviewers. A Personal Digital Assistant model Mio P550b, by Mio Technology Corporation (United States) was used to capture data from face-to-face interviews. A short version of the same questionnaire was applied to 15% of the participants via telephone one week after the interviews for quality control. Reliability was tested using reported physical activity during leisure time (kappa coefficient = 0.7).

Physical inactivity in the different domains (leisure, commuting, work and household) was assessed using the physical activity section of the questionnaire of the Surveillance System of Protective and Risk Factors for Chronic Diseases by Telephone Survey, used in Brazil since 2006 and known to have satisfactory reliability and validity.[19] Physical inactivity in the leisure domain was defined as a negative answer to the question: 'Do you exercise or do sports at least once a week?' Physical inactivity in the commuting domain was defined as a negative answer to the questions: 'Do you walk or ride a bike to go or come back from work?' and 'Do you walk or ride a bike to go or come back from school or educational activity?' Individuals that did not work or go to school or educational activities were considered to be physically inactive in the commuting domain. Physical inactivity in the work domain was defined as a negative answer to the questions: 'Do you walk a lot at work?' and 'Do you carry any weight or do physically demanding tasks at work?' Individuals who did not work were considered to be physically inactive in the work domain. Finally, physical inactivity in the household domain was defined by the answer 'another person' to the question: 'Most of the house work is done by you, another person or both?'

The sociodemographic indicators evaluated were: gender; age (20–29, 30–39, 40–49 or 50–59 years); marital status (with or without a partner); educational level (0–4, 5–8, 9–11 or ≥12 complete years of study) and per-capita family income (quartile).

Data analysis was performed using Stata Version 11.0 (Stata Corp., College Station, TX, USA). The sample was

considered complex by employment of the 'svy' command. The sample weights of the research were allocated considering the inverse of the probability of a household being drawn in the census sector to which it belonged. The descriptive statistics included prevalence estimates and 95% confidence intervals (95% CI).

In the research on the clustering of physical activity in different domains, 16 possible combinations were created from physical activity status (active or inactive) in each domain (leisure, commuting, work and household), and examined in terms of observed prevalence, expected prevalence and the relationship between observed and expected prevalence. Expected prevalence was calculated by multiplying the individual probabilities of observed prevalence in each domain in the population researched. For example, the expected prevalence (E) of individuals who were physically inactive in the leisure (L), commuting (C), work (W) and household domains was: $E = C \times L \times W \times H$.

In the analysis of aggregation of physically inactive behaviours, each domain was investigated separately as exposure to the other three domains with status of physical inactivity as outcome, by means of binary logistic regression in unadjusted and adjusted analyses.

Finally, the sociodemographic factors associated with physical inactivity in the multiple domains were investigated. The reference category was physical inactivity in zero or one domain. Multinomial logistic regression was used in the crude and adjusted analyses. The results were not stratified by gender as there were no significant disparities between men and women in the sociodemographic factors associated with the sum of inactive behaviour in the different domains.

In the analysis model, the demographic variables (gender, age and marital status) were included initially, followed by the social variables (education and per-capita family income). In the statistical model, a stepwise selection strategy and a critical level of $P \leq 0.20$ for permanence in the model were adopted in order to control confusion. The effect of each sociodemographic indicator on the outcomes was adjusted to the other variables of the same or higher level. Results are expressed as odds ratios (OR) and 95% CI.

The research was approved by the Ethics Committee for Research on Human Beings of the Federal University of Santa Catarina, Brazil.

Results

In total, 761 men and 959 women from the 2016 eligible adults responded to the interview, representing 85.5% of the sample. Table 1 shows the sociodemographic characteristics of the

Table 1 – Sociodemographic characteristics and physical activity in different domains for adults in Florianópolis, Brazil, 2010.

Variable	Male ($n = 761$)		Female ($n = 959$)		P
	n	%[a]	n	%[a]	
Age (years)					0.13
≤29	260	35.5	280	31.8	
30–39	172	23.1	220	23.6	
40–49	181	23.9	257	26.3	
≥50	148	17.5	202	18.3	
Marital status					0.77
With a partner	302	39.8	375	40.6	
Without a partner	459	60.2	584	59.4	
Educational level (years)					0.54
≤4	71	8.2	90	7.8	
5–8	108	13.4	145	13.8	
9–11	263	34.8	305	32.9	
≥12	318	43.6	419	45.5	
Per-capita family income (quartile)					0.002
1° (poorest)	203	26.7	305	30.9	
2°	152	18.6	183	19.4	
3°	193	27.2	228	25.0	
4° (wealthiest)	197	27.5	224	24.7	
Physical inactivity in different domains					
Leisure	354	45.5	558	58.1	<0.001
Commuting	395	56.9	343	44.5	<0.001
Work	523	81.0	546	80.9	0.95
Household	600	79.0	380	40.4	<0.001
Number of physical inactivity domains[b]					<0.001
0	8	1.1	23	3.4	
1	69	11.1	141	19.3	
2	180	28.1	254	37.4	
3	271	41.3	204	29.6	
4	120	18.4	68	10.3	

a Percentage in the weighted sample.
b Variable with more information ignored for men ($n = 113$) and women ($n = 269$).

Table 2 – Clustering of physical activity in different domains in adults by gender, Florianópolis, Brazil, 2010.

Number of domains with physical inactivity	Presence of physical inactivity in domains				Male ($n = 648$)				Female ($n = 690$)			
	Leisure	Commuting	Work	Household	*n*	%Observed	%Expected	O/E (95% CI)	*n*	%Observed	%Expected	O/E (95% CI)
0	–	–	–	–	8	1.1	0.9	1.17 (0.46–2.37)	23	3.4	2.7	1.28 (0.80–1.89)
1	+	–	–	–	6	0.9	0.8	1.15 (0.43–2.57)	55	6.9	3.7	1.88 (1.40–2.51)
	–	+	–	–	4	0.7	1.2	0.56 (0.20–1.45)	11	1.2	2.1	0.56 (0.24–1.07)
	–	–	+	–	32	5.5	4.0	1.38 (0.97–1.93)	70	10.3	11.2	0.93 (0.73–1.17)
	–	–	–	+	27	4.0	3.5	1.13 (0.74–1.67)	5	0.8	1.8	0.44 (0.18–1.05)
2	+	+	–	–	4	0.6	1.0	0.58 (0.16–1.53)	19	2.6	3.0	0.88 (0.52–1.40)
	+	–	+	–	15	2.4	3.3	0.72 (0.42–1.20)	115	17.3	15.5	1.12 (0.92–1.33)
	+	–	–	+	31	4.7	3.0	1.59 (1.06–2.24)	15	2.0	2.5	0.80 (0.44–1.36)
	–	+	+	–	27	4.1	5.3	0.78 (0.52–1.15)	52	7.4	9.0	0.82 (0.61–1.08)
	–	+	–	+	18	2.6	4.7	0.56 (0.33–0.90)	6	0.8	1.4	0.55 (0.22–1.31)
	–	–	+	+	85	13.7	15.0	0.91 (0.73–1.13)	47	7.3	7.6	0.96 (0.71–1.26)
3	+	+	+	–	29	4.5	4.4	1.02 (0.68–1.46)	68	9.4	12.5	0.75 (0.58–0.96)
	+	+	–	+	31	4.3	3.9	1.10 (0.74–1.60)	10	1.3	2.0	0.65 (0.30–1.24)
	+	–	+	+	69	10.3	12.6	0.82 (0.64–1.05)	53	7.8	10.5	0.74 (0.56–0.97)
	–	+	+	+	142	22.2	19.8	1.12 (0.95–1.32)	73	11.3	6.1	1.85 (1.46–2.31)
4	+	+	+	+	120	18.4	16.6	1.11 (0.92–1.33)	68	10.2	8.5	1.21 (0.93–1.51)

+, Presence of unhealthy behaviour; –, absence of unhealthy behaviour; O/E, %observed/%expected; CI, confidence interval.

Table 3 – Physical inactivity in one domain associated with the clustering of physical inactivity in the other domains by gender, Florianópolis, Brazil, 2010.

Physical activity in domains	Males ($n = 648$)					Females ($n = 690$)				
	%Clustering of physical activity in other domains	OR (95%CI)	P	OR (95% CI)	P	%Clustering of physical activity in other domains	OR (95% CI)	P	OR (95% CI)	P
Leisure active	41.2	1.00	0.78	1.00	0.90	26.5	1.00	0.02	1.00	0.42
Leisure inactive	39.9	0.97 (0.78–1.21)		0.99 (0.80–1.22)		17.9	0.67 (0.49–0.92)		1.13 (0.84–1.52)	
Commuting active	24.2	1.00	0.10	1.00	0.10	13.6	1.00	0.003	1.00	0.004
Commuting inactive	32.0	1.32 (0.95–1.85)		1.33 (0.94–1.86)		23.1	1.70 (1.21–2.38)		1.64 (1.18–2.29)	
Work active	22.7	1.00	0.99	1.00	0.25	7.0	1.00	0.11	1.00	0.20
Work inactive	22.6	1.00 (0.68–1.46)		1.26 (0.85–1.87)		12.7	1.81 (0.87–3.78)		1.62 (0.76–3.43)	
Household active	22.6	1.00	0.94	1.00	0.52	16.0	1.00	0.006	1.00	0.004
Household inactive	23.0	1.01 (0.70–1.48)		0.89 (0.61–1.28)		24.9	1.55 (1.14–2.12)		1.60 (1.17–2.17)	

OR, odds ratio; CI, confidence interval.
Adjusted analysis for age and marital status (first level), and education and per-capita family income (second level).

sample, and the prevalence of physical inactivity in each domain. Physical inactivity at work was the most common risk behaviour in both genders, and the difference was not significant. Among women, the second highest prevalence of physical inactivity was found in the leisure domain (58.1%), whereas the second highest prevalence of physical inactivity in men was found in the household domain (79.0%). Physical inactivity in three and four domains was more common in men (41.3% and 18.4% of men vs 29.6% and 10.3% of women, respectively).

Table 2 shows the prevalence of 16 different combinations related to physical activity in the leisure, commuting, work and household domains. The most common combination in men was simultaneous physical inactivity in the commuting, work and household domains, and the most common combination in women was simultaneous physical inactivity in the leisure and work domains. Only 1.1% of men and 3.4% of women reported physical activity in all four domains.

Among men, the prevalence of physical inactivity in both the leisure and household domains was 59% higher than expected if these behaviours were independent (Table 2). For women, the greatest difference between the observed and expected proportions was found for physical inactivity exclusively in the leisure domain ($O/E = 1.88$), indicating that the frequency of physical inactivity exclusively in the leisure domain was 88% higher than would be predicted if the behaviours were independent (Table 2). In addition, in women, physical inactivity simultaneously in the commuting, work and household domains exceeded the expected percentage by 85% based on the individual probabilities of physical inactivity in each domain (Table 2).

Table 3 shows the aggregation of physical inactivity in a specific domain and the other domains presenting physically inactive behaviour. Among men, physical inactivity in any domain proved to be aggregated with physically inactive behaviour in other domains. Among women, the individual behaviour with the highest aggregation power was physical inactivity in the commuting domain. Compared with women who were physically active in the commuting domain, women who were physically inactive in the commuting domain were 1.64 times more likely to be inactive in the other domains. The aggregation power of physical inactivity in the household domain was evident, as women who were physically inactive in this domain were 1.60 times more likely to be inactive in the leisure, commuting and work domains compared with women who were physically active in the household domain.

Table 4 shows the sociodemographic factors associated with physically inactive behaviour in the leisure, commuting, work and household domains. Compared with subjects who were physically active in all four domains or only inactive in a single domain, the presence of physical inactivity in two, three and four domains was found to be progressively higher in men ($OR = 1.41$, $OR = 2.60$ and $OR = 3.31$, respectively). Increased likeliness of physical inactivity in three ($P = 0.04$) and four domains ($P = 0.04$) was associated with increased age; adults aged $\geq$50 years had ORs of physical inactivity in three and four domains of 2.19 and 2.75, respectively. No association was found between inactive behaviours in multiple domains and marital

Table 4 – Sociodemographic factors associated with the number of inactive domains in adults, Florianópolis, Brazil, 2010.

Variable	2 vs 0 or 1				3 vs 0 or 1				4 vs 0 or 1			
	OR (95% CI)	P	OR (95% CI)[a]	P	OR (95% CI)	P	OR (95% CI)[a]	P	OR (95% CI)	P	OR (95% CI)[a]	P
Gender		0.05[b]		0.04[b]		<0.001[b]		<0.001[b]		<0.001[b]		<0.001[b]
Female	1.00		1.00		1.00		1.00		1.00		1.00	
Male	1.40 (1.00–1.95)		1.41 (1.01–1.96)		2.60 (1.90–3.55)		2.60 (1.88–3.60)		3.33 (2.08–5.34)		3.31 (2.06–5.32)	
Age (years)		0.30[c]		0.33[c]		0.02[c]		0.04[c]		0.005[c]		0.04[c]
≤29	1.00		1.00		1.00		1.00		1.00		1.00	
30–39	1.28 (0.78–2.11)		1.32 (0.77–2.27)		1.80 (1.06–3.07)		1.81 (1.03–3.18)		2.17 (1.26–3.74)		2.00 (1.08–3.69)	
40–49	1.38 (0.90–2.11)		1.41 (0.86–2.30)		1.79 (1.08–2.95)		1.75 (1.01–3.01)		1.52 (0.88–2.62)		1.36 (0.73–2.55)	
≥50	1.21 (0.64–2.30)		1.24 (0.63–2.44)		2.22 (1.15–4.26)		2.19 (1.09–4.40)		3.02 (1.58–5.77)		2.75 (1.29–5.85)	
Marital status		0.54[b]		0.87[b]		0.02[b]		0.26[b]		0.004[b]		0.10[b]
Without a partner	1.00		1.00		1.00		1.00		1.00		1.00	
With a partner	1.11 (0.80–1.54)		1.03 (0.71–1.49)		1.49 (1.06–2.11)		1.24 (0.85–1.80)		1.90 (1.24–2.90)		1.53 (0.92–2.54)	
Educational level (years)		0.28[c]		0.91[c]		0.05[c]		0.68[c]		0.95[c]		0.32[c]
≤4	1.00		1.00		1.00		1.00		1.00		1.00	
5–8	0.47 (0.21–1.07)		0.49 (0.21–1.14)		0.57 (0.23–1.42)		0.64 (0.26–1.62)		0.41 (0.15–1.13)		0.45 (0.17–1.23)	
9–11	1.06 (0.54–2.09)		1.03 (0.50–2.13)		0.94 (0.40–2.17)		0.96 (0.40–2.29)		0.68 (0.26–1.75)		0.71 (0.27–1.89)	
≥12	0.90 (0.42–1.91)		0.70 (0.31–1.59)		1.12 (0.49–2.56)		0.88 (0.35–2.29)		0.62 (0.23–1.66)		0.48 (0.17–1.35)	
Per-capita family income (quartile)		0.01[c]		0.04[c]		<0.001[c]		0.001[c]		0.002[c]		0.003[c]
1° (poorest)	1.00		1.00		1.00		1.00		1.00		1.00	
2°	1.15 (0.76–1.75)		1.15 (0.76–1.72)		1.16 (0.70–1.93)		1.10 (0.67–1.81)		1.29 (0.74–2.25)		1.30 (0.74–2.30)	
3°	1.30 (0.81–2.09)		1.30 (0.77–2.19)		1.39 (0.89–2.16)		1.29 (0.81–2.06)		1.34 (0.78–2.31)		1.43 (0.78–2.64)	
4° (wealthiest)	2.41 (1.23–4.72)		2.39 (1.12–5.10)		3.92 (2.06–7.44)		3.51 (1.73–7.15)		3.50 (1.65–7.42)		4.03 (1.74–9.34)	

OR, odds ratio; CI, confidence interval.

a Results of multinomial logistic regression, with socio-economic variables controlled for demographic variables. The physical activity domains assessed were: leisure, commuting, work and household.

b *P*-value resulting from test for heterogeneity.

c *P*-value resulting from the linear trend test.

status or education. The higher the per-capita family income, the greater the likelihood of physical inactivity in two ($P = 0.04$), three ($P = 0.001$) or four domains ($P = 0.003$). This difference was greater when comparing participants with higher or lower incomes in clustering of physical inactivity in the four domains (OR = 4.03, 95% CI 1.74–9.34).

Discussion

This research found that physical activity exclusively in the leisure domain was more common in men than women. This is in agreement with the literature, which has shown that men are more active in this domain than women.[9,13,20,21] Increasing physical activity in the leisure domain and decreasing physical activity in the commuting and work domains was also observed.[22] New technologies have meant that many tasks at work, often performed by men, are now performed using machines, especially in the primary and secondary sectors of the economy. In the commuting domain, the improvement in income distribution has increased vehicle ownership, and vehicles are culturally the responsibility of men in Brazil. In addition, men usually engage in less domestic physical activity compared with women.[23,24] These observations support the findings of this research. However, of the domains evaluated, the leisure domain does not account for the greatest proportion of time invested in physical activity each week in developing countries, regardless of gender.[20,25]

Among women, physical activity in both the commuting and household domains was the most common pattern. Culturally, women are more likely to be engaged in household physical activity,[23,26] such as cleaning and organizing the house. In addition, the greater responsibility allocated to women in child care leads to greater physical activity in the household and commuting (e.g. taking the children to school) domains.

A relationship was found between physical activity in the commuting and work domains in men. Among women, a relationship was found between physical activity in the leisure domain and physical inactivity in the other domains, as well as between physical inactivity in the leisure domain and physical activity in the other domains. Socio-economic indicators such as income and education, as well as gender differences, may be responsible for these findings. Physical activity in the work environment has traditionally been assigned to men. With the significant reduction in physical activity at work in the last decades,[27] the likelihood of this behaviour being identified in men with low professional qualifications is higher. It is plausible that men who are physically active in the work domain are also active in the commuting domain (e.g. using a bicycle or walking to work) because these forms of commuting do not require large financial investments. Physical activity in the leisure domain is not as common among women compared with men,[13,20] and as physical activity in the leisure domain is associated with financial investment, physical activity in the leisure domain leads to increased probability of inactivity in the other domains. This finding is supported by the fact that women with a higher socio-economic status tend to have more skilled jobs which are less physically demanding. In addition, they tend to have their own vehicles and are able to afford housekeepers.

Physical inactivity in the household and (especially) commuting domains increased the likelihood of physical inactivity in the other domains among women. For men, no trend was observed for a specific domain contributing to physical inactivity in the other domains, although physical inactivity in the commuting domain came closest to showing this power of agglomeration. This may be a very promising observation for public health because, as a large part of the population were inactive in all domains, the commuting domain could be the initial target for actions to promote physical activity. Research[28] undertaken in the USA identified that active commuting was associated with greater regularity of walking during leisure time in both genders. Physical activity in the commuting domain can reduce demographic and socio-economic disparities in achieving recommended levels of physical activity.[13]

Clustering of physical inactivity in the domains was more common in older male participants who had higher per-capita family income. Physical activity in men tended to be greater in the leisure and work domains compared with women.[9,23] In recent years, occupational physical activity among men has decreased,[27] and physical activity during leisure time has increased, especially among women.[29] These findings can explain why women have achieved a better balance of physically active behaviours across the different domains. Ageing has contributed to reduced physical activity in all domains, particularly the leisure and work domains.[26] Economic indicators, such as family income[20] and economic level,[23] were directly associated with physical activity in the leisure domain. However, in the other domains, this relationship was reversed and socio-economic disadvantage was associated with physical activity in the commuting, work and household domains.[13,23]

The originality of this study in researching the clustering of physical inactivity in the leisure, commuting, work and household domains made it possible to identify how specific combinations interact differently for each gender. However, this study had limitations, such as the size of the sample, and the fact that the intensity and volume of physical activity were not considered. In addition, in some domains, a limited number of questions were used to assess physical activity status, subject to estimation inaccuracies. Finally, Brazil is a very large country with social inequalities; as such the data from this study cannot be generalized to Brazil as a whole.

Conclusions

Simultaneous physical inactivity in different domains was associated with gender. Older men and those with higher per-capita family income were more likely to be physically inactive in all four domains. Thus, strategies for public health should target specific subgroups in order to reduce physical inactivity in specific domains, considering that the success of public policies depends basically on the desire and participation of the population.

Author statements

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Ethical approval

The research was approved by the Ethics Committee for Research on Human Beings of the Federal University of Santa Catarina, Brazil (Document No. 351/08).

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Competing interests

None declared.

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