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Leisure-time physical inactivity in adults and factors associated

ABSTRACT

OBJECTIVE: To analyze the association between leisure-time physical inactivity and sociodemographic factors and risk or protection factors for chronic noncommunicable diseases among adults.

METHODS: Cross-sectional study comprising adults aged 18 years and older (n = 1,996). Data was obtained from the Surveillance System for Risk Factors for Chronic Noncommunicable Diseases (CNCDs), a random-digit-dialed telephone survey carried out in the city of Florianópolis, southern Brazil, in 2005. There were studied sociodemographic, and behavioral protective and risk factors. Results of the multivariate analysis of the association between leisure-time physical inactivity and independent variables were expressed as prevalence ratios.

RESULTS: The prevalence of leisure-time physical inactivity was 54.6% (47.3% among men, 61.4% among women). After adjustment, among men, higher physical inactivity was positively associated with older age, lower schooling, and inversely associated with working status; and lower physical inactivity was associated with alcohol abuse, regardless of age, schooling, and work status. Among women, higher leisure-time physical inactivity was positively associated with schooling (less than 12 years of education) and working status. The analyses adjusted for schooling and work status showed higher physical inactivity among those women reporting consuming fruits and vegetables less than five times a day and whole milk.

CONCLUSIONS: Factors associated with leisure-time physical inactivity were different among men and women. Among women, physical inactivity was associated to risk factors for chronic diseases, especially eating habits. Among men, physical inactivity was associated to sociodemographic factors.

DESCRIPTORS: Physical Fitness. Leisure Activities. Risk Factors. Socioeconomic Factors. Chronic Disease, prevention & control. Health Surveys.

INTRODUCTION

Studies investigating Brazilian adult population have reported that men as well as younger, better educated people, and those with higher income engage more in leisure-time physical activity.[1,4,11,18] Besides, those individuals that regularly engage in leisure-time physical activity have better self-perception of health compared to sedentary ones.[2] Risk factors for chronic noncommunicable diseases (CNCD), such as smoking and obesity, can be associated with leisure-time physical inactivity.[1,5] However, there are few studies exploring potential associations between leisure-time physical inactivity and indicators of food intake and alcohol use associated to protective or risk factors for chronic diseases among Brazilian adults.

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According to the World Health Organization (WHO),[23] 80% of cases of coronary diseases, 90% of type 2 diabetes, and 30% of cancer could be prevented with changes in eating habits, levels of physical activity and tobacco use. Regular physical activity can reduce the risk of cardiovascular diseases, type 2 diabetes, colon and breast cancer, prevent osteoporosis and help keeping a healthy weight.[23] Studies on the associations between diet and chronic diseases have also verified a protective effect of healthy eating – high consumption of fruits, legumes, green vegetables, and whole cereals –, and a negative impact of high-saturated fat diets on the cardiovascular risk.[23]

Better understanding of the relationships between physical activity and food intake, both constituting protective or risk factors for chronic diseases, can help the development of interventions for improving people's health status.

The objective of the present study was to assess the association between leisure-time physical inactivity among adults and sociodemographic and protective or risk factors for CNCD.

METHODS

A population-based cross-sectional study was carried out including adults aged 18 years or more living in households with fixed phone lines in the city of Florianópolis, southern Brazil. The study was based on data from the Local Monitoring System of Risk Factors for Chronic Noncommunicable Diseases (SIMTEL) Survey – "SIMTEL Five Cities," collected in 2005 in Florianópolis and other four Brazilian capitals (Belém, Goiânia, Salvador, and São Paulo, Northern, West-Center, Northeastern and Southeastern Brazil, respectively). SIMTEL is a system that conducts annual surveys in probabilistic samples of adult population living in households with fixed phone lines. The survey scientific background, objectives, and methods are published elsewhere.[12]

The sampling first step in Florianópolis (SIMTEL/Fpolis) consisted of systematic drawing of 14,000 out of 126,088 phone lines included in the electronic listing of a phone company through a self-weighting sample approach of home lines. The drawing process was stratified by city districts and areas, keeping the same proportion for each stratum in the listing. The 14,000 lines drawn were then redrawn and divided into 40 sets of 350 lines, known as replicates, as they reproduced the same composition of the entire sample. The second step, conducted in parallel to interviews, consisted of drawing a resident younger than 18 years old for each phone number drawn, after listing the names of all adults living in the household contacted.

To obtain a minimum of 2,000 interviews required to estimate the rate of any risk factor in the population studied at 95% confidence interval and maximum error of about two percent points,[12] 15 replicates were used, totaling 5,250 phone lines. All lines were called up to ten times at different days (weekdays, Saturdays, and Sundays) and at different hours (morning, afternoon, and evening) based on the methods developed for this study design.[12] There were considered eligible 3,280 phone lines (62.5%). Non-eligible phone lines were those out-of-service, belonging to businesses or deactivated (n=1,970).

There were considered losses calls that were not answered after ten attempted calls at different days and times; calls made to households where no adult resident was available for consent and drawing; households drawn but no new contact was possible; and calls made to busy lines, fax or voice mail (n=963). A total of 2,013 interviews (809 men and 1,204 women) were conducted between May and December 2005. The final rate of interviews per eligible phone lines was 61.4%; the loss rate was 29.4% and refusal rate was 9.3%. The study interviews lasted on average 7.5 (standard deviation [SD]= 3.3) minutes.

For quality control, all 500 initial interviews and a random sample of 20% of subsequent interviews were reviewed and, as needed, a new call was placed to respondents for checking their answers.

The analyses of the present study included a sample of 1,996 respondents (51.8% of women), and data from pregnant women (n=17) was excluded.

SIMTEL questionnaire consisted of 75 short straightforward questions on demographic and socioeconomic characteristics; eating and physical activity patterns associated to the occurrence of CNCD; frequency of tobacco and alcohol use; and self-perception of health status and past medical diagnosis of arterial hypertension, high cholesterol and triglycerides, diabetes, and osteoporosis.

The outcome variable was leisure-time physical inactivity, defined as non-engagement in physical activity or physical activity reported at a frequency lower than once a week during leisure time (physical exercise or sports).

The indicators selected from SIMTEL questionnaire to explore the association with physical inactivity included sociodemographic variables (age, weight, and height, skin color, schooling, marital status, and employment status), risk (alcohol abuse, smoking, excess weight, consumption of sugar or sugar-free carbonated beverages, whole milk, and fatty meat) and protective factors (consumption of fruits, legumes, and green vegetables) for chronic diseases.

The reported age in full years was grouped into age groups (18–24; 25–34; 35–44; 45–54; or 55 and more). Skin color (from the options white, black, mixed, Asian) was categorized into white or non-white. Schooling was categorized in years of study (zero to four; five to eight; nine to 11; or 12 and more). Marital status was categorized into married, and single, widowed and separated. Paid job was indicated through "yes/no" answers.

Alcohol abuse (yes/no) was obtained based on the reported consumption of five or more doses of any alcoholic drink at least once in the last month prior to the interview, regardless of gender.

Smoking was categorized into smoker (respondents who reported being a smoker at the time of interview); former smoker; or never smoked.

Excess weight was categorized into non-excess weight (body mass index [BMI] <25 kg/m^2), pre-obesity (BMI ≥25 kg/m^2 and <30 kg/m^2), and obesity (BMI ≥30 kg/m^2)[22] based on BMI calculated from weight (kg) divided by the squared height (m). Both weight and height measures were self-reported.

Consumption of carbonated beverages including diet or light was categorized into seldom (never and seldom); one to two times a week; and three and more times a week. Consumption of whole milk (yes/no) was computed by combining answers on the habit of consuming milk and type of milk consumed as for fat content. Consumption of fatty meat (yes/no) was obtained by combining the answers on the habit of consuming fatty red meat and poultry with skin with the visible fat.

The daily frequency of intake of fruits, green vegetables, and legumes was categorized by combining the answers on frequency of intake of fruits, raw salads, green vegetables and cooked legumes into five or more times, three to four, one to two or less than once a day.

Bivariate and multiple regression analyses were performed using Stata program version 9.0. Prevalence ratios (PR) and 95% confidence intervals (95% CI) were estimated through Poisson regression with robust variance and the inclusion of variables following a hierarchical model.[21] In the first level of the model were included sociodemographic variables and in the second level, protective and risk variables for chronic diseases. Indicators included in the hierarchical model were selected based on their relevance for establishing leisure-time physical inactivity in studies carried out in Brazil[1,5,11] and other countries.[3,8-10]

Variables with p<0.20 were included in the model according to the hierarchical level to control for confounders. The factors associated to leisure-time physical inactivity were those with significant tests for heterogeneity or linear trend (p<0.05).

Data were stratified by gender and prevalence estimates were produced for the entire adult population in the city using expansion factors according to the sociodemographic distribution based on the 2000 Population Census.[12]

The study was approved by the Human Research Ethics Committee of *Universidade Federal de Santa Catarina* and *Universidade de São Paulo* School of Public Health. A free informed consent form was replaced by a verbal consent that was properly recorded at the time phone calls were placed.

RESULTS

Table 1 shows sociodemographic characteristics of the population with phone lines studied by SIMTEL in Florianópolis compared to the characteristics of the city's adult population of a random sample of 10% of households surveyed in the 2000 Population Census.[a] Both samples have similar characteristics, although the population studied by SIMTEL in Florianopolis had a higher proportion of women (59.8% in the study

Table1. Estimated distributions of general adult population and adult population with phone lines according to sociodemographic variables. City of Florianópolis. Southern Brazil. 2000-2005.

Variable	General adult population[a]	Adult population with phone lines[b]
	%	%
Gender		
Male	47.4	40.2
Female	52.6	59.8
Age (years)		
18–24	20.8	16.6
25–34	24.2	26.0
35–44	22.4	25.7
45–54	15.8	13.8
55–64	8.8	9.9
65 and +	8.0	7.9
Schooling (years)		
0–4	21.6	10.6
5–8	20.2	15.2
9–11	29.8	33.1
12 and +	28.4	41.1

[a] Sample of adult population drawn from 10% of households of the 2000 Population Census. Instituo Brasileiro de Geografia e Estatística (Brazilian Institute of Geography and Statistics). 2000 Census: Brazil [CD-ROM]. Brasília; 2000.
[b] Sample of adult population with phone lines studied through SIMTEL (n = 2.013) in Florianópolis in 2005.

[a] Brazilian Institute of Geography and Statistics. 2000 Census: Brazil [CD-ROM]. Brasília; 2000.

sample versus 52.6% in the Census), lower proportion of young people aged between 18 and 24 years (16.6% versus 20.8% in the Census), and higher proportion of respondents with schooling equal to or higher than nine years (74.2% versus 58.2%, in the Census).

In the sample studied, mean age was 39.7 years old (SD= 15.0) and mean schooling was 11.2 (SD= 4.4) years.

Similar distributions of sociodemographic variables were seen between men and women at different age and levels of schooling with a predominance of white men and women. A higher proportion of men compared to women reported being married and having a paid job. As for protective or risk factors for chronic diseases, compared to women, a higher rate of men had pre-obesity, and reported alcohol abuse and smoking. On the other hand, compared to men, a higher proportion of women reported consuming fruits, legumes, and green vegetables at a frequency greater than three to four times a day, seldom consuming carbonated beverages, and not consuming whole milk and fatty meat. (Table 2)

Of 1,996 respondents, 1,090 reported leisure-time physical inactivity, and 58.3% of them were women. The prevalence of leisure-time physical inactivity was overall 54.6% (95% CI: 51.8;57.4); 47.3% (95% CI: 42.8;51.7) among men; and 61.4% (95% CI: 58.1;64.7) among women.

Tables 3 and 4 show prevalences and crude and adjusted prevalence ratios for the association between leisure-time physical inactivity and sociodemographic and risk or protective factors for chronic diseases among men and women.

Among men, the bivariate analysis showed an association between leisure-time physical inactivity and older age, lower schooling, being married and employed. As for behavioral risk factors, men who reported smoking and consuming whole milk and fatty meat were more likely to be inactive during their leisure time. On the other hand, alcohol abuse was associated to lower prevalence of leisure-time physical inactivity.

In the adjusted analyses at the first level of the hierarchical model, the associations between higher prevalence of leisure-time physical inactivity and older age, lower schooling, and employment status remained, but the association with the marital status married disappeared. In the adjusted analyses at the second level controlled for age, schooling, and employment status, the association between lower prevalence of leisure-time physical inactivity and alcohol abuse was confirmed but with a reduced magnitude of effect. The adjustments also produced loss of statistical significance of the associations between leisure-time inactivity and consumption of fatty meat and whole milk. In regard

Table 2. Sociodemographic characteristics and protective or risk factors for chronic noncommunicable diseases in adult population by gender. City of Florianópolis, southern Brazil, 2005.

Variable	Male [a] (n=962)		Female[a] (n=1034)	
	%	95% CI	%	95% CI
Age group (years)				
18–24	21.9	17.8;25.9	18.4	15.5;21.3
25–34	24.9	20.9;28.9	23.8	21.0;26.6
35–44	22.3	19.0;25.6	22.8	20.0;25.5
45–54	15.6	12.3;19.0	16.3	13.6;18.9
55 and +	15.3	12.4;18.2	18.8	16.1;21.5
Skin color				
White	64.0	59.4;68.6	68.6	65.3;72.0
Non-white	36.0	31.4;40.6	31.4	28.0;34.7
Schooling (years)				
12 and +	30.4	26.9;33.9	27.0	24.3;29.6
9–11	29.1	25.5;32.7	31.3	28.3;34.2
5–8	20.1	16.3;24.0	20.1	17.1;23.2
0–4	20.3	15.5;25.2	21.6	18.3;25.0
Marital status				
Single, widowed, separated	38.1	33.7;42.4	46.4	43.0;49.9
Married	61.9	57.6;66.3	53.6	50.1;57.0
Employment status				
Yes	78.7	75.3;82.0	57.8	54.4;61.2
No	21.3	18.0;24.7	42.2	38.8;45.6
Nutritional status (BMI)				
Non-excess weight	54.8	50.4;59.2	66.3	62.8;69.8
Pre-obesity	33.7	29.7;37.7	23.3	20.1;26.5
Obesity	11.5	8.7;14.3	10.4	8.1;12.7
Alcohol abuse[b]				
No	67.6	63.2;72.0	91.5	89.6;93.4
Yes	32.4	28.0;36.8	8.5	6.6;10.4
Smoking				
Never smoked	51.2	46.7;55.7	64.0	60.7;67.4
Former smoker	24.2	20.1;28.2	17.3	14.7;19.9
Smoker	24.6	20.7;28.5	18.7	15.9;21.4
Consumption of fruits, legumes, and green vegetables (times/day)				
≥5	18.4	14.7;22.1	24.1	21.2;27.0
3–4	32.6	28.7;36.6	43.6	40.2;47.0
1–2	33.3	29.1;37.5	25.3	22.3;28.2
<1	15.6	12.1;19.2	7.1	5.2;9.0
Consumption of carbonated beverages (times/week)				
Seldom	31.7	27.7;35.7	41.4	38.1;44.8
1–2	28.8	24.5;33.1	34.5	31.1;37.8
≥3	39.5	35.1;43.9	24.1	21.1;27.0

To be continued

Table 2 continuation

Variable	Male [a] (n=962)		Female[a] (n=1034)	
	%	95% CI	%	95% CI
Consumption of whole milk				
No	24.4	20.3;28.4	35.4	31.8;38.9
Yes	75.6	71.6;79.7	64.6	61.1;68.2
Consumption of fatty meat or poultry with skin				
No	48.8	44.0;53.6	72.8	69.3;76.2
Yes	51.2	46.4;56.0	27.2	23.8;30.7

[a] Adjusted for the entire adult population in the city;
[b] Alcohol consumption ≥ 5 doses/day at least once in the last month;

to smoking, the statistical significance in the test for heterogeneity was preserved, but the lower limits of confidence intervals in the categories former smoker and smoker were smaller than the unit. (Table 3)

Among women, in the bivariate analyses with socio-demographic factors, only schooling was associated to leisure-time physical inactivity. The lower the schooling, the more likely respondents were inactive. In these analyses, the selected nutritional protective or risk factors were positively associated to greater likelihood of leisure-time physical inactivity. Alcohol abuse, smoking, and nutritional status did not show any association with leisure-time physical inactivity.

The analyses at the first level of the hierarchical model, adjusted for schooling and employment, potentiated the magnitude of the associations between higher prevalence of leisure-time physical inactivity and less than 12 years of schooling and revealed an inverse association with employment status, which was previously not identified in the bivariate analysis. The adjusted analyses at the second level, controlled for schooling and employment, confirmed the associations between higher prevalence of leisure-time physical inactivity and intake of fruits, legumes, and green vegetables in the categories of frequency less than five times a day, reduced the magnitude of effect of the association between physical inactivity and consumption of whole milk and eliminated the association with consumption of fatty meat, as previously seen in the bivariate analysis. (Table 4)

DISCUSSION

The results of the present study showed the association between leisure-time physical inactivity and risk factors for CNCD among males and females and corroborated the well-known different patterns of leisure-time physical activity (women are less active than men) and risk factors for chronic diseases (overall, women had less major risk factors).

Leisure-time physical activity is only one dimension of physical activity. Public health recommendations stress the importance of cumulative physical activity in the different scenarios of daily life including leisure time (physical exercises and sports), occupational activities, commuting, and home physical activities.[6] However, the measure of leisure-time physical activity has become increasingly relevant as it is an optional, pleasant activity and has more consistent associations with risk factors for cardiovascular diseases when compared to occupational activities.[19]

The present study has some limitations. First, the sample interviewed by SIMTEL only allows inferences for adult population living in households with fixed phone lines, which does not have a universal coverage, and may have low coverage in lower socio-economic areas. Hence, to minimize biases resulting from non-universal phone coverage, post-stratification weighting was applied.[12] Second, the study was based on self-referred information. However, indicators of physical activity and sedentary lifestyle and food and alcohol consumption showed good reproducibility and adequate validity in studies including SIMTEL/São Paulo respondents,[13,14] though these results cannot be extended to Florianópolis or other cities, especially due to regional and cultural differences. Third, the findings of the present study are based on a cross-sectional study, which is an adequate design for assumptions of associations or co-occurrence of behaviors but it does not provide information on how the associated behaviors affect health. The risk factors and outcome were studied at the same time and bias of reverse causality for behavioral factors cannot be eliminated. The study design did not allow to establishing whether, for example, smoking, non-consumption of alcohol, low intake of fruits, legumes, and green vegetables and/or intake of whole milk precede physical inactivity.

As for the positive aspects of the study, it should be noted the sampling procedures and the training of interviewers in conducting standardized interviews with strict quality control.

The prevalence of leisure-time physical inactivity found in the present study (54.6% overall; 47.3% among men; and 61.4% among women) was lower than that reported in SIMTEL/Goiânia (66.5% overall; 53.2% among men; and 67.1% among women).[17]

SIMTEL questionnaire had different questions on physical activity compared to other questionnaires, limiting comparisons with leisure-time physical inactivity rates obtained in other population-based studies in Brazil. Most large studies conducted in Brazil with adult populations used different questionnaires and definitions for leisure-time physical inactivity. In a study investigating lifestyles carried out in northeastern and southeastern Brazil in 1996–1997, including people

Table 3. Crude and adjusted prevalence ratios of the hierarchical model for the association between leisure-time physical inactivity, sociodemographic and protective or risk factors for chronic noncommunicable diseases among males. City of Florianópolis, Southern Brazil, 2005.

Variable			Crude analysis			Adjusted analysis		
	n	LTPI (%)	PR	95% CI	p-value	PR	95% CI	p-value
1st Level[a]								
Age group (years)					0.000			0.000
18-24	210	31.9	1			1		
25-34	240	38.3	1.19	0.81;1.77		1.09	0.72;1.65	
35-44	214	54.2	1.69	1.19;2.41		1.51	1.05;2.17	
45-54	150	56.7	1.77	1.21;2.59		1.55	1.06;2.28	
55 and +	148	63.5	1.99	1.40;2.83		1.90	1.32;2.75	
Skin color					0.723			
White	616	46.6	1					
Non-white	346	48.3	1.04	0.84;1.28				
Schooling (years)					0.000			0.000
12 and +	293	37.5	1			1		
9-11	280	38.2	1.02	0.81;1.27		1.09	0.87;1.36	
5-8	194	51.5	1.37	1.05;1.77		1.48	1.15;1.90	
0-4	196	70.4	1.88	1.45;2.43		1.66	1.30;2.13	
Marital status					0.000			0.538
Single, widowed or separated	367	36.0	1			1		
Married	596	54.2	1.51	1.21;1.88		1.08	0.85;1.35	
Employment status					0.003			0.001
Yes	757	50.7	1			1		
No	206	34.5	0.68	0.52;0.88		0.67	0.51;0.88	
2nd Level[a]								
Nutritional status (BMI)					0.360			
Non-excess weight	506	44.6	1					
Overweight	311	40.5	0.93	0.75;1.15				
Obesity	106	57.5	1.25	0.96;1.61				
Alcohol abuse[b]					0.001			0.020
No	651	53.5	1			1		
Yes	312	34.4	0.64	0.50;0.82		0.72	0.55;0.95	
Smoking					0.002			0.019
Never smoked	493	42.4	1			1		
Former smoker	233	44.6	1.05	0.82;1.36		0.79	0.60;1.05	
Smoker	237	59.9	1.41	1.16;1.73		1.20	0.93;1.55	
Consumption of fruits, legumes, and green vegetables (times/day)					0.064			0.204
≥ 5	177	40.7	1			1		
3 - 4	314	45.5	1.12	0.83;1.53		1.21	0.90;1.62	
1 - 2	321	48.9	1.21	0.89;1.65		1.19	0.89;1.60	
Consumption of carbonated beverages (times/week)					0.468			
Seldom	305	50.8	1					
1-2	277	46.9	0.93	0.73;1.18				
≥3	380	47.2	0.88	0.71;1.08				

To be continued

Table 3 continuation

Variable	n	LTPI (%)	Crude analysis PR	95% CI	p-value	Adjusted analysis PR	95% CI	p-value
2nd Level[a]								
Consumption of whole milk					0.018			0.052
No	176	33.0	1			1		
Yes	546	47.8	1.46	1.07;1.99		1.36	1.00;1.85	
Consumption of fatty meat or poultry with skin					0.002			0.170
Não	555	38.7	1			1		
Sim	316	55.1	1.12	1.12;1.69		1.18	0.93;1.49	

BMI: Body mass index
LTPI: Leisure-time physical inactivity
[a] Adjusted for the entire adult population in the city;
[b] Alcohol abuse ≥ 5 doses/day at least once in the last month

aged 20 or more, 87% reported not engaging in any leisure-time physical activity (defined as 30 minutes or more of physical exercises or sports at least one a week).[11] In the city of Rio de Janeiro, Southeastern Brazil, in 1996, leisure-time physical inactivity rate (not engaging regularly in any physical activity or sports in the month prior to the interview) among men and women aged 12 or more was 59.8% and 77.8%, respectively.[4] In Salvador, in 2000, the prevalence of leisure-time physical inactivity (not engaging in any physical activity during leisure time in a typical week) among men and women aged between 20 and 94 years was 60.4% and 82.7%, respectively.[18] In the city of Pelotas, Southern Brazil, in 2003, the prevalence of leisure-time physical inactivity among men and women aged 20 years or more (evaluated using the International Physical Activity Questionnaire – long version and defined as score = zero minute per week) was 49.8% and 64.4%, respectively.[5]

The associations between leisure-time physical inactivity and sociodemographic factors found in the present study corroborate the findings of other studies conducted in Brazil[1,4,5,11] and in the United States (US):[8] older individuals with lower schooling had higher prevalence of physical inactivity. The association between leisure-time physical inactivity and age among men only was also reported in the city of Pelotas in a study conducted in 2003.[1] In the present study, among both men and women, no association was found between leisure-time physical inactivity and skin color, and pre-obesity and obesity, corroborating the Pelotas study.[5]

An inverse association was found between leisure-time physical inactivity and alcohol consumption with higher prevalence of inactivity (53.5%) among men who reported not abusing alcohol compared to those who reported alcohol abuse (34.4%). This behavior, also reported in other studies with industry workers in the state of Santa Catarina[2] and in the Behavioral Risk Factor System in the US,[15] indicates a lifestyle where protective and risk factors coexist with leisure-time physical activity. This finding can be partially explained by the presence of a residual confounder not measured in the present study and, consequently, not controlled for in the analysis. For example, a Swedish study (The Malmö Diet and Cancer Study) found that individuals with lower leisure-time physical activity reported engaging less in social activities (parties, meetings, collective sports) compared to those with higher physical activity.[7] Further studies are needed to investigate whether those who are physically inactive during leisure time would be less exposed to environments facilitating alcohol consumption. The findings of the Lifestyle Study[11] showed that Brazilian men engage more in group activities (soccer, volleyball, basketball) than women. Among Brazilian men, leisure-time physical activity is related more to pleasure and fun than health concerns.[1,11]

On the other hand, the association between employment and leisure-time physical inactivity, indicating higher prevalence of inactivity among those employed compared to non-employed, can be easily explained by no time for leisure among working individuals, which is often reported as a barrier to physical exercises and sports.

Similar associations between leisure-time physical activity and eating habits were seen in studies conducted in the US[3,9,15] and European countries.[10,16,20] Leisure-time physical activity was associated to higher intake of fruits, fruit juices, legumes, and green vegetables, lower intake of saturated and total fat[3,9,10,15,21] and more healthy eating habits seen during breakfast.[10,16]

The findings of the present study are consistent with data of other population-based studies conducted through phone surveys and household interviews. The prevalence of leisure-time physical inactivity tends to

Table 4. Crude and adjusted prevalence ratios of the hierarchical model for the association between leisure-time physical inactivity, sociodemographic and protective or risk factors for chronic noncommunicable diseases among females. City of Florianópolis, Southern Brazil, 2005.

Variable			Crude analysis			Adjusted analysis		
	n	LTPI (%)	PR	95% CI	p-value	PR	95% CI	p-value
1st Level								
Age group (years)					0.653			
18–24	190	60.0	1					
25–34	246	64.6	1.08	0.91;1.28				
35–44	236	63.6	1.06	0.89;1.27				
45–54	168	54.8	0.91	0.73;1.14				
55 and +	194	62	1.03	0.85;1.25				
Skin color					0.715			
White	709	60.9	1					
Non-white	324	62.3	1.02	0.91;1.16				
Schooling (years)					0.000			0.000
12 and +	279	47.7	1			1		
9–11	324	59.9	1.25	1.09;1.44		1.27	1.11;1.45	
5–8	208	65.4	1.37	1.15;1.62		1.40	1.18;1.66	
0–4	224	76.8	1.60	1.39;1.85		1.70	1.47;1.98	
Marital status					0.423			
Single, widowed, or separated	480	60.0	1					
Married	554	62.6	1.05	0.94;1.16				
Employment status					0.11			0.002
Yes	597	63.8	1			1		
No	437	58.1	0.91	0.82;1.02		0.83	0.75;0.93	
2nd Level								
Nutritional status (BMI)					0.109			0.10
Non-excess weight	617	57.5	1			1		
Overweight	217	60.8	1.06	0.92;1.22		1.09	0.94;1.27	
Obesity	97	67.0	1.16	0.96;1.39		1.18	0.94;1.49	
Alcohol abuse[ba]					0.749			
No	946	61.5	1					
Yes	88	59.8	0.97	0.80;1.17				
Smoking					0.595			
Never smoked	662	60.1	1					
Former smoker	179	63.1	1.05	0.91;1.21				
Smoker	193	63.7	1.06	0.93;1.22				
Consumption of fruits, legumes, and green vegetables (times/day)					0.000			0.002
≥ 5	249	51.0	1			1		
3–4	451	60.5	1.19	1.02;1.39		1.23	1.05;1.45	
1–2	262	67.2	1.32	1.12;1.56		1.34	1.12;1.60	
< 1	73	80.8	1.59	1.27;1.99		1.46	1.04;2.05	
Consumption of carbonated beverages (times/week)					0.055			0.344
Seldom	428	57.5	1			1		
1–2	356	61.8	1.07	0.95;1.22		0.99	0.85;1.16	
≥ 3	249	67.5	1.17	1.03;1.33		1.09	0.93;1.27	

To be continued

Table 4 continuation

Variable	n	LTPI (%)	Crude analysis PR	95% CI	p-value	Adjusted analysis PR	95% CI	p-value
2nd Level								
Consumption of whole milk					0.000			0.000
No	289	45.3	1			1		
Yes	529	70.32	1.55	1.34;1.80		1.37	1.19;1.58	
Consumption of fatty meat or poultry with skin					0.003			0.729
No	629	59.9	1			1		
Yes	235	71.5	1.20	1.06;1.34		1.03	0.88;1.21	

BMI: Body mass index
LTPI: Leisure-time physical inactivity
[a] Adjusted for the entire adult population in the city
[b] Alcohol abuse ≥ 5 doses/day at least once in the last month

be incorporated into risk behaviors for CNCD such as smoking (among men) and less healthy eating habits especially among women. Other factors that were not investigated in the present study, such as healthy food price (e.g., prices of fruits, legumes, and green vegetables), purchase power, and environmental background characteristics, could help interpreting associations between unhealthy eating patterns and leisure-time physical inactivity.

In conclusion, the findings of the present study indicate that, among women, leisure-time physical inactivity is more likely in those with less than 12 years of schooling, those who were employed and those reporting intake of fruits, legumes and green vegetables less than five times a day and intake of whole milk. Among men, leisure-time physical inactivity was more likely to be associated to older age, lower schooling, and employment; inactivity was less likely among those who reported alcohol abuse.

The availability of comprehensive data as well as a surveillance system of health risk factors can help the development of specific actions for promoting more healthy and active lifestyles among adults.

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