Leisure-time physical activity and associated factors among adolescents of Pernambuco, Brazil: From 2006 to 2011

Mudanças na atividade física no lazer e fatores associados em adolescentes de Pernambuco, Brasil: de 2006 a 2011

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Abstract – Leisure-time physical activity (LTPA) has important implications in promoting physical activity among young people. The present study aimed to analyze variations occurred in the 2006-2011 period in LTPA and associated factors among high school boys and girls in the state of Pernambuco, Northeastern Brazil. A cross-sectional school-based and statewide survey was conducted in 2006 (n = 4,207) and 2011 (n = 6,264), and samples of adolescents (14-19 years) were compared. Data were collected through a questionnaire. The practice of LTPA was obtained by the question "Do you perform regularly, some kind of physical activity in your free time?" Poisson regression was used (confidence interval (CI) 95%) in crude and adjusted analyses stratified by gender. From 2006 to 2011, there was stability in the proportion of adolescents practicing LTPA both among boys (77.5% versus 78.9%) and girls (51.2%, versus 54.0%). The weekly frequency of physical education classes was directly associated with LTPA both in girls and boys, regardless of the survey year. Age, marital status, grade and computer use were significantly associated with LTPA, but there were distinctions between genders and surveys. In conclusion, there was a temporal variation between 2006 and 2011, but the reduction or increment in LTPA practice varied according to stratification of subgroups of adolescents. In general, physical education class was a factor that remained associated with LTPA in the investigated period.

Key words: Adolescents; Brazil; Leisure activities; Motor activity; Risk behavior.

Resumo – *A prática de atividades físicas no lazer (AFL) tem importante implicação na promoção da atividade física entre jovens. O presente estudo objetivou analisar variações ocorridas, de 2006 a 2011, na AFL e nos fatores associados em estudantes do ensino médio no estado de Pernambuco, Brasil. Foram comparados os resultados de dois inquéritos transversais de base escolar e abrangência estadual, realizados em 2006 (n= 4.207) e 2011 (n= 6.264), com amostras representativas de adolescentes (14 a 19 anos). Os dados foram coletados por meio de questionário. A prática de AFL foi obtida pela questão "Você realiza, regularmente, algum tipo de atividade física no seu tempo livre?". Empregou-se a regressão de Poisson (IC de 95%) em análises bruta e ajustada estratificadas por sexo. De 2006 para 2011, houve estabilidade na proporção de adolescentes praticantes de AFL, tanto entre os rapazes (de 77,5%; IC95%: 75,5; 79,6 para 78,9%; IC95%: 77,2; 80,6), quanto entre as moças (de 51,2%; IC95%: 48,7; 53,6 para 54,0%; IC95%: 51,8; 56,2). A frequência semanal de aulas de Educação Física esteve diretamente associada à prática de AFL em moças e rapazes, tanto em 2006 quanto em 2011. Idade, estado civil, série de curso e possuir computador estiveram significativamente associados à AFL, mas com distinções entre sexos e inquéritos. Conclui-se que ocorreu variação temporal, entre 2006 e 2011, com redução ou aumento na prevalência de AFL, conforme estratificação dos subgrupos de adolescentes apresentados acima. De um modo geral, o fator aula de Educação Física se manteve associado à AFL no período investigado.

Palavras-chave: Adolescentes; Atividades de Lazer; Atividade motora; Brasil; Conduta de saúde.*

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INTRODUCTION

Regular physical activity provides many benefits to the health of adolescents both in the short and long term. Increased cardiorespiratory fitness and muscle strength, weight control and reduced risk of metabolic diseases, depression symptoms and mortality rates from cardiovascular disease and diabetes are the main benefits[1]. Although many health problems do not manifest at early age[2], current recommendations from the World Health Organization[1] and Center for Disease Control and Prevention[3] emphasize the need for an active lifestyle in all cycles of life, including childhood and adolescence.

In adolescence, leisure-time physical activities appear to be especially important, with positive association with attention span and inversely related to the occurrence of insomnia and depression[4]. However, this concern with the options of activities available and choices of young people in leisure time results from the set of observational studies that showed high percentages of physical inactivity and preference for sedentary leisure activities in this population[5]. In addition, it turns out that girls show higher prevalence of sedentary leisure habits compared to boys[6]. In addition, the stability of physically active behaviors from adolescence to adulthood seems to be dependent on intrinsic and extrinsic factors that are more easily observed in leisure time than in other domains such as domestic tasks and work[7].

Monitoring the practice of leisure-time physical activity (LTPA) occurs more frequently in high-income countries where trends observed in these contexts are different from those in low- and middle-income countries[8] and between[9]. In Brazil, epidemiological surveillance of this behavior is still incipient. For example, the National Survey of Students' Health[10] includes only students from the ninth grade of elementary school of Brazilian state capitals and is not focused on LTPA. However, the assessment of changes and population subgroups most likely to reduce LTPA can contribute to the development of public actions to stimulate PA among young people, especially in leisure time, but there are few studies on time trends of physical activity in young people, specifically addressing the leisure domain[9-11], and if any, are focused on adolescent populations from the Southern and Southeastern regions of Brazil[12].

In 2001 and 2006, the first Brazilian cross-sectional school-based and statewide surveys were conducted in the states of Santa Catarina[13] and Pernambuco[14], respectively, in order to analyze the practice of PA in high school students. In 2011, these surveys were reapplied in their respective target populations, enabling the study of changes in the prevalence and factors associated with health behaviors in these regions. The present study aimed to analyze separately for boys and girls, the temporal variations occurred in five years (2006-2011) in the practice of LTPA and factors associated with these variations in high school students in the state of Pernambuco.

METHODS

Design

This study compared data from two epidemiological, cross-sectional, school-based and statewide surveys called "Projeto Atitude". The first had data collection carried out from April to October 2006 and the second from May to November 2011. Both surveys were conducted in a target population of students (359,897 in 2006 and 367,813 in 2011) from state public schools of Pernambuco in the age group 14-19 years.

This limitation is justified by the need to obtain data for this population in order to support the development of policies for public schools in the state of Pernambuco. In addition, students enrolled in public schools (668 in 2006 and 769 in 20110 represented 80.2% in 2006 and 85.6% in 2011 of the total number of high school students in the state of Pernambuco (448,653 in 2005 and 429,451 in 2010), while the rest were distributed as follows: 13.2% in 2005 and 11.2% in 2010 in private schools, 5.9% in 2005 and 1.3% in 2010 in municipal schools and 0.72% in 2005 and 1.82% in 2010 in federal schools.

All requirements regarding ethical aspects were adopted with the research protocol of survey conducted in 2006 was approved by the Ethics Committee in Research with Human Beings of the "Agamenom Magal-hães" Hospital (Recife, PE) while protocol of survey conducted in 2011 was approved by Ethics Research Committee of the University of Pernambuco (CAAE: 0158.0.097.000-10).

Planning and sample selection

The sample design including the sample size and the strategy adopted to select participants followed similar methodological procedures. However, the parameters used to establish the minimum sample size were different, and in 2006, a larger sample design effect value was adopted (deff = 4.0 in 2006; deff = 2.0 in 2011), while that in the survey conducted in 2011, lower maximum tolerable error was adopted (3% in 2006 and 2% in 2011). These adjustments resulted in minimum sample sizes of 4,217 and 4,770 in 2006 and 2011, respectively. In 2006, the parameters and procedures adopted for sample designing are described in previous publications[15], while compared to the survey conducted in 2011, these were similar to those reported by Silva et al.[16].

All public schools of Pernambuco were considered eligible for the study and were arbitrarily classified into three levels: small size (schools with less than 200 students), midsize (200-499 students) and large (≥500 students).

The sample selection was performed by two stages. In the first, schools were selected (primary sampling unit) and secondly the classes (secondary sampling unit). In the first stage, the proportionality criterion by region and size was adopted to make the draw of schools where data collection would be performed, defining, therefore, that a school would be selected from the stratum with lower proportional representation.

Then, considering the average number of students per high school class, the number of classes that should be drawn was defined, so that it reached the minimum sample size. In 2006, to reach the sample size previously defined, 234 high school classes were randomly selected[14], while in 2011 323 were randomly selected. The draw of classes was random, considering the proportionality of classes per shift (day and night). All students in selected classes were invited to participate in the study, excluding those older than the target age group (14-19 years).

Instrument

Data were collected through an adapted version of the questionnaire "Global School-based Student Health Survey" proposed by the World Health Organization[17]. Prior to carrying out both surveys, pilot studies (test-retest after a week) were performed to test the instrument. Data for the pilot study in 2006 were collected in two public schools of Recife, with a sample of 138 adolescents aged 14-19 years (59 girls). The 2011 pilot study was conducted with 86 adolescents in the same age group in a school of the State Public Network located in the Metropolitan Region of Recife. Kappa concordance indexes ranged from 0.52 to 1.00 in 2006 and 0.63 to 0.98 in 2011. Data collection was conducted by previously trained researchers (theory and practice) and the questionnaire was applied to students in classroom, without the presence of teachers.

The practice of LTPA was assessed using the following question: Do you perform regularly some type of physical activity in your free time, like exercise, sports, dance or martial arts (yes/no). Adolescents who answered positively were considered physically active during leisure time. Demographic (gender, age and marital status) and economic variables (maternal education, housing zone, occupational status, ownership of computer and geographic mesoregion) and those related to school (grade, shift and participation in physical education classes) were collected and categorized as shown in Table 1.

Data tabulation was performed using the EpiData software, version 3.1. Typing was performed in duplicate on separate data files, which were compared ("check" function) in order to identify and correct typing errors. After cleaning data files of 2006 and 2011, these were stored together in a single file so that analyses proposed in this study could be performed.

Data analysis

Absolute (n) and relative (%) frequencies and confidence intervals of 95% (CI 95%) were described for LTPA. The differences between proportions were calculated in percentage deltas. The proportions of students physically active during leisure time in both surveys were compared using the Pearson chi-square test. Poisson regression, with crude and adjusted analysis was used to identify factors associated with LTPA. Independent variables were organized into three hierarchical levels based on the model of Dumith et al.[18]. Level 1 included demographic variables (geographical mesoregion,

housing zone, age and marital status). Socioeconomic variables (employment status, ownership of computer and maternal schooling) were considered at level 2. Level 3 included variables related to school (grade, school shift and physical education classes). The association of a variable with LTPA was controlled by the variables of the same level and previous hierarchical levels.

To control possible confounding factors, all variables were taken to multivariate analysis, regardless of the level of significance in the bivariate analysis and respecting their respective conceptual level. In the final analysis, 5% significance level was considered to identify variables associated with the outcome. In all analyses, procedures for studies with complex methodologies were adopted (sampling by conglomerates, multiple stages) incorporating to the syntax "svyset" prefix, feature available in STATA. All analyses were stratified by sex.

RESULTS

The percentage of participation in the study was 98.1% and 95.7% in 2006 and 2011, respectively. In 2006, 6,112 students in selected classes attended the school during the period of data collection and were invited to participate in the study, but 83 students refused to participate; 1,819 questionnaires were excluded from the study because students were older than 19, and the other 03 for being under 14 years. Thus, the final sample was composed of 4,207 adolescents. In 2011, they 7,467 students of selected classes attended school in the data collection period, but 282 students refused to participate; 930 questionnaires were excluded because students aged above 19 years, resulting in a final sample of 6,264 students. The final sample was slightly lower in 2006 and higher than the sample dimension previously established in 2011. Table 1 shows the demographic and economic characteristics and those related to school of participants in both surveys.

In both surveys, there was a higher proportion of single female students aged 16-17 years who reported not working and living in urban areas. It was also observed that, from 2006 to 2011, there was a rise in the proportion of adolescents who had computer (from 10.7% to 41.1%; p <0.001), students in the morning shift (from 57.5% to 72.0%; p <0.001) and those who participated in physical education classes (35.1% to 74.1%; p <0.001).

Overall, comparing the findings of both surveys, no statistically significant changes were observed in the proportion of adolescents physically active during leisure, both among boys (77.5% in 2006, CI 95%: 75.5-79.6; and 78.9% in 2011, CI 95%: 77.2-80.6) and among girls (51.2% in 2006, CI 95%: 48.7-53.6, and 54.0% in 2011, CI 95%: 51.8-56.2). However, it was found that among students aged 16-17 years and those living in rural areas, there was an increase in the proportion of leisure-time physically active students. In contrast, the prevalence of leisure-time physically active students decreased among adolescents who participated in two or more weekly physical education classes (Table 2).

Table 1. Characteristics of samples of adolescents aged 14-19 years, high school students from the public education network of Pernambuco in 2006 and 2011, by sex.

Variable	2006						2011					
	Boys (n= 1.690)		Girls (n= 2.517)		All (n= 4.207)		Boys (n= 2.525)		Girls (n= 3.739)		All (n= 6.264)	
	n	%	n	%	n	%	n	%	n	%	n	%
Age (years)												
14-15	255	15.1	579	23.0	834	19.8	460	18.2	890	23.8	1.350	21.5
16-17	842	49.8	1.199	47.6	2.041	48.5	1.353	53.6	1.992	53.3	3.345	53.4
18-19	593	35.1	739	29.4	1.332	31.7	712	28.2	857	22.9	1.569	25.1
Marital status [a,b]												
Single	1.606	95.7	2.340	93.5	3.946	94.0	2.351	93.4	3.356	89.9	5.707	91.3
Other	72	4.3	162	6.5	234	5.6	167	6.6	376	10.1	543	8.7
Occupational status [c,d]												
Works	517	30.9	382	15.2	899	21.5	805	32.0	585	15.7	1.390	22.2
Does not work	1.157	69.1	2.123	84.8	3.280	78.5	1.713	68.0	3.144	84.3	4.857	77.8
Ownership of computer [e,f]												
Yes	220	13.1	227	9.1	447	10.7	1.177	46.7	1.394	37.3	2.571	41.1
No	1.461	86.9	2.278	90.9	3.739	89.3	1344	53.3	2.342	62.7	3.686	58.9
Maternal schooling [g,h]												
Incomplete elementary school	912	58.2	1.560	65.4	2.472	62.6	1.108	50.6	1.858	58.0	2.996	55.0
Incomplete high school	258	16.4	321	13.5	579	14.6	336	15.4	475	14.8	811	15.0
Complete high school	271	17.3	376	15.8	647	16.4	506	23.1	607	18.9	1.113	20.6
Higher education	127	8.1	126	5.3	253	6.4	239	10.9	265	8.3	504	9.4
Housing zone [i,j]												
Urban	1.313	78.1	1.986	79.5	3.299	78.9	1879	74.6	2.767	74.5	4.646	74.5
Rural	368	21.9	513	20.5	881	21.1	640	25.4	948	25.5	1.588	25.5
Geographic mesoregion												
Metropolitan region	671	39.7	1.086	43.2	1.757	41.8	482	19.1	815	21.8	1.297	20.7
Zona da mata	307	18.2	436	17.3	743	17.7	831	32.9	1.081	28.9	1.912	30.5
Agreste	279	16.5	424	16.9	703	16.7	453	17.9	688	18.4	1.141	18.2
Sertão of Pernambucano	252	14.9	323	12.8	575	13.6	571	22.6	880	23.5	1.451	23.2
Sertão of São Francisco	181	10.7	248	9.8	429	10.2	188	7.5	275	7.4	463	7.4
School shift												
Day	910	53.9	1.509	60.0	2.419	57.5	1.750	69.3	2.760	73.8	4.510	72.0
Night	780	46.1	1.008	40.0	1.788	42.5	775	30.7	979	26.2	1.754	28.0
School grade												
1st grade	781	46.2	1.102	43.8	1.883	44.7	978	38.7	1.358	36.3	2.336	37.3
2nd grade	523	31.0	821	32.6	1.344	32.0	802	31.8	1.215	32.5	2.017	32.2
3rd grade	386	22.8	594	23.6	980	23.3	745	29.5	1.166	31.2	1.911	30.5
Physical Education classes [k]												
No / does not participate	1.020	60.5	1.699	67.8	2.719	64.9	567	22.4	1.055	28.3	1.622	25.9
1 class / week	276	16.4	370	14.8	646	15.4	1.104	43.8	1.692	45.4	2.796	44.8
≥ 2 classes / week	389	23.1	437	17.4	826	19.7	850	33.8	984	26.3	1.834	29.3

Especially among girls, the proportion of leisure-time physically active students increased from 2006 to 2011 among those not working, among those who reported not having computer, among those whose mothers have not completed elementary school, among those resident in the *sertão* of São Francisco, among students of the second grade of high school and among those of the evening shift (Table 2).

Table 2. Comparison of prevalence in 2006 versus 2011 of leisure-time practice of physical activity among high school students of the Pernambuco according to demographic, economic variables and those related to school, by sex.

Variable	Boys						Girls					
	2006 (n=1690)		2011(n=2517)		Δ %	p-value	2006 (n=2525)		2011 (n=3739)		Δ %	p-value
	n	% (CI 95%)	n	% (CI 95%)			n	% (CI 95%)	n	% (CI 95%)		
Age (years)												
14-15	212	83.5 (78.8; 88.2)	378	82.4 (79.2; 85.6)	-1.3	0.707	338	58.9 (54.4; 63.4)	538	60.4 (56.0; 64.9)	+2.5	0.551
16-17	642	76.6 (73.8; 79.4)	1091	80.6 (78.4; 82.8)	+5.2	0.024	579	48.4 (45.0; 51.9)	1066	53.6 (51.0; 56.2)	+10.7	0.005
18-19	450	76.3 (72.9; 79.7)	521	73.3 (69.8; 76.7)	-3.9	0.217	363	49.6 (45.9; 53.3)	413	48.3 (44.4; 52.2)	-2.6	0.609
Marital status [a,b]												
Single	1242	77.7 (75.5; 80.0)	1847	78.6 (76.8; 80.4)	+1.6	0.514	1202	51.7 (49.2; 54.2)	1811	54.0 (51.8; 56.3)	+4.4	0.084
Other	55	76.4 (66.1; 86.7)	139	83.2 (77.5; 88.9)	+8.9	0.214	73	45.1 (37.7; 52.4)	200	53.2 (47.1; 59.3)	+18.0	0.084
Occupational status [c,d]												
Works	387	75.0 (71.1; 98.9)	629	78.2 (75.4; 81.1)	+4.3	0.173	201	52.8 (47.4; 58.1)	315	53.9 (49.1; 58.8)	+2.1	0.719
Does not work	907	78.8 (76.5; 81.1)	1356	79.2 (77.2; 81.3)	+0.5	0.794	1073	50.9 (48.3; 53.4)	1695	54.0 (51.6; 56.3)	+6.1	0.028
Ownership of computer [e,f]												
Yes	174	79.1 (73.7; 84.5)	932	79.3 (76.7; 81.8)	+0.3	0.957	120	53.1 (46.6; 59.6)	691	49.7 (46.7; 52.7)	-6.4	0.340
No	1123	77.3 (75.0; 79.5)	1055	78.6 (76.2; 80.9)	+1.3	0.420	1153	50.9 (48.3; 53.5)	1325	56.6 (53.8; 59.4)	+11.2	<0.001
Maternal schooling [g,h]												
Incomplete element. School	694	76.4 (73.5; 79.4)	873	78.8 (76.4; 81.2)	+3.1	0.205	786	50.7 (47.8; 53.6)	1019	54.9 (52.1; 57.8)	+8.3	0.014
Incomplete high school	199	77.4 (72.3; 82.6)	270	80.4 (76.0; 84.7)	+3.9	0.385	161	50.5 (44.6; 56.4)	242	51.0 (46.3; 55.6)	+1.0	0.895
Complete high school	218	80.7 (76.3; 85.3)	396	78.4 (74.6; 82.2)	-2.9	0.447	198	52.8 (47.4; 58.2)	315	51.9 (47.8; 56.0)	-1.7	0.783
Higher education	104	81.9 (75.1; 88.7)	200	83.7 (78.9; 88.5)	+3.5	0.663	70	56.5 (47.7; 65.2)	153	58.0 (51.7; 64.2)	+2.7	0.780
Housing zone [i,j]												
Urban	1026	78.4 (76.1; 80.6)	1467	78.1 (76.1; 80.1)	-0.4	0.858	997	50.5 (47.8; 53.3)	1448	52.4 (50.1; 54.7)	+3.8	0.201
Rural	270	74.2 (69.5; 78.9)	517	80.9 (77.9; 83.9)	+9.0	0.013	271	53.0 (48.3; 57.8)	556	58.7 (54.5; 62.9)	+10.8	0.037
Geographic mesoregion												
Metropolitan region	524	78.3 (75.1; 81.5)	374	77.6 (73.2; 81.9)	-0.9	0.767	528	49.1 (45.3; 52.8)	420	51.6 (46.1; 57.1)	+5.1	0.277
Zona da mata	234	76.7 (71.6; 81.8)	662	79.7 (76.5; 82.8)	+3.9	0.282	218	50.2 (43.9; 56.6)	576	53.3 (49.9; 56.8)	+2.1	0.274
Agreste	214	77.3 (71.6; 82.9)	355	78.5 (74.7; 82.4)	+1.6	0.684	222	52.6 (47.1; 58.1)	348	50.6 (46.0; 55.1)	-3.8	0.512
Sertão of Pernambucano	197	78.8 (73.8; 83.4)	445	77.9 (74.5; 81.4)	-1.1	0.782	191	59.3 (52.7; 66.0)	510	58.1 (53.0; 63.1)	-2.0	0.702
Sertão of São Francisco	135	74.6 (67.9; 81.2)	154	82.4 (76.5; 88.2)	+10.5	0.070	121	48.8 (41.0; 56.7)	163	59.3 (50.8; 67.8)	+21.5	0.016
School shift												
Day	713	78.8 (76.1; 81.5)	1405	80.3 (78.4; 82.3)	+1.9	0.347	785	52.2 (48.9; 55.4)	1487	53.9 (51.3; 56.6)	+3.3	0.276
Night	591	76.1 (73.0; 79.1)	585	75.6 (72.2; 78.9)	-0.7	0.825	495	49.6 (45.9; 53.3)	530	54.2 (50.3; 58.1)	+9.3	0.041
School grade												
1st grade	612	78.9 (75.7; 82.1)	783	80.2 (77.7; 82.7)	+1.6	0.483	629	57.6 (54.4; 60.8)	814	60.0 (56.2; 63.7)	+4.2	0.233
2nd grade	403	77.1 (73.7; 80.4)	650	81.1 (78.1; 84.0)	+4.4	0.079	385	47.2 (43.4; 51.0)	670	55.2 (51.5; 58.9)	+16.9	<0.001

Continues...

Variable	Boys						Girls					
	2006 (n=1690)		2011(n=2517)		Δ %	p-value	2006 (n=2525)		2011 (n=3739)		Δ %	p-value
	n	% (CI 95%)	n	% (CI 95%)			n	% (CI 95%)	n	% (CI 95%)		
3rd grade	289	75.5 (71.1; 79.9)	557	74.8 (71.3; 78.2)	-0.9	0.799	266	44.8 (39.5; 50.0)	533	45.8 (42.5; 49.1)	+2.2	0.688
Physical Education classes [k]												
No / does not participate	728	71.4 (68.7; 74.2)	400	70.6 (66.5; 74.5)	-1.1	0.706	754	44.5 (41.6; 47.4)	476	45.2 (41.3; 49.1)	+1.6	0.712
1 class / week	229	83.3 (78.9; 87.6)	877	79.5 (77.0; 82.0)	-4.6	0.161	217	59.0 (53.3; 64.6)	914	54.0 (50.9; 57.1)	-8.5	0.084
≥ 2 classes / week	347	90.1 (87.3; 93.0)	711	83.6 (81.2; 86.3)	-7.2	0.003	304	70.2 (64.3; 76.1)	623	63.4 (59.3; 67.5)	-9.7	0.013

Δ = proportional variation

In the adjusted analysis, an inverse association between LTPA and age was found among boys in 2011 but not in 2006. There was a direct association between LTPA and participation in physical education classes both in 2006 as in 2011. After adjustments, boys who had marital status different from single (other) were more likely to perform LTPA. The other variables were not statistically associated with LTPA among boys (p> 0.05), both in 2006 as in 2011 (Table 3).

In analysis adjusted for girls, it was found that high grades were associated with lower prevalence of LTPA practice in 2006 and 2011. The frequency of physical education classes had positive association with the practice of LTPA in both surveys. Finally, girls who had no computer were more likely to perform LTPA only in 2011. The remaining variables were not statistically associated with LTPA among women (p> 0.05), both in 2006 as in 2011 (Table 4).

Table 3. Crude and adjusted analysis of leisure-time physical activity in 2006 * and 2011 **, among high school male students of Pernambuco according to demographic, economic variables and those related to school.

	Variables	Crude						Adjusted					
		2006			2011			2006			2011		
		PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value
Level 1	Geographic mesoregion			0,832[b]			0,639[b]			0,877[b]			0,499[b]
	Metropolitan region	1,00			1,00			1,00			1,00		
	Zona da mata	0,98	0,91; 1,06		1,03	0,96; 1,10		0,99	0,92; 1,07		1,03	0,97; 1,10	
	Agreste	0,99	0,91; 1,07		1,01	0,94; 1,09		0,99	0,92; 1,07		1,02	0,95; 1,09	
	Sertão of Pernambucano	1,01	0,93; 1,08		1,00	0,94; 1,08		1,02	0,95; 1,10		1,00	0,93; 1,07	
	Sertão of São Francisco	0,95	0,87; 1,04		1,06	0,97; 1,16		0,97	0,88; 1,06		1,06	0,98; 1,15	
	Housing zone [i,j]			0,114[a]			0,112[a]			0,129			0,061
	Urban	1,00			1,00			1,00			1,00		
	Rural	0,95	0,88; 1,01		1,04	0,99; 1,08		0,95	0,89; 1,02		1,04	1,00; 1,09	
	Age (years)			0,048			<0,001			0,341			0,001
	14-15	1,00			1,00			1,00			1,00		
	16-17	1,00	0,95; 1,06		1,10	1,04; 1,16		0,98	0,93; 1,04		1,09	1,03; 1,15	
	18-19	1,09	1,02; 1,18		1,12	1,06; 1,19		1,05	0,97; 1,13		1,11	1,03; 1,18	
	Marital status			0,807			0,111			0,675			0,052
	Single	1,00			1,00			1,00			1,00		
	Other	1,02	0,89; 1,17		0,94	0,88; 1,01		1,03	0,89; 1,19		0,94	0,87; 1,00	

... continues

Variables		Crude						Adjusted					
		2006			2011			2006			2011		
		PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value
Level2	Occupational status			0,104[a]			0,574[a]			0,316			0,793
	Works	1,00			1,00			1,00			1,00		
	Does not work	1,05	0,99; 1,12		1,01	0,97; 1,06		1,03	0,97; 1,10		1,01	0,96; 1,01	
	Ownership of computer			0,545[a]			0,691[a]			0,670			0,857
	Yes	1,00			1,00			1,00			1,00		
	No	0,98	0,91; 1,05		0,99	0,95; 1,04		1,02	0,94; 1,11		1,00	0,95; 1,04	
	Maternal schooling			0,048			0,274			0,432			0,261
	Incomplete element. school	1,00			1,00			1,00			1,00		
	Incomplete high school	0,99	0,89; 1,09		0,94	0,88; 1,01		1,02	0,92; 1,13		0,94	0,87; 1,02	
	Complete high school	0,95	0,85; 1,05		0,96	0,89; 1,04		0,99	0,89; 1,10		0,97	0,89; 1,05	
	Higher education	0,93	0,85; 1,02		0,94	0,88; 1,00		0,99	0,90; 1,08		0,94	0,88; 1,01	
Level 3	School shift			0,184			0,018			0,336			0,413
	Day	1,00			1,00			1,00			1,00		
	Night	1,04	0,98; 1,09		1,06	1,01; 1,12		0,97	0,91; 1,03		1,02	0,97; 1,08	
	School grade			0,655			0,007			0,876			0,059
	1st grade	1,00			1,00			1,00			1,00		
	2nd grade	1,05	0,97; 1,12		1,07	1,02; 1,13		1,04	0,97; 1,12		1,03	0,97; 1,09	
	3rd grade	1,02	0,95; 1,10		1,08	1,02; 1,15		1,01	0,94; 1,09		1,06	1,00; 1,12	
	Physical Education classes [k]			<0,001			<0,001[b]			< 0.001			<0,001
	No / does not participate	1,00			1,00			1,00			1,00		
	1 class / week	1,17	1,09; 1,24		1,13	1,06; 1,20		1,16	1,09; 1,24		1,12	1,05; 1,20	
	≥ 2 classes / week	1,26	1,20; 1,32		1,19	1,11; 1,27		1,26	1,20; 1,33		1,17	1,11; 1,26	

* n = 4207 **n = 6264; a = Wald test for linear trend; b = Wald test for heterogeneity.

Table 4. Crude and adjusted analysis of leisure-time physical activity in 2006 * and 2011 **, among high school female students of Pernambuco according to demographic, economic variables and those related to school.

Variables		Crude						Adjusted					
		2006			2011			2006			2011		
		PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value
Level 1	Geographic mesoregion			0,066			0,108			0,285			0,569
	Metropolitan region	1.00			1.00			1.00			1.00		
	Zona da mata	1.02	0.87; 1.18		1.03	0.92; 1.17		1.04	0.90; 1.21		1.07	0.96; 1.21	
	Agreste	1.07	0.94; 1.22		0.98	0.86; 1.13		1.05	0.93; 1.20		1.06	0.94; 1.20	
	Sertão of Pernambucano	1.21	1.06; 1.38		1.13	0.98; 1.29		1.16	1.02; 1.33		1.10	0.97; 1.25	
	Sertão of São Francisco	0.99	0.84; 1.17		1.15	0.97; 1.36		1.02	0.87; 1.19		1.13	0.95; 1.34	
	Housing zone [i,j]			0.350			0.004			0.713			0,244
	Urban	1.00			1.00			1.00			1.00		
	Rural	1.05	0.95; 1.16		1.12	1.04; 1.21		1.02	0.91; 1.14		1.05	0.97; 1.14	
	Age (years)			0.002			<0.001			0.039			0,001
	14-15	1.00			1.00			1.00			1.00		
	16-17	0.98	0.89; 1.08		1.11	1.02; 1.21		0.96	0.87; 1.07		1.06	0.97; 1.16	
	18-19	1.19	1.07; 1.32		1.25	1.12; 1.39		1.12	1.01; 1.25		1.11	0.99; 1.24	
	Marital status			0.104			0.794			0.258			0,858
	Single	1.00			1.00			1.00			1.00		
	Other	1.15	0.97; 1.35		1.02	0.90; 1.14		1.10	0.93; 1.30		0.99	0.88; 1.11	

Continues...

Variables		Crude						Adjusted					
		2006			2011			2006			2011		
		PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value
Level 2	Occupational status			0.503			0.992			0.595			0,652
	Works	1.00			1.00			1.00			1.00		
	Does not work	0.96	0.87; 1.07		1.00	0.91; 1.10		0.97	0.87; 1.08		0.98	0.89; 1.07	
	Ownership of computer			0.524			0.001			0.804			0,001
	Yes	1.00			1.00			1.00			1.00		
	No	0.96	0.84; 1.09		1.14	1.06; 1.23		0.98	0.86; 1.13		1.14	1.05; 1.23	
	Maternal schooling			0.221			0.774			0.221			0,520
	Incomplete element. school	1.00			1.00			1.00			1.00		
	Incomplete high school	0.94	0.78; 1.12		0.90	0.80; 1.01		0.96	0.80; 1.14		0.90	0.90; 1.01	
	Complete high school	0.89	0.73; 1.09		0.88	0.77; 1.00		0.90	0.74; 1.10		0.88	0.77; 1.00	
	Higher education	0.90	0.76; 1.06		0.95	0.84; 1.06		0.91	0.77; 1.07		0.92	0.81; 1.03	
Level 3	School shift			0.302			0.915			0.245			0,253
	Day	1.00			1.00			1.00			1.00		
	Night	1.05	0.95; 1.16		1.00	0.91; 1.09		0.94	0.85; 1.04		0.95	0.87; 1.04	
	School grade			0.821			<0.001			0.817			0,017
	1st grade	1.00			1.00			1.00			1.00		
	2nd grade	1.29	1.13; 1.46		1.31	1.19; 1.44		1.23	1.07; 1.42		1.22	1.11; 1.35	
	3rd grade	1.05	0.92; 1.21		1.21	1.09; 1.33		1.06	0.92; 1.22		1.16	1.05; 1.28	
	Physical Education classes [k]			<0.001			<0.001			<0.001			<0,001
	No / does not participate	1.00			1.00			1.00			1.00		
	1 class / week	1.33	1.19; 1.48		1.19	1.08; 1.32		1.29	1.16; 1.45		1.17	1.06; 1.28	
	≥ 2 classes / week	1.58	1.42; 1.75		1.40	1.27; 1.55		1.55	1.40; 1.71		1.38	1.25; 1.52	

DISCUSSION

This study was pioneer in estimating changes occurring specifically in LTPA and potential associated factors after a period of five years, in a representative sample of adolescent students of a state in northeastern Brazil. Regarding the total sample, changes were not observed in the proportion of leisure-time physically active adolescents from 2006 to 2011.

The increase in the practice of LTPA in turn, was observed in some subgroups of adolescents students. This may be due to the reduction of social inequalities that occurred from 2006 to 2011, especially because the state of Pernambuco presented a growth rate higher than that of Brazil as a whole[19]. In addition, this period was also marked by expansion of some public programs to encourage the practice of physical activity specifically focused on young populations, such as the *Programa Segundo Tempo*[20] and *Programa Saúde na Escola*[21].

Girls continue to show lower prevalence of leisure-time physical activity compared to boys. The explanations for this gender difference have been explored in some studies[22,23] and seem to be mainly related to social and cultural factors. For example, girls are encouraged from childhood to become involved with less physically active recreational activities[23].

The first study conducted in Brazil covering time trends of physical activity in adolescent students (10-19 years) was conducted in southern Brazil[24]. The results were similar to those found in this study; however, the proportion of students classified to be physically active during leisure time was very different between studies, being higher in this study (61.8% in 2006 versus 64.0% in 2011) than in the survey conducted by Coll et al.[24], 26.3 % in 2005 versus 28.1% in 2012. The National Survey of Students' Health from 2009 to 2012[10] does not bring data on time trends of PA, total or during leisure.

Compared to the findings of international studies, the results of this study were similar to those found in American students in the period from 1991 to 2007[25], but different from those observed among Catalan adolescents [26]. Among Catalan adolescents (10-17 years) who were followed from 1993 to 2003, the prevalence of leisure time physical activity increased from 66% to 78.1% among boys and from 45% to 52.8% among girls.

The trend in the reduction of prevalence of LTPA among students for greater participation in physical education classes was found between boys and girls from Pernambuco. This finding was somehow unexpected, as results of cross-sectional studies have shown positive relationship among variables[27,28], and longitudinal and intervention studies have shown that participation in physical education classes can positively influence physical activity[29].

It is noteworthy that the considerable increase in the participation of students in physical education classes in the state did not contribute, within five years, for the increase in the practice of LTPA among adolescents. So, it could not be said that this trend began with the action of the physical education teacher at school, providing physical and sporting activities, encouraging and guiding students for a physically active and healthy lifestyle, which would be ideal. On the contrary, perhaps traditional physical education classes (specific sports, practices with low motor variation)[30] could be a factor that discourages leisure-time physical activity, especially among high school students. This may also be partly explained by the entry of older adolescents into the labor market and / or their withdrawal from other activities to devote exclusively to technical training courses and / or preparation for entry into the university.

The main strengths of this study are the performance of extensive fieldwork with the use of previously tested tool and with data collection in samples sufficiently large for the proposed analyses. The methodological similarity of both surveys and their scope, including the participation of students of the night shift and those living in rural areas are also a strong point. The main limitation of the study was the use of a tool that only allows obtaining self-reported measures.

CONCLUSION

The findings indicate the occurrence of temporal variation in prevalence of LTPA in different subgroups of adolescents, with reduced LTPA among

those who participate in two or more physical education classes and increased among residents in rural areas. The weekly frequency of physical education classes was directly associated with the practice of LTPA among girls and boys, both in 2006 as in 2011. Age, marital status, grade and the ownership of computer were also significantly associated with LTPA, but with distinctions between genders and surveys.

However, it is necessary to review the strategies of physical activity programs to adapt to the different ages of adolescence. Changes in the structure of the physical education classes seem to be essential in the LTPA promotion among adolescents. Interventions are needed to prevent the negative impact of urbanization and technological growth in the lifestyle of young people, especially the excessive use of computer / video games during leisure time.

Acknowledgments

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