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Physical activity and associated factors in high-school adolescents in Southern Brazil

ABSTRACT

OBJECTIVE: To estimate the prevalence of physical activity in adolescents and to identify associated factors.

METHODS: A cross-sectional study was conducted with a representative sample (n=1,518, 59.2% females) of students aged between 14 and 18 years, enrolled in the public school network of the city of Curitiba, Southern Brazil, in 2006. Physical activity practice was self-reported, according to the number of days per week when they perform moderate to vigorous physical activity lasting $\geq$ 60 minutes. This practice was analyzed in two distinct models. In the first model, the variable was dichotomized into "0 day" and "$\geq$ 1 day"; in the second, into "$\leq$ 4 days" and "$\geq$ 5 days". Independent variables were as follows: biological-demographic (sex, age, body mass index); socioeconomic (parents' level of education, number of cars); behavioral (number of hours spent watching television, number of hours spent using a computer); and sociocultural (social support from family and friends and the perception of barriers to the practice of activities), tested with Poisson regression.

RESULTS: In the first model of analysis, the prevalence of physical activity was 58.2% (75.1% in males; 46.5% in females; p<0.001), while, in the second, it was 14.5% (22.3% and 9.1%, respectively; p<0.001). In the first model, the variables associated with physical activity were: male sex (PR=1.63, 95% CI: 1.48;1.78), social support from family (PR=1.14, 95% CI: 1.05;1.23), social support from friends (PR=1.52, 95% CI: 1.31;1.78) and high perception of barriers (PR=0.54, 95% CI: 0.46;0.62). In the second model, only male sex (PR=2.45, 95% CI: 1.73;3.46) and high perception of barriers (PR=0.24, 95% CI: 0.15;0.38) were associated with physical activity.

CONCLUSIONS: More than half of adolescents practice physical activity at least one day of the week, although 14.5% achieved the current recommendations. The recommended levels are associated with a lower number of factors. Gender and perception of barriers were consistently associated with physical activity levels.

DESCRIPTORS: Adolescent. Motor Activity. Socioeconomic Factors. Cross-Sectional Studies.

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INTRODUCTION

Scientific evidence points to innumerable benefits of the practice of physical activity (PA) for health and quality of life in all ages.[a] The regular practice of moderate to vigorous physical activity (MVPA) is associated with better

[a] United States Department of Health and Human Services. Physical Activity Guidelines Advisory Committee Report, 2008. Washington; 2008[cited 2009 Apr 22]. Available from: http://www.health.gov/paguidelines/Report/pdf/CommitteeReport.pdf

physical fitness, weight control, physical and mental health, and a healthy lifestyle in adulthood.[23,a] However, certain evidence suggests an increase in the prevalence of physical inactivity in adolescence,[18,25] mostly due to a reduction in the time spent on MVPA.[13] In Brazil, the estimate of prevalence of physical inactivity in adolescents is high. A recent review pointed to values between 39.0% and 93.5%,[24] a great variability that may partly be explained by different measuring instruments and distinct cut-off points for PA used in studies.

Several factors associated with PA are reported in the international literature and grouped in six dimensions: demographic-biological; psychological, cognitive and emotional; sociocultural; environmental; PA characteristics; and behavioral attributes.[9,18,22,25] The multidimensionality of such factors shows the complexity of aspects that can influence this behavior.[17]

Some Brazilian studies have analyzed the association between PA and demographic-biological (age,[1,5,8] gender[5,8,11,14] and skin color[10]) and socioeconomic factors (income,[8] economic class[1,5,10,11] and parents' level of education[1]). However, there is a lack of studies that analyze the association with sociocultural variables, such as the social support and perception of barriers for the practice of PA. Greater social support results in an increase in the adherence to PA and maintenance of levels of activity.[11,22] With regard to barriers, girls show a greater perception of barriers and higher probability of being physically inactive.[20] Thus, it is expected that greater support from family and friends and a lower number of perceived barriers will lead adolescents to be more active.

A recent review of 21 studies on PA in adolescents, conducted in different Brazilian regions,[24] showed that the association between PA and support from family and friends, in addition to that between PA and perception of barriers, has been little studied. Likewise, there are few representative studies conducted with adolescents, in capitals of Southern Brazil.[24]

Thus, the present study aimed to estimate the prevalence of PA in high-school adolescents and identify associated factors.

METHODS

A study with a representative sample of high-school students of the public education network was conducted in the city of Curitiba, Southern Brazil, between March and May 2006. In the year of this study, the population of day-time students in this city was 42,563, according to data from the State of Paraná Department of Education.[b]

A sample error of 3%, an estimated prevalence of 50%[11,16] (considering < 300 min/week as physical inactivity), design effect of 1.5, an additional 10% for losses and refusals and 95% confidence interval were considered to estimate the sample size. The values recommended in the literature for research with sampling strategies similar to the present study were used to estimate the design effect.[12] Based on these data, the estimated sample size was 1,609 students.

Two-stage cluster sampling was used to select the sample. In the first stage, 14 schools were randomly selected from a list provided by the State of Paraná Department of Education, so that each area met the expected proportion of students per grade. Proportionality of students was established according to the number of enrollments in each of the nine administrative areas of the city and the number of students in each of the three high-school grades. In the second stage, the selected schools were visited, 62 classes were selected and the respective students recruited for this study. Adolescents aged more than 18 years or those with special needs were excluded. Participants who did not hand in an informed consent form, signed by a responsible adult, were considered losses.

A questionnaire, previously tested and applied in classrooms in a coordinated way, was used to collect data. Applications were conducted by two interviewers, who had been qualified for this purpose.

The practice of PA was reported by adolescents as the number of days, in a typical week, when they performed MVPA lasting ≥60 minutes. This measure has been used in population surveys[2] and it enables the level of PA to be classified, according to the recommendations for this age group.[23,a]

The body mass index (BMI) was obtained from the ratio between weight (kg) and square of the height (m^2), based on self-reported measures. The following cut-off points, derived from the Brazilian population,[6] were used to classify the BMI: "normal weight" (low weight and normal weight) and "overweight" (overweight and/or obesity). Self-reported measures of weight and height show a high agreement with the objective evaluation and they are frequently employed in studies conducted with adolescents.[7]

Parents' level of education was obtained from a question about paternal and maternal level of education and subsequently grouped into four categories (incomplete primary school, complete primary school, complete high-school and complete higher education). Ownership of cars was obtained from a question about the number of vehicles in the household. Sedentary behavior was

Table 1. Distribution of participants in the study by sex, according to selected variables. Curitiba, Southern Brazil, 2006.

Variables	Total		Male		Female		p
	n	%	n	%	n	%	
Age (years)	1,518	100	619	40.8	899	59.2	
14	86	5.7	30	4.8	56	6.2	
15	378	24.9	145	23.4	233	25.9	
16	501	33.0	203	32.8	298	33.1	0.40
17	425	28.0	184	29.7	241	26.8	
18	128	8.4	57	9.2	71	7.9	
Body mass index							
Normal	1,340	88.3	517	83.5	823	91.5	< 0.001
Overweight	178	11.7	102	16.5	76	8.5	
Maternal level of education							
Incomplete primary school	349	23.2	109	17.8	240	26.8	
Complete primary school	322	21.4	127	20.8	195	21.8	< 0.001
Complete high-school	547	36.3	246	40.3	301	33.6	
Complete higher education	289	19.2	129	21.1	160	17.9	
Paternal level of education							
Incomplete primary school	335	22.6	109	17.9	226	25.8	
Complete primary school	317	21.3	127	20.8	190	21.7	< 0.001
Complete high-school	521	35.1	237	38.9	284	32.5	
Complete higher education	312	21.0	137	22.5	175	20.0	
Number of cars							
None	371	24.4	133	21.5	238	26.5	
One	760	50.1	310	50.1	450	50.1	0.03
Two or more	387	25.5	176	28.4	211	23.5	
Hours spent watching television							
< 1 hour	245	16.2	97	15.7	148	16.5	
from 1 to 4 hours	808	53.3	345	55.9	463	51.5	0.21
> 4 hours	463	30.5	175	28.4	288	32.0	
Hours spent using a computer							
< 1 hour	570	37.6	190	30.8	380	42.3	
from 1 to 4 hours	600	39.6	249	40.4	351	39.1	< 0.001
> 4 hours	344	22.7	177	28.7	167	18.6	
Social support from family for PA							
No	720	47.4	294	47.5	426	47.4	0.97
Yes	798	52.6	325	52.5	473	52.6	
Social support from friends for PA							
No	434	28.6	112	18.1	322	35.8	< 0.001
Yes	1,084	71.4	507	81.9	577	64.2	
Number of barriers for the practice of PA							
Low (≤ 1 barrier)	525	34.6	222	35.9	303	33.7	
Average (2 - 3 barriers)	520	34.3	196	31.7	324	36.0	0.21
High (≥ 4 barriers)	473	31.2	201	32.4	272	30.3	
PA categories*							
0 day	635	41.8	154	24.9	481	53.5	< 0.001
≥ 1 day	883	58.2	465	75.1	418	46.5	
≤ 4 days	1,298	85.5	481	77.7	817	90.9	< 0.001
≥ 5 days	220	14.5	138	22.3	82	9.1	

PA: physical activity
* 0 day: 0 day/week, moderate to vigorous PA ≥ 60 min
≥ 1 day: ≥ 1 day/week, moderate to vigorous PA ≥ 60 min
≤ 4 days: ≤ 4 days/week, moderate to vigorous PA ≥ 60 min
≥ 5 Days: ≥ 5 days/week, moderate to vigorous PA ≥ 60 min

classified according to the time, in hours, that adolescents spent watching television and using a computer (< 1 hour, between 1 and 4 hours, > 4 hours).

Social support is a broad and multidimensional concept and it can be classified into "instrumental", "informative" and "evaluative". Practical actions such as accompanying or taking someone to perform PA are instrumental ways of social support.[15] Social support for the practice of PA was based on the support of families and friends, identified by a dichotomous response to the following questions: "In the last three months, did anyone in your family practice physical activities with you?" and "In the last three months, did any friends practice physical activities with you?", derived from the questionnaire previously validated for this population.[15]

An instrument developed to evaluate the perceived barriers for the practice of PA was used.[21] The perception of barriers by adolescents was categorized according to the number reported by them: low (≤1 barrier), average (2 to 3 barriers) and high (≥4 barriers).

The distribution of absolute and relative frequencies and the chi-square test for proportions were used to describe the variables, stratified by sex. After the bivariate analysis, the association between the practice of PA and demographic-biological (gender, age and BMI), socioeconomic (parents' level of education and number of cars), behavioral (hours spent watching television and using a computer) and sociocultural variables (social support from family and friends and barriers for the practice of PA) was tested using Poisson regression.

In the first model of analysis, PA dichotomized into "no days" (in case the adolescent did not practice MVPA for at least 60 minutes) and "≥ 1 day" (≥1 day/week, MVPA, ≥60 min) was considered as dependent variable. In the second model, PA dichotomized into "≤ 4 days" (≤4 days/week, MVPA, ≥60 min) and "≥ 5 days" (≥5 days/week, AFMV, ≥60 min) was considered as dependent variable.

A multiple model was used, designed from the hierarchical structure with the following levels and variables: level 1 – demographic-biological; level 2 – socioeconomic; level 3 – behavioral; and level 4 – socio-cultural. Analyses were performed in the Stata 9.0 statistical software and the significance level was maintained at 5%. Once the sample was selected using cluster sampling, correction for design effect was made using the "svy" command for data analysis resulting from complex samples.

This research project was approved by the Research Ethics Committee of the Pontifícia Universidade Católica do Paraná (Process 1076/2006) and the protocols were in accordance with the recommendations of the Brazilian System of Research Ethics.

RESULTS

The final study sample was comprised of 1,518 students (59.2% were females), aged between 14 and 18 years (Table 1). The majority of participants were aged 16 years (32.8% were males and 33.1% were females). Rate of refusal to participate in the study was lower than 5% (n=79).

Higher prevalence of overweight was observed in male students (16.5%; CI95% 14.0;19.0 versus 8.5%; CI95% 6.1;10.7; p<0.001). The majority of mothers (36.3%; CI95% 30.4;42.1) and fathers (35.1%; CI95% 30.3;40.0) had a complete high-school level. More than ¾ of adolescents (CI95% 70.9;80.3) had one or more cars in their homes.

Approximately 30% (CI95% 24.1;37.0) of adolescents reported watching television for more than four hours/day and 22.7% (CI95% 19.2;26.2), using a computer, including a higher proportion of males (28.7% versus 18.6%; p<0.001). With regard to social support, 47.4% (CI95% 44.5;50.4) of adolescents reported that family members did not practice PA with them, although 71.4% reported having support from friends, including a higher proportion of males (81.9% versus 64.2%; p<0.001).

The prevalence of recommended PA was 14.5% (CI95% 12.9;16.1), with male students being more active than females (22.3% versus 9.1%; p<0.001). The majority of adolescents (41.8%; CI95% 37.8;45.8) reported not practicing MVPA on any day of the week, especially females (53.5%; CI 95% 48.7;58.3).

Table 2 shows the analysis of association between PA (≥1 days/week, MVPA ≥60 min) and independent variables. In the bivariate analysis, PA was positively associated with the following: male sex (PR=1.62, CI95% 1.47;1.77), overweight (PR=1.10, CI95% 1.00;1.22), paternal level of education (complete high-school level; PR=1.23, CI95% 1.02;1.48), using a computer (1-4 hours/day, PR=1.18, CI95% 1.06;1.31), and having social support from the family (PR=1.32, CI95% 1.18;1.47) and friends (PR=1.97, CI95% 1.67;2.33). There was an inverse association with moderate (PR=0.71, CI95% 0.65;0.78) and high number of barriers (PR=0.48, CI 95% 0.43;0.55) for the practice of PA. After adjustment for all other variables of the study, male sex, having social support from family and friends, and a moderate and high number of barriers continued to be significantly associated with the practice of PA (p<0.05).

Table 3 shows the analysis of the association between recommended practice of PA and independent variables. In the bivariate analysis, practice of PA was positively associated with the male sex (PR=2.44, CI95% 1.74;3.44), father with a higher level of education (PR=1.36, CI95% 1.08;1.71), ownership of two or more cars (PR=1.69, CI95% 1.06;2.70), and having

Table 2. Factors associated with the practice of physical activity in adolescents. Curitiba, Southern Brazil, 2006

Variables	Practice of PA[a]		Bivariate analysis		Multiple analysis	
Level 1	n	%	PR	CI95%	PR	CI95%
Sex						
Female	418	46.5	1	ref.	1	ref.
Male	465	75.1	1.62	1.47;1.77	1.63	1.48;1.78
Age (years)						
14	49	57.0	1	ref.	1	ref.
15	244	64.6	1.13	0.84;1.52	1.11	0.84;1.47
16	288	57.5	1.01	0.79;1.28	0.98	0.78;1.23
17	241	56.7	1.00	0.76;1.30	0.95	0.75;1.21
18	61	47.7	0.84	0.59;1.18	0.80	0.56;1.13
Body mass index						
Normal	770	57.5	1	ref.	1	ref.
Overweight	113	63.5	1.10	1.00;1.22	1.01	0.91;1.11
Level 2						
Maternal level of education						
Incomplete primary school	189	54.2	1	ref.	1	ref.
Complete primary school	187	58.1	1.07	0.94;1.23	1.01	0.87;1.16
Complete high-school	323	59.0	1.09	0.93;1.27	0.97	0.82;1.15
Complete higher education	174	60.2	1.11	0.98;1.26	1.04	0.88;1.22
Paternal level of education						
Incomplete primary school	173	51.6	1	ref.	1	ref.
Complete primary school	184	58.0	1.12	0.92;1.37	1.09	0.89;1.35
Complete high-school	331	63.5	1.23	1.02;1.48	1.17	0.95;1.43
Complete higher education	180	57.7	1.12	0.97;1.29	1.04	0.85;1.28
Number of cars						
None	215	58.0	1	ref.	1	ref.
One	441	58.0	1.00	0.89;1.12	0.95	0.86;1.06
Two or more	227	58.7	1.01	0.85;1.20	0.97	0.83;1.13
Level 3						
Hours spent watching television						
< 1 hour	130	53.1	1	ref.	1	ref.
from 1 to 4 hours	489	60.5	1.14	0.99;1.31	1.09	0.94;1.27
> 4 hours	263	56.8	1.07	0.95;1.21	1.06	0.95;1.19
Hours spent using a computer						
< 1 hour	301	52.8	1	ref.	1	ref.
from 1 to 4 hours	373	62.2	1.18	1.06;1.31	1.12	0.97;1.29
> 4 hours	207	60.2	1.14	0.98;1.32	1.03	0.88;1.20
Level 4						
Social support from family for PA						
No	359	49.9	1	ref.	1	ref.
Yes	524	65.7	1.32	1.18;1.47	1.14	1.05;1.23
Social support from friends for PA						
No	149	34.3	1	ref.	1	ref.
Yes	734	67.7	1.97	1.67;2.33	1.52	1.31;1.78
Number of barriers for the practice of PA[a]						
Low (≤1 barriers)	412	78.5	1	ref.	1	ref.
Average (2 - 3 barriers)	291	56.0	0.71	0.65;0.78	0.76	0.70;0.82
High (≥ 4 barriers)	180	38.1	0.48	0.43;0.55	0.54	0.46;0.62

[a] ≥ 1 day/week, MVPA, ≥ 60 min
PA: physical activity; PR: prevalence ratio; CI95%: 95% confidence interval

social support from family (PR=1.49, CI95% 1.10;2.02) and friends (PR=2.44, CI95% 1.67;3.57). There was an inverse association with moderate (PR=0.33, CI95% 0.22;0.48) and high number of barriers (PR=0.21, CI95% 0.13;0.33) for the practice of PA. After adjustment for all other variables of the study, only male sex and number of barriers remained associated with the recommended practice of PA (p<0.001).

DISCUSSION

More than half of the adolescents practiced MVPA at least one day of the week, although only 14.5% met the recommendation for their age group. The factors associated with practice of PA were male sex, having social support from family and friends and perceiving a low number of barriers.

Table 3. Factors associated with the recommended practice of physical activity. Curitiba, Southern Brazil, 2006.

Variables	Recommended practice of PA[a]		Bivariate analysis		Multiple analysis	
	n	%	PR	CI95%	PR	CI95%
Level 1						
Sex						
Female	82	9.1	1	ref.	1	ref.
Male	138	22.3	2.44	1.74;3.44	2.45	1.73;3.46
Age						
14	9	10.5	1	Ref.	1	Ref.
15	56	14.8	1.42	0.76;2.63	1.36	0.74;2.50
16	71	14.2	1.35	0.70;2.61	1.28	0.68;2.43
17	65	15.3	1.46	0.87;2.46	1.35	0.85;2.13
18	19	14.8	1.42	0.90;2.25	1.29	0.81;2.05
Body mass index						
Normal	192	14.3	1	ref.	1	ref.
Overweight	28	15.7	1.10	0.78;1.55	0.94	0.65;1.37
Level 2						
Maternal level of education						
Incomplete primary school	45	12.9	1	ref.	1	ref.
Complete primary school	41	12.7	0.99	0.62;1.56	0.94	0.60;1.46
Complete high-school	76	13.9	1.08	0.78;1.49	0.89	0.61;1.29
Complete higher education	53	18.3	1.42	1.00;2.03	1.11	0.74;1.68
Paternal level of education						
Incomplete primary school	45	13.4	1	ref.	1	ref.
Complete primary school	38	12.0	0.89	0.67;1.19	0.87	0.63;1.21
Complete high-school	78	15.0	1.11	0.77;1.61	1.04	0.67;1.63
Complete higher education	57	18.3	1.36	1.08;1.71	1.16	0.86;1.55
Number of cars						
None	42	11.3	1	ref.	1	ref.
One	104	13.7	1.21	0.79;1.85	1.10	0.70;1.72
Two or more	74	19.1	1.69	1.06;2.70	1.45	0.88;2.40
Level 3						
Hours spent watching television						
< 1 hour	46	18.8	1	ref.	1	ref.
from 1 to 4 hours	118	14.6	0.78	0.50;1.21	0.75	0.50;1.14
> 4 hours	56	12.1	0.64	0.38;1.10	0.70	0.44;1.10
Hours spent using a computer						
< 1 hours	76	13.3	1	ref.	1	ref.
from 1 to 4 hours	93	15.5	1.16	0.86;1.57	0.98	0.74;1.30
> 4 hours	51	14.8	1.11	0.82;1.51	0.88	0.67;1.17

To be continued

Table 3 continuation

Variables	Recommended practice of PA[a]		Bivariate analysis		Multiple analysis	
	n	%	PR	CI95%	PR	CI95%
Level 4						
Social support from family for PA						
No	83	11.5	1	Ref.	1	Ref.
Yes	137	17.2	1.49	1.10;2.02	1.19	0.89;1.60
Social support from friends for PA						
No	31	7.1	1	Ref.	1	
Yes	189	17.4	2.44	1.67;3.57	1.42	0.97;2.06
Number of barriers for the practice of PA[a]						
Low (≤1 barrier)	146	27.8	1	Ref.	1	Ref.
Average (2 - 3 barriers)	47	9.0	0.33	0.22;0.48	0.36	0.23;0.55
High (≥ 4 barriers)	27	5.7	0.21	0.13;0.33	0.24	0.15;0.38

[a] ≥ 5 days/week, MVPA, ≥ 60 min1
PA: physical activity; PR: prevalence ratio; CI95%: 95% confidence interval

In the present study, an instrument frequently used in epidemiological surveys with adolescents[2] was used, enabling the classification of individuals according to current recommendations for the practice of physical activities.[23,a] More recent studies, which used similar PA measures and cut-off points, indicate a high prevalence of physical inactivity in adolescents of Pelotas, Southern Brazil[1,10] and the following Brazilian cities – Florianópolis,[14] Londrina,[16] São Paulo,[5] Rio de Janeiro[4] and Recife[14] – with values varying between 39.2%[16] and 69.8%.[1] The high prevalence of physical inactivity found in Curitiba (85.5%, Table 1) is higher than those found in the previously mentioned studies and more coherent with the Brazilian situation.[24] This difference can be partly explained by the low sensitivity and high criterion of PA time (60 minutes) in the instrument used, which could lead to classification errors.

The results found in the literature are consistent with those of the present study and support the statement that male adolescents are physically more active.[3,18,22,25] In fact, in this study, they were more active both in the practice of PA for at least one day a week and in meeting the recommendations (75.1% versus 46.5% and 22.3% versus 9.1%, respectively, p<0.001). As PA is a complex behavior, influenced by several factors, it is important to distinguish the reasons for individuals of both sexes to choose more active lifestyles. In addition to biological attributes, there are gender differences associated with education and initial development, as well as other sociocultural factors.[10,22] Since an early age, female adolescents are directed towards caring for their families, whereas males are directed towards more vigorous work activities.[22] As an example, it is estimated that women spend approximately three times more time on household chores than men (27.2 versus 10.7 hours/week).[c]

The social support provided by family and friends for the practice of PA is important to adopt and maintain this behavior,[18] representing a relevant and consistent determinant of PA.[22] In the present study, the participation of family and friends was associated with greater involvement with the practice of PA in both genders, although there was no association with meeting the minimum recommendations for PA (≥5 days/week, MVPA, ≥60 min). In contrast, in the present study, greater contact with friends, especially out of the school environment during adolescence, seems to contribute to a more active behavior.[10] The fact that friends are involved with PA can increase the chance of adolescents practicing PA.[22,25] The inclusion of adolescents in social groups can lead them to adopt habits of their peers. Thus, data from the present study point out that social support from friends can promote an active lifestyle, particularly in male adolescents; similar results were observed for support from family, especially in female adolescents. These results are in accordance with investigations that point to sedentary behavior of parents being associated with that of their children;[1,11,19] likewise, physically active parents tend to have equally active children.[22]

Barriers represent factors that prevent or hinder involvement with PA.[9,22] The main barriers reported by adolescents are of an environmental (climate), sociocultural (lack of company of friends) and psychological nature (laziness).[20] Reports of "preferring to do other things" and "not being able to afford something" were also

[c] Pinheiro L, Fontoura NO, Querino AC, Bonetti A, Rosa W. Retrato das desigualdades de gênero e raça. Brasília: Secretaria Especial de Políticas para as Mulheres. Instituto de Pesquisa Econômica Aplicada. Fundo de Desenvolvimento das Nações Unidas para a Mulher; 2008. [cited 2008 Dec 28]. Available from: http://www.ipea.gov.br/sites/000/2/destaque/Pesquisa_Retrato_das_Desigualdades.pdf

relevant barriers for the practice of PA.[20] These barriers seem inherent to the current context of society, where an adolescent is subject to innumerable school activities (classes, homework and others) and out-of-the-school activities (language, computer and pre-university courses), which conflict with the time for leisure and sports activities.[18] Perception of a high number of barriers was inversely associated with meeting PA recommendations, suggesting that these should be considered in intervention programs and promotion of PA in adolescents.[20]

Age, BMI, parents' level of education, ownership of cars and sedentary behavior (hours spent watching television and using a computer) were not associated with PA. These results converge with studies that did not find associations between PA and age[8] and sedentary behavior.[5] However, they diverge from other studies that point to an association with age,[18] BMI,[11,18] parents' level of education[25] and sedentary behavior.[11,18]

Certain limitations must be considered when interpreting the results of the present study. The use of an instrument that evaluates PA globally and that considers at least 60 minutes of activity as criterion of classification hinders the identification of shorter periods, in addition to the variations in type and intensity of PA performed. The fact that the sample involves public school network students does not enable the generalization of results to all adolescents in the city, especially those from very high or low economic classes. The age of adolescents studied was limited to the interval between 14 and 18 years, a period when possible variations in PA levels can be smaller, preventing comparisons between age groups. Another limitation refers to parents' level of education, which is relatively high (more than 50% have a complete high-school or higher education level), which may have reduced the level of comparisons between classes of extreme levels of education and PA level of adolescents. However, sample size and representativeness in relation to the population enable a safer extrapolation of results to public network students and a higher level of statistical analyses. In addition to this characteristic, there is the fact that the majority of adolescents enrolled in the city of Curitiba belong to the public school network. Thus, the results of this study have contributions to a significant part of adolescents in the city.

Although more than half of adolescents practice PA at least one day a week, only one out of every seven meets the recommendations. Based on these results, it is suggested that interventions be aim at greater social support and reduce the barriers for promotion of practice of physical activity in adolescents.

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