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Physical activity patterns among high school students of Ponta Grossa, PR

Padrões de atividade física em escolares de Ponta Grossa, Paraná

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Abstract

Physical activity (PA) during adolescence promotes health benefits and can be an indicator of PA in adulthood. This study aims to identify physical activity patterns in a sample of 1,129 students (58.5% of girls), aged between 14 and 18 years, from High Schools of Ponta Grossa, PR. In this study, the following data were collected: sociodemographic information, weight, height, sedentary behavior, active commuting to school, moderate to vigorous PA (MVPA), and participation in physical education (PE) classes. For data analysis we used absolute and relative frequency distribution and the chi-square test for proportions. Logistic regression analysis was used to assess the association between different contexts of PA and the independent variables. Statistical calculations were developed by the SPSS 16.0 program and a significance level of p <0.05 was adopted. The prevalence of overweight was 19.1% (CI=14.7-29.8%), higher among boys (26.3% versus 14.1%: p <0.01). Most of the students are active regarding commuting to school (58.8%), MVPA (71%) and PE classes (85.5%), and present sedentary behavior that lasts between 1 and 4 hours (55.2%) per day. There was an association between participating in PE classes and active commuting to school (p <0.05). Girls and adolescents aged 17-18 years participate less in PE classes. Teenagers who do not work are the ones who least practice MVPA. It is concluded that special attention should be given to these groups, promoting intervention programs and encouraging the practice of PA.

Keywords

Motor activity; Adolescent; Students.

Resumo

A atividade física (AF) na adolescência promove benefícios à saúde e pode ser um indicador de AF na idade adulta. Este estudo tem como objetivo identificar os padrões de atividade física (AF) em 1129 escolares (58,5% meninas), entre 14 e 18 anos, do Ensino Médio de Ponta Grossa, PR. Foram coletadas as informações sociodemográficas, massa corporal, estatura, comportamento sedentário, deslocamento ativo para a escola, prática de AF de intensidade moderada a vigorosa (AFMV) e participação nas aulas de educação física (EF). Para análise dos dados utilizou-se a distribuição de frequências absoluta e relativa e o teste Qui-quadrado para proporções. A análise de regressão logística foi utilizada para verificar a associação entre os diferentes contextos de AF e as variáveis independentes. Os cálculos estatísticos foram desenvolvidos pelo programa SPSS 16.0, adotando-se um nível de significância de p<0,05. A prevalência de excesso de peso foi de 19,1% (IC = 14,7-29,8%), sendo maior entre os meninos (26,3% versus 14,1%: p<0,01). Maior parte dos escolares são ativos no deslocamento para a escola (58,8%), em AFMV (71%), nas aulas de EF (85,5%) e apresentam comportamento sedentário de 1 a 4 horas (55,2%). Houve associação entre participar das aulas de EF e deslocamento ativo (p<0,05). As meninas e os adolescentes entre 17 e 18 anos participam menos das aulas de EF. Os adolescentes que não trabalham são os que menos praticam AFMV. Conclui-se que atenção especial deve ser dada a estes grupos promovendo programas de intervenção e incentivo à prática de AF.

Palavras-chave

Atividade motora; Adolescente; Estudantes.

INTRODUCTION

Physical activity (PA) decreases during adolescence[1], contributing to the low prevalence of adolescents who achieve the recommended PA levels to obtain health benefits [2-3]. Remaining active in adolescence is associated with greater probability of PA in adulthood [4], as well as with lower odds of developing morbidities [5]. Understanding PA patterns in adolescents and how they associate with sociodemographic and behavioral variables can contribute to the development of more efficient intervention strategies in this population[4].

In Brazil, few studies have explored PA in different contexts and the factors associated with it [6-7]. Investigations have shown that the main forms of PA in adolescence are participation in physical education (PE) classes, active commuting to school and engagement in moderate to vigorous PA (MVPA) outside school, especially in sports activities [8-9]. However, it is believed that there is a variation in the prevalences of these PA forms in relation to the (local) context where the studies are carried out. For example, participation in PE classes varies from 62.8% to 87.6% in different regions of Brazil [7, 10-11]. Likewise, the practice of MVPA varies from 71.5% to 90.8% among Brazilian adolescents [9, 11-12], and between 20 and 60% in international studies [3, 13-14].

Like the prevalence, the associated factors may also differ in relation to each form of PA [3]. Therefore, identifying PA patterns and how they associate with sociodemographic aspects in relation to different forms of PA may contribute to better understand this behavior in adolescents. Thus, the aim of this study is to analyze PA patterns and their associated factors among High School students in the city of Ponta Grossa, State of Paraná (Southern Brazil).

METHODS

A school-based, cross-sectional study (N=6,597) was carried out in public schools of the city of Ponta Grossa, State of Paraná (Southern Brazil). Individuals of both sexes enrolled in urban High Schools in the period of the morning participated in the study. The sampling process was conducted by the two-stage proportionate stratified method. Initially, all the public schools were listed and grouped according to their geographical location (north, south, east, west and center). Nine schools were then selected through stratification by geographical region, which guaranteed the representativeness of the city's geographical zones in the sample. The number of selected classes in each school was defined so as to reach the percentage representativeness of its geographical area in relation to the municipality as a whole.

To calculate sample size, the following aspects were taken into account: prevalence of physical inactivity of 50% among adolescents, confidence interval of 95%, error of 3 percentage points, design effect of 1.5 and addition of 10% for losses/refusals. The minimum sample was estimated at 1,015 individuals, and all the individuals who were in the classroom on the collection day and whose participation had been authorized by parents/guardians were considered eligible subjects. The exclusion criteria were: being older than 19 years, pregnant adolescents, and refusal of the parent/guardian or adolescent to sign the informed consent document. Thus, the final sample was composed of 1,129 individuals aged between 14 and 18 years.

Data collection occurred during the week in the Physical Education classes. All the students were volunteers and signed the informed consent document. A structured questionnaire was administered, containing questions about sociodemographic and economic information, sedentary behavior, habitual physical activity and participation in physical education classes. Students' weight and height were also measured.

Information about age and sex was collected. Socioeconomic level was analyzed based on the ownership of items, according to the classification into economic classes [15]. Operationally, the economic classes were grouped into the following strata: high (A1+A2+B1+B2), medium (C1+C2) and low (D+E). The adolescent's labor activity practice was analyzed through the question: *"Besides studying, do you have a paid job?"* The answer options were dichotomized as "no" and "yes".

Weight and height were measured [16]. Based on these measures, the body mass index (BMI) was calculated. The classification of the nutritional status [17] took into account sex and age and was grouped into normal weight (low weight + normal weight) and overweight (overweight + obesity).

Sedentary behavior was analyzed by means of a question referring to the time, in hours, spent watching television or using the computer per day [18]. This variable was categorized into three levels: less than 1 hour/day, between 1 and 4 hours/day and ≥ 5 hours/day.

Active commuting was assessed by means of the way in which the adolescent regularly goes to school. Students who reported going to school walking or cycling on a regular basis were considered active commuters.

Habitual physical activity was assessed by means of the International Physical Activity Questionnaire, IPAQ – short version. It is valid to assess habitual PA in Brazilian adolescents [19]. Adolescents who reported practicing moderate and vigorous activities for at least 300 minutes per week were considered active. Participation in Physical Education classes was assessed by means of the question: *"Do you regularly participate in the Physical Education classes at school?"*, and the answers were dichotomized as "no, I don't" and "yes, I do".

To describe the variables, stratified by sex, absolute and relative frequency distribution was used. The chi-square test for proportions was utilized to verify differences in the studied variables between sexes. Logistic regression analysis was employed to verify the association between different contexts of physical activity practice and the independent variables. Three models of analysis were proposed considering different dependent variables: model 1 (active commuting to school), model 2 (participates in the physical education classes) and model 3 (physically active >300 min./week MVPA). Sex, age, occupation, nutritional status, socioeconomic level and sedentary behavior variables were considered independent variables. The statistical calculations were developed by the program SPSS 16.0, and a level of significance of $p<0.05$ was adopted. This study was approved by the Ethics Committee for Research with Human Beings of *Universidade Estadual de Ponta Grossa*-PR (protocol 40/07), according to Resolution 196/96 of the National Health Council.

RESULTS

The study involved the participation of 1,129 adolescents (58.5% of girls), aged between 14 and 18 years. The prevalence of overweight was 19.1% (CI = 14.7-

29.8%), higher among boys (26.3% *versus* 14.1%: p<0.01). The majority of the adolescents belong to the medium economic stratum (75.3%). Approximately 80% of the adolescents do not work, and this prevalence is higher among the girls (85.9% *versus* 74.2%; p<0.001). In relation to the PE classes, it was observed that 85.5% participate in them, and participation is higher among the boys (94.8% *versus* 78.9%; p<0.001). The majority of the students actively commute to school (58.8%), practice MVPA (71%) and spend between 1 and 4 hours per day (55.2%) in sedentary behaviors. Other characteristics of the sample are presented on Table 1.

Table 1 – Characteristics of the sociodemographic variables, body composition, physical activity and sedentary behavior among students according to sex. Ponta Grossa, Brasil, 2010.

Variables	Categories	Total		Boys		Girls			
		n	%	n	%	n	%	X^2	p
Sex		1129	100.0	469	41.5	660	58.5		
Age (years)	14	164	14.5	72	15.4	92	13.9	2.6	0.63
	15	310	27.5	134	28.6	176	26.7		
	16	367	32.5	151	32.2	216	32.7		
	17	215	19.0	80	17.1	135	20.5		
	18	73	6.5	32	6.8	41	6.2		
Nutritional status	Normal	769	80.9	292	73.7	477	85.9	22.3	0.00
	Overweight	182	19.1	104	26.3	78	14.1		
SES	A+B	114	10.1	62	13.2	52	7.9	14.6	0.001
	C	850	75.3	355	75.7	495	75.0		
	D+E	165	14.6	52	11.1	113	17.1		
Works	Yes	212	18.9	120	25.8	92	14.1	24.2	0.00
	No	908	81.1	346	74.2	562	85.9		
Active Commuting	No	463	41.2	198	42.2	265	40.5	0.3	0.55
	Yes	661	58.8	271	57.8	390	59.5		
Participation in PE classes	Does not participate	162	14.5	24	5.2	138	21.1	56.1	0.00
	Participates	957	85.5	442	94.8	515	78.9		
MVPA	Inactive/Insuff. Active	313	29.0	117	26.1	196	31.1	3.1	0.08
	Active	766	71.0	331	73.9	435	68.9		
Sedentary Behavior	<1 hour	122	10.9	42	9.0	80	12.2	3.25	0.20
	from 1 to 4 hours	620	55.2	268	57.1	352	53.7		
	>4 hours	382	34.0	159	33.9	223	34.0		

SES: socioeconomic status. MVPA: Moderate to vigorous physical activity. X2: chi-square.

After adjusting for potential confounding variables, active commuting to school (Table 2) was associated with participation in PE classes (PR=1.21; CI=1.00-1.48).

As presented on Table 3, girls and adolescents aged 16, 17 and 18 participate less in PE classes. However, the adolescents who present sedentary behavior that lasts between 1 and 4 hours participate more in PE classes. When adjusted for all the other independent variables, only female sex and the age categories of 17 and 18 years were associated with lower participation in PE classes.

Table 2 – Crude and adjusted logistic regression analysis of the association between active commuting to school and sociodemographic characteristics, body composition, moderate to vigorous physical activity, participation in Physical Education classes and sedentary behavior. Ponta Grossa, Brasil, 2010.

Variables				Crude analysis		Adjusted analysis	
		n	%	PR (95%CI)	p	PR (95%CI)	p
Sex	Male	271	57.8				
	Female	390	59.5	1.03 (0.93-1.14)	0.51	1.05 (0.94-1.16)	0.36
Age	14	97	59.5				
	15	178	57.4	0.96 (0.74-1.25)	0.76	0.95 (0.77-1.18)	0.62
	16	233	63.8	1.07 (0.82-1.40)	0.56	1.05 (0.86-1.28)	0.61
	17	117	54.9	0.92 (0.72-1.18)	0.48	0.97 (0.79-1.19)	0.71
	18	36	49.3	0.83 (0.61-1.13)	0.20	0.88 (0.67-1.17)	0.33
BMI	Normal	459	60.0				
	Overweight	109	60.2	1.00 (0.87-1.16)	0.95	0.99 (0.86-1.13)	0.82
Works	Yes	116	54.7				
	No	541	59.9	1.09 (0.90-1.34)	0.32	1.05 (0.90-1.22)	0.49
SES	A+B	52	46.4				
	C	507	59.8	1.29 (1.03-1.61)	0.03	1.16 (0.93-1.43)	0.16
	D+E	102	62.2	1.34 (1.07-1.68)	0.02	1.18 (0.92-1.51)	0.16
MVPA	Inactive	170	54.7				
	Active	463	60.6	1.11 (0.90-1.36)	0.28	1.08 (0.88-1.34)	0.40
Participation PE Classes	Does not participate	83	51.2				
	Participates	577	60.3	1.18 (0.96-1.45)	0.11	1.21 (1.00-1.48)	0.05
Sedentary Behavior	<1 hour	69	56.6				
	from 1 to 4 hours	373	60.2	1.06 (0.89-1.27)	0.45	1.04 (0.84-1.29)	0.68
	>4 hours	219	57.3	1.01 (0.75-1.37)	0.92	1.00 (0.67-1.50)	1.00

BMI: Body Mass Index. SES: socioeconomic status. MVPA: Moderate to vigorous physical activity. PR: prevalence ratio.

Table 3 – Crude and adjusted logistic regression analysis of the association between participation in Physical Education classes and sociodemographic characteristics, body composition, moderate to vigorous physical activity, active commuting and sedentary behavior. Ponta Grossa, Brasil, 2010.

Variables				Crude analysis		Adjusted analysis	
		n	%	PR (95%CI)	p	PR (95%CI)	p
Sex	Male	442	94.8				
	Female	515	78.9	0.83 (0.75-0.93)	0.00	0.82 (0.73-0.92)	0.00
Age	14	149	91.4				
	15	276	89.0	0.97 (0.92-1.04)	0.35	1.00 (0.94-1.07)	0.95
	16	304	83.7	0.92 (0.86-0.98)	0.01	0.93 (0.86-1.00)	0.06
	17	173	82.0	0.90 (0.86-0.94)	0.00	0.91 (0.82-1.00)	0.05
	18	55	76.4	0.84 (0.73-0.96)	0.02	0.81 (0.67-0.98)	0.03

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BMI	Normal	641	84.1				
	Overweight	158	87.3	1.04 (0.95-1.13)	0.35	1.00 (0.91-1.10)	0.98
Occupation	Yes	179	84.8				
	No	772	85.9	1.01 (0.96-1.06)	0.58	1.03 (0.95-1.12)	0.43
SES	A+B	96	85.7				
	C	723	85.7	1.00 (0.91-1.10)	0.99	1.03 (0.95-1.12)	0.43
	D+E	138	84.7	0.99 (0.88-1.11)	0.81	1.05 (0.94-1.17)	0.37
MVPA	Inactive/ Insuff. active	229	81.8				
	Active	671	86.6	1.06 (0.97-1.15)	0.17	1.02 (0.96-1.09)	0.53
Active Commuting	No	380	82.8				
	Yes	577	87.4	1.06 (0.99-1.13)	0.09	1.07 (1.00-1.14)	0.05
Sedentary Behavior	<1 hour	98	80.3				
	from 1 to 4 hours	545	88.5	1.10 (1.00-1.21)	0.04	1.08 (0.97-1.20)	0.12
	>4 hours	314	82.4	1.03 (0.89-1.19)	0.70	1.00 (0.85-1.18)	0.98

BMI: Body Mass Index. SES: socioeconomic status. MVPA: Moderate to vigorous physical activity. PR: prevalence ratio.

In relation to the practice of MVPA (Table 4), it was observed that the adolescents who do not work presented lower probability of performing these physical activities when compared to those who work (PR=0.90; CI=0.84-0.96).

Table 4 – Crude and adjusted logistic regression analysis of the association between practice of MVPA and sociodemographic characteristics, body composition, participation in Physical Education classes, active commuting and sedentary behavior. Ponta Grossa, Brasil, 2010.

Variables				Crude analysis		Adjusted analysis	
		n	%	PR (95%CI)	p	PR (95%CI)	p
Sex	Male	326	75.3				
	Female	451	72.2	0.96 (0.87-1.06)	0.37	1.00 (0.92-1.09)	1.00
Age	14	102	65.8				
	15	217	73.3	1.11 (0.95-1.31)	0.16	1.12 (0.94-1.33)	0.16
	16	264	76.7	1.17 (0.96-1.41)	0.10	1.12 (0.90-1.41)	0.26
	17	147	75.4	1.15 (0.91-1.45)	0.22	1.11 (0.87-1.41)	0.34
	18	47	69.1	1.05 (0.85-1.29)	0.60	1.06 (0.83-1.36)	0.60
BMI	Normal	531	73.9				
	Overweight	129	74.1	1.00 (0.92-1.10)	0.92	1.00 (0.94-1.07)	0.89
Works	Yes	155	79.9				
	No	616	71.9	0.90 (0.83-0.97)	0.01	0.90 (0.84-0.96)	0.01
SES	A+B	78	72.9				
	C	577	72.3	0.99 (0.88-1.11)	0.88	0.97 (0.81-1.16)	0.70
	D+E	122	79.7	1.09 (0.97-1.23)	0.12	1.03 (0.90-1.18)	0.64

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Participation PE classes	Does not participate	104	67.1				
	Participates	671	74.6	1.11 (0.92-1.35)	0.24	1.07 (0.89-1.28)	0.42
Active Commuting	No	305	70.0				
	Yes	472	75.9	1.08 (0.96-1.23)	0.17	1.06 (0.92-1.22)	0.35
Sedentary Behavior	<1 hour	85	73.3				
	from 1 to 4 hours	456	78.4	1.07 (0.90-1.27)	0.40	1.04 (0.89-1.22)	0.58
	>4 hours	236	65.6	0.89 (0.80-1.00)	0.06	0.89 (0.77-1.02)	0.08

BMI: Body Mass Index. SES: socioeconomic status. MVPA: Moderate to vigorous physical activity. PR: prevalence ratio.

DISCUSSION

The results of this study reveal high prevalence of active commuting (58.8%), participation in PE classes (85.5%) and practice of MVPA (71.0%). These results are similar to those found in other national studies, which have reported prevalence of active commuting from 50% to 70% [8-9], participation in PE classes from 62.8 to 87.6% [7, 10-11], and MVPA from 71.5 to 90.8% [9, 11-12]. Thus, despite environmental and sociocultural differences, the pattern of behaviors related to PA was not different from that observed in other studies in Brazil.

In relation to the associated factors, it is observed that they differ in relation to the form of PA that was analyzed. Participation in PE classes was positively associated with active commuting; in addition, participation in this type of PA was lower among girls and tends to decrease as adolescence advances. This result has also been observed in other studies [7, 11, 20]. The girls' lower participation in PE classes can contribute to explain the lower levels of global PA observed in this group. A positive experience in the PE classes is positively associated with global participation in PA [21]. Therefore, time optimization and the quality of the PE classes can favor and stimulate PA among adolescents. In this way, encouraging participation in the PE classes can be an efficient strategy to stimulate PA, which can favor the performance of active commuting to school [8]. Therefore, it is recommended that participation in PE classes is stressed by public policies that guarantee an adequate number of weekdays, as well as conditions to maintain their quality [22].

Another important issue refers to the decrease in the participation in PE classes as age advances. It is believed that the larger number of school tasks and the proximity to the universities' entrance exams make the adolescents prioritize these activities to the detriment of the participation in PE classes. This may have a negative impact on PA levels in adulthood, as this pattern can be adopted as a lifestyle habit that can lead to the prioritization of labor activities. This pattern has been observed among university students, who tend to reduce the PA levels even more, compared to the initial patterns they presented when they entered the courses [23].

In relation to MVPA, adolescents who do not work are less physically active compared to those who work. These results are similar to the ones reported among adolescents aged 14-18 years in the city of João Pessoa, State of Paraíba (Northeastern Brazil), where it was observed that the adolescents who do not work were more inactive [24]. These results suggest that, although the teenagers who

do not work have more available time, they probably use it in other activities. The teenagers are involved in a variety of activities in their free time and the majority of them are sedentary [25]. A study carried out in the city of Curitiba [12] (Southern Brazil) identified that one of the main barriers to the adolescents' performing PA is *"to prefer to do other things"*, both for boys and girls. However, this issue needs to be analyzed with caution, because although PA is high among the analyzed adolescents, it competes nowadays with a number of other sedentary activities that may be more attractive to the adolescents.

This study has some limitations. It is a cross-sectional study; thus, it is not possible to establish cause and effect relations in the associations. The utilization of self-reported measures can be influenced by memory bias, mainly in relation to the PA and sedentary behavior measures. The delimitation of adolescent students of public schools does not allow extrapolating the results to all the adolescents of the city, nor to adolescent students of private schools. The small number of sociodemographic variables that were associated with PA suggests that future studies should explore other types of variables, like self-efficacy, social support, environment, taste, family norms, etc. However, the results of this study present contributions to a significant part of this population, as the representativeness and sample size allows to extrapolate results to the population of adolescent students of public schools, contributing to a greater power of the analyzes, as well as to the assessment of many forms of PA in adolescence.

Based on the results, it is possible to conclude that a considerable part of the High School adolescents of public schools of Ponta Grossa, state of Paraná, participate in PE classes, are physically active in commuting to school, practice MVPA and perform sedentary activities during 1 to 4 hours per day. Adolescents who commute to school in a physically active way tend to participate more in PE classes. There was higher participation in PE classes among boys and among younger teenagers, and MVPA associated with the adolescents' occupation.

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