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original article

Physical activity and associated factors among students attending evening classes

Fatores associados à atividade física em adolescentes estudantes do período noturno

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Abstract – The aim of this study was to describe the physical activity level and associated factors among students attending evening classes in public and private schools in a region of the city of São Paulo. The sample was composed of 1,844 adolescents of both sexes aged 15-20 years. Three public and private schools in the city of São Paulo were visited. Daily physical activity level was assessed through International Physical Activity Questionnaire that classifies physical activity level. Physical activity level was divided into insufficiently active (when subject reported less than 300 minutes of moderate to vigorous physical activities per week) and physically active (when subject reported more than 300 minutes of moderate to vigorous physical activities per week). Information related to risk behavior such as smoking and alcohol consumption was collected. Data were analyzed using logistic regression with three levels of data input and p<.05 as significance. The prevalence of physically active adolescents was 36.1%. Most active subjects were: A) younger boys with low socioeconomic levels; B) adolescents from private schools; C) adolescents that do not smoke or drink alcoholic beverages; D) those who do not attend formal exercise program; E) those who go to school to perform physical activities on weekends. Adolescents attending evening classes tended to be insufficiently active. We believe that school structure, working hours, and distance from home and workplace to school and risk factor should explain these data. Intervention programs could significantly contribute to increase the physical activity level among adolescents.

Key words: Adolescents; Evening classes; Motor activity.

Resumo – *O objetivo do estudo foi descrever os fatores associados à atividade física de adolescentes que frequentam aula no período noturno de escolas públicas e privadas em uma região da cidade de São Paulo. Foram selecionadas três escolas públicas e três escolas privadas que ofereciam as séries acadêmicas do ensino médio na zona norte da cidade de São Paulo. A amostra foi composta de 1.844 adolescentes com idades entre 15 e 20 anos. A atividade física foi avaliada pelo Questionário Internacional de Atividade Física. Os adolescentes classificados como ativos foram àqueles que cumpriram a recomendação de no mínimo 300 minutos semanais em atividades físicas. Coletaram-se informações sobre o uso de tabaco e ingestão de bebidas alcoólicas. Empregou-se a regressão logística (significância de p< 0,05). A prevalência geral de adolescentes que cumpriam a recomendação da atividade física (>300 minutos/semanais) foi de 36,1%, se associando às seguintes variáveis: A) rapazes mais jovens e com menor nível socioeconômico; B) adolescentes que estudavam em escolas privadas; C) não fazer uso de tabaco ou bebidas alcoólicas; D) não exercer atividades profissionais remuneradas e; E) frequentar a escola nos fins de semana para praticar atividades físicas. O nível de atividade física dos estudantes de escolas públicas e privadas parece sofrer influência do período que frequentam as aulas, sugerindo a implantação de mecanismos de incentivo que aumentem a participação em atividades físicas. A estrutura escolar e programas de intervenção poderiam contribuir para incrementar o nível de atividade física entre adolescentes.*

Palavras-chave: *Adolescentes; Atividade motora; Ensino noturno.*

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INTRODUCTION

The last decades have been marked by major technological changes worldwide, which may explain in part the decrease in daily physical activity levels in adolescents and young adults both in developed and developing countries[1]. Scientific evidence has demonstrated that reduced physical activity levels are associated with higher prevalence of chronic diseases, especially when there is combination of health risk behaviors such as tobacco use, alcohol consumption and poor diet, which result in high levels of blood cholesterol, overweight and type II diabetes[2,3]. On the other hand, there is consensus about the relationship between regular physical activity and its health benefits, regardless of age, ethnicity and social class[4,5].

Specifically during adolescence, the combination between low physical activity levels and health risk behaviors are determining factors in the development of the cardiorespiratory, neuromuscular and bone mass problems during adolescence and adulthood[6,7].

Studies have shown various health risk indicators in adolescents, which have led public health authorities worldwide to increase interventions, following recommendations of health promotion focusing on regular physical activity for adolescents supported by the World Health Organization[2], American Heart Association[5], Centers for Disease Control and Prevention[3], American College of Sports Medicine[7] and American Academy of Pediatrics[8]. Recommendations suggest that all adolescents should perform at least 300 minutes of physical activity per week, over five days of week, 60 minutes per session, preferably at moderate and vigorous intensities[2,3,7,8].

In a recent meta-analysis study evaluating Brazilian adolescents, it was demonstrated that the prevalence of physical inactivity (<300 minutes of PA per week) ranged from 5.4% to 91%, according to sex, age, socioeconomic status, alcohol and tobacco use, and this variation was due to the different types of instruments used to measure physical activity levels[9].

Although scientific information available in literature has evaluated the physical activity level among adolescents, only one study was conducted with individuals at this age group in cities with high degree of urbanization attending high school evening classes in the city São Paulo[10]. Thus, quantifying the prevalence of physical activity and associated factors will facilitate health promotion programs with specific focus, seeking to reduce the prevalence of health risk factors in this population.

The aim of this study was to describe factors associated with physical activity in adolescents attending evening classes in schools in a city with high degree of urbanization.

METHODOLOGICAL PROCEDURES

This study was conducted in 2013 in the city of São Paulo with approximately 1 million adolescents aged 14-20 years distributed in an area of 1,522 km2, divided into 9 geographical regions[11]. This study is the first step

of a project that has evaluated the physical activity level and health risk behaviors of adolescents in nine regions of São Paulo.

The study sample was defined from the process of selection of public and private schools in the city of São Paulo. Among the 204 schools, 129 were public and 75 private. Three public and three private schools were selected. Schools participating in the study were located in northern region of São Paulo according to two selection criteria: 1) public and private schools included in the list of the Department of Education of northern city of São Paulo; 2) schools offering high school evening classes. After the selection of schools, the researchers contacted the heads of each school, explaining the study objectives, instruments, application form and evaluation logistics.

Sample size estimation was performed according to the following parameters: a) expected prevalence of physical activity of 50.0%; 2) sampling error of 3 points; and 3) 95% confidence interval. Thus, the minimum sample required was estimated in at least 384 adolescents, and with no response rate of 10%, the sample included 406 adolescents.

The sample selection considered the total number of students enrolled in three private schools (1,567 students) and three public schools (2,434 students). A drawing for two grades in each school was carried out, and all students participated in the study, except if they were not attending high school evening classes, aged over 20 years and did not agree to complete or sign the Free Informed Consent Form, when over 18 or did not have the form signed by their parents or guardians when under 18. Sample included 2,042 adolescents and 198 were excluded. Thus, the final sample included 1,844 adolescents aged 15-20 years (17.1 ± 2.1 years).

Socioeconomic status (SES) was assessed by the classification questionnaire of the Brazilian Association of Research Companies (ABEP)[12], using as criteria the educational level of the household head and some consumer goods, allowing categorizing SES in descending order into 5 categories from A to E.

Physical activity level was determined by the International Physical Activity Questionnaire (IPAQ), short version 8 [13]. The classification of the physical activity level of adolescents considered all physical activities performed at moderate and / or vigorous intensities inside or outside the school in structured or unstructured way for at least 300 minutes per week. Thus, adolescents who have accumulated more than 300 minutes per week of physical activities were classified as physically active [7].

Health risk behaviors were determined by the "Questionnaire on Health and Nutrition Conditions (2004)" and considered the use of tobacco and alcohol consumption[14]. Adolescents who reported smoking at least once a week were classified as smokers. Regarding the consumption of any type of alcoholic beverage, contact with this type of drink at least once in the month prior to the evaluation was considered. All questionnaires were answered by self-report method.

The prevalence of physical activity was calculated for categories of each independent variable. The significance between proportions was assessed

using the chi-square test for heterogeneity or linear trend. Multivariate analysis was performed using logistic regression to estimate odds ratios (OR) and confidence intervals (CI 95%) and the input order of variables according to the hierarchical model of causality previously determined[15].

The hierarchical model included three levels of importance of dependent variables, and for the independent variable to remain in the adjusted model, it would have to show significance of $p < 0.20$ in the crude analysis. In the first level, socio-demographic variables (sex, age and skin color); in the second level, socioeconomic variables (SES), type of school (public or private) and paid activity during the weekdays were consider; the third level included behavioral variables (smoking, alcohol consumption and physical activity on the weekends at school). The significance level adopted was $p < 0.05$.

The research was approved by the Research Ethics Committee of the São Judas Tadeu University (CAAE – No. 212 655) and protocols followed recommendations of the National Research Ethics System.

RESULTS

Sociodemographic and behavioral characteristics of adolescents are shown in Table 1. Adolescents who attended evening classes reported paid activity (72.4%), being significantly higher among adolescents from public schools compared to those from private schools ($p < 0.001$).

The overall prevalence of tobacco use was 53.7% and was significantly higher among adolescents from private schools (56%) compared to those from public schools (46%), $p = 0.031$ and among boys (68.3%) compared to girls (39.2%), $p = 0.031$. The overall prevalence of alcohol consumption was 75.2% and was significantly higher in adolescents from public schools than in those from private schools. There was no significant difference in the prevalence of alcohol consumption in relation to sex ($p = 0.452$).

The overall prevalence of physical activity was 36.1% in adolescents attending evening classes of public and private schools. The results presented in Table 2 showed that the prevalence of physical activity was significantly higher in boys (39.4%) and younger adolescents (38.1%). Regarding socioeconomic level, adolescents of levels D (39.8%) and E (39.1%) had higher prevalence of physical activity, although 52.2% of adolescents attending private schools were classified as physically active. On the other hand, 69.4% of adolescents who reported no paid activity during the week were classified as active, as well as those who did not report use of tobacco (39.7%) or alcohol consumption (53.9%). The practice of some type of physical activity at school on weekends was positively associated with adolescents classified as physically active (49.5%).

The results of the hierarchical multivariate analysis showed that the independent variables presented similar behavior in the crude and adjusted analysis, except for skin color, which showed no statistical difference in the adjusted model (Table 3).

Table 1. Socio-demographic and behavioral characteristics of adolescent attending high school evening classes in public and private schools of São Paulo.

Independent variables	n	%
Sex		
Boys	987	53.5
Girls	857	46.5
Age		
15-17 years	1.391	75.4
18-20 years	453	24.6
Skin color		
White	965	52.3
Non white	879	47.7
Socioeconomic level		
B	44	2.4
C	551	29.9
D	462	25.1
E	787	42.7
Type of school		
Private	930	50.4
Public	914	49.6
Paid activity		
Yes	1.335	72.4
No	509	27.6
Smoking		
Yes	990	53.7
No	854	46.3
Use of alcoholic beverages		
Yes	1.387	75.2
No	457	24.8
Physical activity in school on weekends		
Yes	495	26.8
No	1.349	73.2
TOTAL	1.844	100.0

The adjusted model showed that students from private schools were more active than those from public schools (OR: 4.07 [CI 95%: 3.24-5.78]). Adolescents from socioeconomic levels D and E were 7 and 8 times more likely to achieve the weekly physical activity recommendation of health proportion compared to those from socioeconomic level B.

Behavioral variables showed that adolescents who do not smoke and do not use alcohol are 1.3 and 2.5 times more likely to comply with physical activity recommendations compared to those who use tobacco and alcohol, respectively. Adolescents who practice physical activities within the school facilities on weekends are two times more likely to be active when compared to those who did not use the school structure.

Table 2. Prevalence of physical activity according to categories of independent variables of adolescents attending evening classes in public and private schools of São Paulo.

	Prevalence of physical activity		
Independent variables	n	%	p
Sex			
Boys	389	39.4	0.001
Girls	276	32.2	
Age			
15-17 years	530	38.1	0.001
18-20 years	135	29.8	
Skin color			
White	325	33.7	0.025
Non white	340	38.7	
Socioeconomic level			
B	3	6.8	0.001
C	170	30.9	
D	184	39.8	
E	308	39.1	
Type of school			
Private	485	52.2	0.001
Public	180	19.7	
Paid activity			
Yes	312	23.4	0.001
No	353	69.4	
Smoking			
Yes	326	32.9	0.003
No	339	39.7	
Use of alcoholic beverages			
Yes	419	30.2	0.001
No	246	53.8	
Physical activity in school on weekends			
Yes	245	49.5	0.001
No	420	31.1	
TOTAL	665	36.1	

DISCUSSION

The regular practice of physical activities is important during adolescence because it promotes many health benefits, especially in physiological responses related to growth, development and human behavior[6,7]. These benefits may reflect a lower prevalence of chronic diseases and behavioral disorders in adulthood.

According to Wong and Leatherdale[16], low prevalence of physical activity in adolescence is related to risk behaviors such as increased body fat and increased risk of developing cardiovascular disease at the adult age[17] and physical inactivity[18]. Thus, insufficient practice of physical activity in

Table 3. Crude and adjusted Odds Ratio (OR) for the prevalence of physical activity according to categories of independent variables of adolescents attending evening classes in public and private schools of São Paulo

			Multivariate analysis	
Variables	Crude OR (CI95%)	p	Adjusted OR (CI95%)	p
Sex				
Boys	1.37 (1.13-1.66)	0.001	1.35 (1.10-1.68)	0.001
Girls	1.00		1.00	
Age				
15-17 years	1.45 (1.15-1.82)	0.001	1.42 (1.11-1.88)	0.001
18-20 years	1.00		1.00	
Skin color				
White	1.24 (1.03-1.50)	0.025	1.17 (0.95-1.59)	0.067
Non white	1.00		1.00	
Socioeconomic level				
B	1.00	0.001	1.00	0.003
C	5.96 (1.84-19.29)		5.03 (1.67-19.45)	
D	8.84 (2.72-28.63)		8.23 (2.21-28.29)	
E	8.59 (2.66-27.65)		7.24 (2.41-27.87)	
Type of school				
Private	4.44 (3.61-5.47)	0.001	4.07 (3.24-5.78)	0.005
Public	1.00		1.00	
Paid activity				
Yes	7.42 (5.91-9.31)	0.001	6.78 (4.45-9.02)	0.028
No	1.00		1.00	
Smoking				
Yes	1.34 (1.11-1.62)	0.001	1.33 (1.10-1.67)	0.001
No	1.00		1.00	
Use of alcoholic beverages				
Yes	2.69 (2.17-3.34)	0.001	2.54(2.11-3.42)	0.001
No	1.00		1.00	
Physical activity in school on weekends				
Yes	2.17 (1.76-2.68)	0.001	2.11 (1.71-2.72)	0.001
No	1.00		1.00	

adolescence is associated with health risk behaviors, which can be associated with the development of chronic diseases at early ages.

This study showed low prevalence of physical activity (36.1%) in adolescents attending evening classes of public and private schools in the northern region of the city of São Paulo and also that demographic, behavioral and social factors are associated with this complex phenomenon.

Epidemiological studies focusing on the prevalence of physical activity and physical inactivity are important to identify risk factors associated with outcomes, allowing the development of health promotion programs with specific objectives based on public health policies.

Few studies on the prevalence of physical activity in adolescents of large urban centers of Brazil have been found in literature[23-26]. On the other

hand, several epidemiological studies with adolescents from other countries have been found. For example, the World Health Organization published a report with global data containing the prevalence of physical activity among 162,306 adolescents aged 11-15 years. The results showed low prevalence of physical activity (34%), being higher in boys (40%) than in girls (27%)[19].

Butcheret al.[20] evaluated 6,125 adolescents aged 14-17 years of the 100 most populous cities in the United States and found a prevalence of physical activity of 48%, 57% for boys and 40% for girls. Janssen et al.[21] found a prevalence of physical activity of 50% in 7,235 young Canadians, 55% for boys and 45% for girls. Chen et al.[22] evaluated 2,235 adolescents aged 12-18 years in Taiwan and found prevalence of physical activity of 28%, 33% for boys and 25% for girls.

In Brazil, data on the prevalence of physical activity in urban areas of João Pessoa - PB[23], Curitiba –PR[24], Pelotas - RS[25] and Sao Paulo - SP[26] have shown overall prevalence of physical activity of 50.2%, 58.2 %, 48.2% and 62.5%, respectively. All of the above studies have shown that boys had higher prevalence of physical activity than girls.

Specifically in São Paulo, which is the largest city in Brazil, with the highest population density and economic potential, there are few studies showing the prevalence of physical activity in adolescents. Studies conducted by our research group with adolescent attending morning classes have found low prevalence of physical activity and high prevalence of physical inactivity. In a study with 1,738 adolescents attending private high schools in southern city of São Paulo showed that 53.8% of individuals did not meet the minimum recommendations related to maintaining health through physical activity[31]. In another study performed with 3,845 adolescents from public schools in all regions of São Paulo, the authors found prevalence of physical inactivity of 62.5%, but this study included only adolescent attending morning classes[26].

This study found low prevalence of physical activity in adolescents attending evening classes. On the other hand, there is only one study found in literature evaluating the relationship between shift (morning and evening) that adolescents attended classes and physical activity level. This study was conducted in only one public school in northern city of São Paulo and concluded that students attending evening classes showed higher prevalence of physical inactivity, also showing that 87.3% of students did not meet the minimum recommendations of physical activity for health promotion and that 47.9% of students in the morning shift met these recommendations[10].

The results of this study demonstrated higher prevalence of tobacco (53.7%) and alcohol use (75.2%) among adolescents attending evening classes. These results could be explained by the lower opportunity to perform physical activities, since the results of this study demonstrated that active adolescents had lower prevalence of tobacco and alcohol use than those less active.

These data allow us hypothesizing the protective effect of physical activity in relation to the use of tobacco and alcohol consumption, regardless of physical activity being performed inside or outside the school. Similar data

were found in a study with American adolescents who performed physical activities at school [OR CI 95%: 0.82 (0.71-0.95)], in recreation centers [OR CI 95%: 0.82 (0.71-0.95)] or voluntary participation in sport modalities [OR CI 95%: 0.61 (0.54-0.69)], and physical activity level was a protective factor in relation to tobacco use. Alcohol consumption was lower among physically active adolescents regarding the weekly frequency of five days a week and moderate intensity, suggesting a protective effect of physical activity in relation to alcohol consumption [OR CI 95%: 0.84 (0.74 -0.96])[18].

In a recent study, Davis et al.[29] evaluated the economic impact of physical inactivity and found that between 1 and 4% of total direct health expenditures are associated with physical inactivity, reaching approximately 8% annually. The authors concluded that the best investment in terms of health promotion is to encourage the practice of regular physical activity and that the school environment plays a central role in the adoption of an active lifestyle, especially for adolescents.

In this context, the school structure can be exploited as an incentive to the adoption of a healthy lifestyle in children and adolescents[5], as recently demonstrated in intervention programs, in which the school structure contributed to an increase from 2 to 11 times the likelihood of an individual to become more active[30].

Adolescents who reported the performance of physical activities in private schools on weekends were more active than those who did not use the school structure. The population evaluated in this study was composed of adolescents enrolled in evening classes, 72.4% reported paid activity, with daily workload of at least six hours, which together with the total hours remaining in school and less free time to practice physical activity on weekdays, may have contributed for them not to reach 300 minutes per week of physical activities. Thus, the possibility of using the school structure can significantly contribute with increasing physical activity level of the study group.

The scarcity of data on the prevalence of physical activity in adolescents from public and private schools in the same region of São Paulo will assists in future comparisons, especially in the analysis of cultural, social and economic characteristics of this region, which shows high level of social and economic development. Further studies in other regions of the city of São Paulo will propose health intervention strategies aimed to increase physical activity levels, thus contributing to existing preventive actions.

CONCLUSIONS

The present study allowed us concluding that adolescents attending evening classes do not meet the minimum recommendations of physical activity associated with health promotion. In addition, the overall prevalence of physical activity was low and significantly higher in younger individuals, in adolescents with lower socioeconomic level, adolescents enrolled in private schools and in those who do not smoke or consume alcohol.

Thus, it could be hypothesized that increased physical activity levels among adolescents are associated with: A) interdisciplinary discussion about the health benefits of the regular practice of physical activities in order to increase the knowledge of students in all high school grades in the evening shift; B) promoting educational activities on how to increase the daily physical activity level, particularly in unstructured and daily life activities, could help this group of individuals; C) the use of the structure of existing physical activity promotion programs through partnerships seems to be an important strategy in this context; D) discussion and implementation of public policies for children and adolescents.

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