

Enrollment in Physical Education Is Associated With Health-Related Behavior Among High School Students

RAFAEL M. TASSITANO, MSc^a

MAURO V.G. BARROS, PhD^b

MARIA C.M. TENÓRIO, MSc^c

JORGE BEZERRA, MSc^d

ALEX A. FLORINDO, PhD^e

RODRIGO S. REIS, PhD^f

ABSTRACT

BACKGROUND: Physical education (PE) plays a critical role in the healthy development of youth; however, the influence of PE classes in helping to provide students with health-related behavior patterns is not clear. This study aims to analyze whether participation in PE classes is associated with health-related behavior among high school students.

METHODS: A total of 4210 students attending public high schools in Pernambuco (northeast of Brazil) were selected using random 2-stage cluster sampling. Data were collected by using the Global School-based Student Health Survey. The independent variable was the frequency of participation in PE classes, whereas physical activity, television viewing, smoking, and alcohol, fruit, vegetables and soda consumption were dependent variables. Logistic regressions were carried out to perform crude and adjusted analysis of the association between enrollment in PE classes and health-related behaviors.

RESULTS: Sixty-five percent of students do not take part in PE classes, with a significantly higher proportion among females (67.8%). It was observed that enrollment in PE classes was positively associated with physical activity, TV viewing, and fruit consumption, but was negatively associated with soda drinking. The likelihood of reporting being active and eating fruit on a daily basis was 27% and 45% higher, respectively, among those who participate in at least 2 classes per week in comparison with those who do not. Students who participate in PE classes had 28-30% higher likelihood of reporting lower TV viewing during week days.

CONCLUSIONS: Findings suggest that higher levels of enrollment in PE classes could play a role in the promotion of health-related behaviors among high school students.

Keywords: health behavior; physical education; health promotion; adolescents.

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^aAssistant Professor, (rafael.tassitano@gmail.com), Universidade Federal Rural de Pernambuco/Associação Caruaruense de Ensino Superior Teles Júnior, 33, Apto. 501 Aflitos, Recife - PE, Brazil 50.100-130.

^bAssistant Professor, (mauro.barros@pq.cnpq.br), Universidade de Pernambuco, Arnóbio Marques, 310, Campus Universitário HUOC Santo Amaro, Recife - PE, Brazil 50.100-130.

^cAssistant Professor, (mariaceciliatenorio@gmail.com), Universidade de Pernambuco, Arnóbio Marques, 310, Campus Universitário HUOC Santo Amaro, Recife - PE, Brazil 50.100-130.

^dAssistant Professor, (jorge.bezerra@upe.br), Universidade de Pernambuco, Arnóbio Marques, 310, Campus Universitário HUOC Santo Amaro, Recife-PE, Brazil 50.100-130.

^eAssistant Professor, (aflorind@usp.br), Universidade de São Paulo, Rua Arlindo Bettio, 1000 São Paulo - SP, Brazil 03090-020.

^fAssociate Professor, (reis.rodrigo@pucpr.br), Universidade Federal do Paraná, Rua Imaculada Conceição, 1155 Curitiba - PR, Brazil 80215-901.

Address correspondence to: Mauro V.G. Barros, Assistant Professor, (mauro.barros@pq.cnpq.br), Universidade de Pernambuco, Arnóbio Marques, 310, Campus Universitário HUOC Santo Amaro, Recife - PE, Brazil 50.100-130.

Currently, the main modifiable health-risk factors associated with noncommunicable chronic diseases are poor nutrition, physical inactivity, and smoking. In 2005, it was estimated that 60% of all mortality in the world can be attributed to these lifestyle factors.¹ In spite of this evidence, epidemiological studies have reported high levels of physical inactivity,² improper nutrition,³ and tobacco consumption⁴ among adolescents. Scientific organizations have suggested the need for tailored interventions focusing on reducing exposure to these health-risk behavior patterns and have discussed the role of school activities in meeting this challenge.⁵⁻⁷

The school is known to be a promising environment for health promotion activities, not only because it reaches a large proportion of the young population but also because knowledge gathered from review studies suggests that interventions in this environment are more efficient and effective.^{8,9} Evidence regarding this subject has been presented in relation to tobacco¹⁰ and drug use,¹¹ but there is no conclusive evidence with regards to alcohol consumption,¹² physical activity,^{13,14} and eating habits.¹⁴

Physical education (PE) is a basic component of the school curriculum and focuses on human and motor development acquired through knowledge and practice of physical activities.^{8,15-17} In addition, PE classes have the potential to promote knowledge and positive attitudes relating to a healthy lifestyle.^{18,19} In the United States, for instance, the Healthy People 2010 program included 3 target outcomes associated with PE, 2 of which are related to the increase in the number of schools where students attend PE classes daily. The third target outcome is to increase the number of students who perform moderate physical activity in at least 50% of all classes.⁶ Despite awareness of the importance of this, the maintenance of PE classes as a part of the school curriculum is still under discussion.²⁰

In Brazil, the role that PE can play in school-based health promotion programs only began to be discussed in the early 1990s.^{15,16} Although the social and political credibility for school PE has risen in the past years in Brazil, several issues related to salary, facilities for physical activity practice, work environment, and curriculum contents still representing important barriers, and schools struggle to offer high-quality PE.²¹

At present, a consensus is growing among health professionals and policy makers that engagement in physical activity and sports may provide some protection against stress, symptoms of depression, and drug use among adolescents.²²⁻²⁵ On the other hand, it has been reported that alcohol consumption is positively correlated with the practice of physical activity among male students.²⁶

The hypothesis has been raised that PE classes may play a role in encouraging health-related behavior patterns, since exercising and playing sports should

represent the main content of PE classes. This study sought to verify whether participation in PE classes is associated with health-related behavior patterns in high school students in a developing country.

METHODS

The target population was limited to high school students enrolled in the State Public School System, which covers around 80% of all students attending this level of schooling in the State of Pernambuco. The sample size aimed to address the various objectives of a large-scale research project, which included the evaluation of a number of health-risk factors. Sampling calculations considered the following criteria: population of 352,829 subjects; 95% confidence interval; 3 percent points of margin of error; estimated prevalence of 50%; and, design effect established at 4 times the minimum required sample size. Although the literature suggests that, for a 2-stage cluster sampling, a design effect of 1.4 to 1.5 would be sufficient to safeguard the desired precision,²⁷ a more conservative correction was applied. Using these criteria, the required sample size was established to be 4217 subjects.

An attempt was made to ensure that the distribution of students in the sample was balanced in terms of geographical distribution, school size, and period of the day attending school (daytime and evening students). The regional distribution was determined by considering the number of students enrolled in each of the 17 school districts. School size was divided into 3 categories according to the number of students attending each high school as follows: small, <200; medium, 200-499; and large, ≥ 500 . Students enrolled in morning or afternoon classes were grouped into a single category (daytime students).

Taking these criteria under consideration, a 2-stage cluster sampling procedure was carried out to select the required sample. In the first stage, a stratified random sampling procedure was used, taking the school density in each microregion of the state and the school size to be the stratification criteria. Schools were randomly selected without taking into account their available infrastructure for PE classes. In the second stage, all classes in the selected schools were eligible. Once again, a stratified random sampling selection was utilized and the stratification criteria were the density of classes in the daytime and in the evening. Selection was carried out by generating random numbers using the Epiinfo software, and the class was used as the sampling unit for the final stage of the process.

Data collection took place between April and October 2006. The questionnaires were applied by 6 previously trained graduate students, who were enrolled in a Master Program in Adolescent Health. The questionnaire used was a previously translated and tested version of the Global School-Based Student

Health Survey as proposed by the World Health Organization, which is available at www.who.int/chp/gshs/en. While the subjects were filling out the questionnaires they were supervised by 2 graduate students. During the application of the questionnaire, students were advised to ask for assistance if they identify any kind of doubt or if they were willing to clarify the questions. Students spent 40-50 minutes for completion of the questionnaire. Graduate students who worked in the data collection were trained by applying the questionnaires in similar groups of students during a pilot study under the supervision of the study coordinator.

Reproducibility indicators (test-retest consistency, 1-week apart) ranged from moderate to high for the majority of the items, with concordance coefficients (kappa) ranging from 0.83 to 0.95 for the physical activity score and the eating frequency questions. Regarding the other health-related behavior patterns validation assessment was not conducted, but the test-retest reliability scores were 0.76 for alcohol consumption and 0.62 for tobacco use. Validity indicators of the physical activity score were similar for boys in comparison to girls. The Spearman correlation coefficient comparing the questionnaire data with the daily recall log varied from 0.37 ($p = .001$) to 0.41 ($p < .001$). Spearman coefficients for evaluating the validity of the dietary patterns questionnaire ranged from 0.23 ($p = .07$) to 0.58 ($p < .01$). The study variables were divided into demographic and socioeconomic (sex, age, ethnicity, marital status, state/geographical region, place of residence [urban/rural], mother's level of education, adolescent's employment status), school-related (participation in PE classes, grade, time of day attending school, and school size) and behavioral (physical activity, TV viewing, eating habits, alcohol consumption, and smoking status) factors.

For association and regression analysis, participation in PE classes was a variable reflecting 3 different levels of exposure: 2 or more classes per week, once a week, or no enrollment. On the basis of current guidelines,²⁸ subjects were classified as physically active (✓) or insufficiently active. Sedentary behavior was measured according to the number of hours of television viewed in a normal week. Subjects reporting a frequency greater or equal to 3 hours a day were considered to be exposed to sedentary behavior. Two variables were considered in the analysis; one reflecting student behavior during week days and other reflecting behavior on weekends.

Eating habits were evaluated according to the consumption of fruit, vegetables, and soda in the period of 30 days before the survey. Adolescents reporting not consuming fruit and vegetables at least 5 times per week were classified as exposed to inadequate eating habits. With regard to the consumption of soda, students who reported consuming soft drinks 5 or more

days per week were classified as exposed to improper consumption.

Students who reported consuming any alcoholic beverage on any of the previous 30 days were classified as having been exposed to alcohol consumption. Similarly, students who reported having smoked on any of the previous 30 days were classified as exposed to smoking, regardless of the intensity of their exposure (frequency and quantity of cigarettes smoked).

The data tabulation was carried out using the Epi-Data software package. Electronic data control was ensured by means of the "CHECK" function. To detect errors, data entry was repeated and errors detected by the duplicate file comparison function were fixed. Data analysis was conducted using SPSS for Windows. The analysis included the Pearson's chi-square and the chi-square for trend tests. Binary logistic regressions were carried out to analyze whether PE participation was associated with health-related behavior patterns by controlling for potential confounders. The logistic regression modeling follows a 3-level hierarchical approach. One regression modeling was run for each one of the 8 health-related behavior patterns analyzed (physical activity, TV viewing during week days, TV viewing during weekend days, fruit, vegetables, and soda consumption, alcohol consumption, and smoking). At the macro level, demographic and socioeconomic factors were included; at the intermediate level, the school-related factors were included; and, finally, the third level included the remaining health-risk behavior patterns as covariates.

RESULTS

Seventy-six schools were visited (11% of all state public schools) in 44 municipalities, representing 23% of all municipalities in the State of Pernambuco (in the northeast region of Brazil). A total of 4272 students (14-19 years old; 59.8% females) were invited to participate; 55 refused (1.3% refusals) and 7 questionnaires were excluded because of inconsistent data and incompleteness. The sample size (4210 subjects) was sufficient to detect as significant odds ratio values greater than 1.5. The demographic and socioeconomic characteristics of the sample are presented in Table 1.

The majority (64.9%) of students reported not participating in PE classes in a typical week and only 19.7% participate twice a week. In the bivariate analysis, significant associations were found between PE enrollment and sex, age, geographical region, mother's level of education, employment status, school size, time of day attending school, and school grade. It was found that ethnicity, marital status, and place of residence (urban/rural) were not statistically associated with PE class attendance (Table 2).

All school-related factors (school size, time of day attending school, and school grade) were significantly

Table 1. Study Participants' Demographic and Socioeconomic Characteristics (n = 4210)

Variable	Male		Female		All		p Value
	n	%	n	%	n	%	
Age (years)							
14-16	599	35.5	1167	46.4	1176	42.0	<.000
17-19	1089	64.5	1346	53.6	2435	58.0	
Ethnicity							
White	417	24.8	639	25.5	1056	25.2	.626
Nonwhite	1263	75.2	1868	74.5	3131	74.8	
Marital status							
Single	1606	95.8	2340	93.6	3946	94.4	.002
Other	71	4.2	48	1.9	91	2.2	
Geographical region							
Metropolitan	671	39.8	1085	43.2	1756	41.8	.087
Coastal	306	18.1	434	17.3	740	17.6	
Interior	711	44.1	99.4	58.3	170.5	40.6	
Place of residence							
Urban	1312	78.1	1985	79.6	3297	79.0	.270
Rural	367	21.9	510	20.4	877	21.0	
Educational level of mother (years of study)							
≤8	1087	69.4	1772	74.5	2859	72.5	<.000
9-11	352	22.5	481	20.2	833	21.1	
≥12	127	8.1	126	5.3	253	6.4	
Employment status							
No	1158	69.3	2121	84.8	3279	78.6	<.000
Yes	514	30.7	381	15.2	895	21.4	
School size							
Small	152	9.0	221	8.8	373	8.9	.278
Medium	457	27.1	628	25.0	1085	25.8	
Large	1079	63.4	1664	66.2	2743	65.3	
Time of day attending school							
Daytime	909	53.9	1508	60.1	2417	57.6	<.000
Evening	778	46.1	1002	39.9	1781	42.4	
School grade							
9	779	46.2	1101	43.8	1880	44.8	.316
10	522	30.9	818	32.6	1340	31.9	
11	386	22.9	593	23.6	979	23.3	

associated with participation in PE classes. A greater proportion of students not participating in PE classes was observed among those attending school in the evening and those from large schools. It was also observed that participation in PE classes was inversely associated with school grade.

The proportion of students not attending PE classes was significantly higher among insufficiently active students and among those who reported lower consumption of fruit and vegetables. Interestingly, there was an inverse association between participation in PE classes and soda intake. The proportion of students who were not enrolled in PE classes was significantly higher among those who reported higher weekly frequency of soda consumption (Table 3).

In the logistical regression, crude analysis showed a significant association between participation in PE classes and physical activity and eating patterns. Students who did not participate in PE classes presented a greater likelihood of being exposed to insufficient levels of physical activity, higher

Table 2. Absolute (n) and Relative (%) Distribution of High School Students by the Number of PE Classes per Week and Demographic, Socioeconomic, and School-Related Variables

Variable	# PE Classes per Week						p Value
	0		1		2 or More		
	n	%	n	%	n	%	
Gender							
Male	1018	60.5	275	16.3	390	23.2	<.000
Female	1696	67.8	370	14.8	436	17.4	
Age (years)							
14-16	1045	59.3	321	18.2	396	22.5	<.000
17-19	1675	68.9	326	13.4	431	17.7	
Ethnicity							
White	685	65.2	172	16.4	193	18.4	.427
Nonwhite	2027	64.7	473	15.1	631	20.2	
Marital status							
Single	2541	64.6	615	15.6	778	19.8	.129
Other	165	70.5	28	12.0	41	17.5	
Geographical region							
Metropolitan	1187	67.7	201	11.5	364	20.8	.044
Coastal	490	66.3	123	16.6	126	17.1	
Interior	1043	61.2	323	19.0	337	19.8	
Place of residence							
Urban	2149	65.3	452	13.7	690	21.0	.169
Rural	554	63.2	193	22.0	129	14.7	
Educational level of mother (years of study)							
≤8	1894	66.3	447	15.7	515	18.0	<.000
9-11	520	62.6	122	14.7	189	22.7	
≥12	143	56.5	45	17.8	65	25.7	
Employment status							
No	2054	62.8	527	16.1	688	21.1	<.000
Yes	645	71.8	118	13.2	135	15.0	
School size							
Small	171	45.7	108	28.9	95	25.4	<.000
Medium	658	60.9	165	15.2	258	23.9	
Large	1891	69.0	374	13.7	474	17.3	
Time of day attending school							
Daytime	1325	54.9	476	19.7	612	25.4	<.000
Evening	1393	78.4	171	9.6	213	12.0	
School grade							
9	1170	62.5	291	15.5	413	22.0	.002
10	901	67.2	198	14.8	242	18.0	
11	649	66.3	158	16.2	171	17.5	

consumption of soda, and lower consumption of fruit and vegetables when compared with those who did participate. These results remain unaltered after the partial and full adjustment when demographic, socioeconomic, school-related, and the other health-related behavior patterns were controlled for, except for the association between participation in PE classes and vegetable eating patterns.

When controlling for potential confounding variables, it was observed that participation in PE classes was significantly associated with TV viewing during week days. This association remains strong even after full adjustment and shows that the students who attend PE classes seem to have a higher likelihood of spending less than 3 hours per day watching TV during week days (Table 4).

Table 3. Absolute (n) and Relative (%) Distribution of High School Students by the Number of PE Classes per Week and Health-Related Variables

Variable	# PE Classes						p Value
	0		1		2 or More		
	n	%	n	%	n	%	
Physical activity							
Insufficiently active	1805	66.1	439	16.1	485	17.8	<.000
Active	907	62.3	207	14.2	341	23.4	
TV viewing during week days							
<3 hours/day	1584	63.9	402	16.2	492	19.9	.281
3+ hours/day	1133	66.3	244	14.3	333	19.5	
TV viewing on weekends							
<3 hours/day	1375	65.7	310	14.8	408	19.5	.374
3+ hours/day	1338	64.0	335	16.0	418	20.0	
Fruit consumption							
<5 days/week	990	70.9	200	14.3	206	14.8	<.001
5+ days/week	1723	61.8	445	16.0	618	22.2	
Vegetable consumption							
<5 days/week	1039	68.6	225	14.9	251	16.6	<.001
5+ days/week	1667	62.8	419	15.8	570	21.5	
Soda consumption							
<5 days/week	1030	66.6	269	17.4	247	16.0	.001
5+ days/week	1674	63.8	376	14.3	574	21.9	
Alcohol consumption							
Yes	808	63.8	187	14.8	272	21.5	.121
No	1906	65.4	458	15.7	551	18.9	
Smoking							
Yes	197	61.6	51	15.9	72	22.5	.154
No	2515	65.2	594	15.4	751	19.5	

PE, physical education.

The results show a significant association between reporting participating in PE classes 2 times per week and meeting recommended levels of physical activity. It was observed that adolescents enrolled in at least 2 classes per week in comparison with those with no weekly PE were 27% more likely to meet the current physical activity guidelines. Both unadjusted and adjusted regression models show that participating once a week in PE classes was not associated with the overall physical activity patterns.

DISCUSSION

The majority of students attending public high schools in this Brazilian region reported not participating in PE classes in a typical week and only a small proportion of them participate twice a week, which is the minimum curriculum requirement according to federal law for students of all grades. This frequency of enrollment is smaller than that observed among students in the United States²⁹ and Canada.³⁰

As expected, a greater proportion of students that did not participate in PE classes were found among those who attend school in the evening, among older students, and among those who work. According to Brazilian law, not only are PE classes optional in the

evening but also those students who can prove they work more than 6 hours a day, who are mothers, who are in the army, or who have medical problems are also exempt from such classes.

Despite not being investigated in this study, structural and organizational factors also make it difficult for PE to be offered and, consequently, for students to participate in such classes, especially in public high schools. According to the Pernambuco Education Evaluation System, it has been shown that 55.8% of all public schools do not have a sports surface or gym and that 35.0% have these but they are in extremely poor condition.³¹ In Brazil, a school not having a sports surface does not indicate that the PE class is not offered. Usually, schools that do not have adequate facilities and sports surfaces can offer some educational activities even in the traditional classrooms or using available public open spaces such as squares, parks, and beaches.

The literature also shows that the systematization of content is also a determining factor in student participation. Evidence not only from Brazil but mainly from other countries also shows that sports practice dominates the content of classes, which poses an obstacle to the participation of some students, particularly girls.^{16,32,33}

At population level, little is known about the association between participation in PE classes and adoption of health-related behavior patterns and this study provides some evidence on this topic. The key finding was that students who attended PE classes reported better eating habits (greater consumption of fruit and vegetables and lower consumption of soda) and lower TV viewing time during week days.

Despite the encouraging evidence, these results should be interpreted with care, because of a number of methodological limitations, such as self-reporting measurement and the possibility of reverse causation, a characteristic present in cross-sectional studies. In addition, the data came from a specific region of a developing country; students attending high school do not represent the adolescent population as a whole, thus the generalizability of the results may be limited.

One strength of this study was that data collection was carried out by previously trained staff and using an instrument with good test-retest reliability. The sample-including students attending schools in both rural and urban areas and those attending school in the evening is also a strong point.

A few studies have focused on the role that participation in PE classes can play in adolescents' health and most have addressed the contribution of PE to improving overall physical activity.^{34,35} In addition, as reviewed by Trudeau and Shephard,³⁶ publications on the potential long-term effects of school PE attendance on health outcomes in both adolescence and adulthood are scarce. For this reason,

Table 4. Crude and Adjusted Odds Ratio (OR) and 95% Confidence Intervals (95% CIs) for 8 Health-Related Behavior Variables, Comparing Students Who Participate in PE Classes and Those Who Do Not

Health Behavior (Outcome)	# PE Classes	Crude OR		Adjusted OR*		Adjusted OR†	
		(95% CI)	p Value	(95% CI)	p Value	(95% CI)	p Value
Physical activity (60+ MVPA per day, 5 days/week)	0	1	.000	1	.012	1	.020
	1	0.94 (0.78; 1.13)	.497	1.01 (0.82; 1.24)	.920	0.98 (0.79; 1.20)	.823
	2	1.40 (1.19; 1.64)	.000	1.30 (1.09; 1.56)	.004	1.27 (1.06; 1.53)	.010
TV viewing during week days (<3 hours/day)	0	1	.180	1	.023	1	.024
	1	1.18 (0.99; 1.41)	.068	1.26 (1.04; 1.53)	.018	1.30 (1.06; 1.60)	.012
	2	1.06 (0.90; 1.24)	.495	1.19 (1.00; 1.42)	.052	1.28 (0.98; 1.43)	.088
TV viewing during weekend days (<3 hours/day)	0	1	.451	1	.737	1	.496
	1	0.90 (0.76; 1.07)	.232	0.97 (0.81; 1.18)	.789	0.89 (0.73; 1.09)	.254
	2	0.95 (0.81; 1.11)	.517	1.06 (0.89; 1.27)	.522	1.00 (0.83; 1.20)	.994
Fruit consumption (5+ days/week)	0	1	.000	1	.000	1	.000
	1	1.28 (1.06; 1.54)	.009	1.35 (1.10; 1.65)	.004	1.34 (1.08; 1.66)	.007
	2	1.72 (1.45; 2.05)	.000	1.67 (1.38; 2.03)	.000	1.45 (1.18; 1.78)	.000
Vegetable consumption (5+ days/week)	0	1	.000	1	.001	1	.180
	1	1.16 (0.97; 1.39)	.104	1.20 (0.98; 1.45)	.071	1.15 (0.94; 1.41)	.183
	2	1.41 (1.20; 1.67)	.000	1.41 (1.18; 1.70)	.000	1.17 (0.96; 1.42)	.113
Soda consumption (<5 days/week)	0	1	.000	1	.000	1	.001
	1	1.16 (0.98; 1.38)	.091	1.07 (0.88; 1.29)	.496	1.16 (0.95; 1.41)	.155
	2	0.70 (0.59; 0.83)	.000	0.64 (0.53; 0.77)	.000	0.72 (0.59; 0.88)	.001
Alcohol consumption (no consumption)	0	1	.148	1	.064	1	.197
	1	1.04 (0.86; 1.25)	.697	1.01 (0.82; 1.25)	.895	1.07 (0.86; 1.33)	.536
	2	0.86 (0.73; 1.01)	.074	0.81 (0.67; 0.97)	.026	0.86 (0.71; 1.05)	.144
Cigarette smoking (no smoking)	0	1	.363	1	.068	1	.094
	1	0.91 (0.66; 1.26)	.575	0.69 (0.48; 0.98)	.038	0.67 (0.46; 0.98)	.038
	2	0.82 (0.62; 1.08)	.160	0.78 (0.57; 1.07)	.119	0.81 (0.58; 1.14)	.227

*Partially adjusted according to the following variables: gender, age, ethnicity, marital status, geographical region, place of residence, employment status, level of education of mother, living with parents, grade, and time of day attending school.

†Fully adjusted including in the model all demographical, socioeconomic, school-related, and health-related behavior variables. MVPA, moderate-to-vigorous physical activity.

discussing the strengths and weaknesses of this study in relation to other results is problematic.

With regard to the association between PE enrollment and students' overall physical activity, the results of this research are consistent with 3 previous studies. Myers et al³⁷ reporting the findings of the Bogalusa Heart Study cohort found that children and adolescents (aged from 9 to 15 years) who were enrolled in PE reported higher physical levels of activity than those not enrolled. In the National Longitudinal Study of Adolescent Health, it was shown that subjects enrolled in PE were more likely to perform higher levels of weekly moderate to vigorous physical activity.³⁸ Lastly, Pate et al³⁵ found that adolescents who participate in PE classes reported higher overall physical activity level. These 3 previous studies were undertaken using relatively large samples of young people. Although the study conducted by Pate et al³⁵ included only female students, the study carried out by Myers et al³⁷ includes both children and adolescents.

It was found in this investigation that enrollment in PE classes is associated with TV viewing during week days (a widely used indicator of inactivity), but not with TV viewing on weekends. Conversely, the number of PE classes per week was not associated with the level of inactivity reported by adolescents

in the study conducted by Gordon-Larsen et al.³⁸ These contradictory results may be attributable to methodological differences, since in the study carried out by Gordon-Larsen et al the measure of inactivity was based on screen time exposure (TV, computer, and videogame), while in this study the inactivity measure was based only on TV viewing time.

In the review of literature, no previous study was found focusing on the association between PE enrollment and eating behaviors, smoking, and alcohol consumption. A few studies have addressed this issue, but have tended to cover college students rather than adolescents.³⁹ Studies have also tried to investigate the association between overall physical activity and lifestyle factors, such as eating habits, smoking, and alcohol consumption.^{25,26} Results suggest that physical activity has a positive effect on enabling subjects to eat better and avoid tobacco but, in the case of alcohol consumption, the opposite has been observed.

In this study, no association between participation in PE classes and smoking and alcohol consumption was observed. One of the possible reasons for this result is the self-reported measure that may have jeopardized data quality, mainly because of the underreporting. For example, self-reported smoking presents low agreement with cotinine concentration, suggesting that

adolescents underestimate tobacco consumption.⁴⁰ In contrast to the United States, where most students spend 4 years in high school and graduate thereafter, only half of the Brazilian teenagers go to public or private high schools, and only for a 3-year period. Another significant difference is that students stay in school for a single period (morning, afternoon, or evening) for a duration of no longer than 4 hours. Although PE is compulsory according to Federal law for all grades from elementary through high school, in Pernambuco, as in most Brazilian states, it is not mandatory for schools to offer PE classes for evening students. In addition, even in schools that do have PE classes, many students are not required to attend them. Physical education is considered optional for married students, girls who are mothers, students older than 18, and those with a regular job. Finally, in Brazil, all students (males and females) have PE classes in a single group, as with a regular class.

A few studies were carried out in Brazil to evaluate the level of physical activity during PE classes; however, the available evidence has shown limited physical activity engagement during a typical class. For example, based on observational and direct physical activity assessment of students from 144 random selected PE classes, it was observed that the students were, on average, engaged in less than 10 minutes of moderate to vigorous physical activity in a typical PE class.¹⁶ In spite of this evidence, some authors have argued that the observed difference in physical activity between enrolled and nonenrolled was not explained primarily by physical activity in the PE classes.^{35,37}

The findings of this study have important implications for health and education policy. Public authorities in the fields of education and public health have clear evidence supporting the need to provide students with good quality PE at least twice a week and are aware that this is a promising way to promote health-related behaviors among adolescents. Commitment to high-quality, health-related school PE programs for all high schools is an important strategy for having a positive influence on the health of adolescents worldwide. Substantial further research is needed to increase our understanding on the long-term impact of school PE programs and to establish whether health-rather than sports-oriented PE programs-might have a more powerful effect on health-related behavior patterns. A study comparing health-related behaviors of adolescents who attend and who do not attend high school in Brazil may show the differences in health risks and status that could inform public authorities regarding effective health promotion initiatives for all adolescents.

Human Subjects Approval Statement

This study was approved by the Ethics Committee of the Agamenon Magalhaes Hospital in the city

of Recife in compliance with the Brazilian National Research Ethics System Guidelines. Parents and students' informed consent was required from each participant.

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