

Are fatigue and sleeping difficulty related to adolescent physical activity and sedentary behavior? Highlights from the Portuguese HBSC study

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Objective: In modern times young people increasingly have unhealthy lifestyles. The practice of regular physical activity is associated with positive effects on the health of adolescents. The purpose of this study is to understand the relationship between physical activity and sedentary behaviour with sleeping difficulty and fatigue in Portuguese adolescents of both genders between the ages of 11 and 16 years. **Design:** The sample consisted of 4877 individuals of both sexes, with an average age of 14 years old. The instrument used was a questionnaire study of the health behaviour in school-aged children. The χ^2 tests, multiple linear regressions and a logistic regression were used as statistical analysis. **Results:** The increase of the practice of physical activity (PA) during the week was associated with the male gender (OR = 0.3, $p < .05$), decreasing by 10 percent per year of age of the subjects (OR = 0.9, $p < .05$) and often to watching TV/DVD over the weekend (OR = 1.2, $p < .055$). We have not found a relationship between sleeping difficulty and fatigue and physical activity. **Conclusion:** The practice of PA of Portuguese adolescents is not associated with fatigue and sleeping difficulty. Associations were found between the male gender, age and watching TV on the weekends.

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Key Words: physical activity, sleeping difficulty, fatigue, adolescents

INTRODUCTION

Recently, several researchers (3, 47) from very distinct fields of study have devoted their attention to the lifestyles of teenagers and the many associated variables. One of these variables is the practice of physical activity (PA); researchers are trying to broaden their knowledge by identifying and understanding the factors that influence it.

Unanimously accepted by society as an important component of a healthy lifestyle, PA is associated with the prevention of chronic diseases such as obesity (31). Portugal is one of the countries in Europe that has a higher number of individuals claiming not to have practiced any sports or PA in the past six years (14), and the available data show that only one-third of the adult population practices the recommended levels of PA (42). Compared to other European Union

countries, only 27 percent of the Portuguese population claims to practice PA regularly (14).

Among adolescents there is a greater prevalence of physical inactivity and a lower PA between girls, older teens, and adolescents living in metropolitan areas or in disadvantaged socio-economic structures, and the levels of inactivity increase significantly when associated with higher levels of exposure to television, computer use, and inadequate hours of sleep (41).

Watching TV is the sedentary activity of choice of adolescents in Portugal (26) and worldwide (4) and its practical impact on PA has been studied extensively (29, 38). The high amount of TV watched by adolescents (more than 3 hours per day) is significantly associated with frequent difficulties in falling asleep and waking up frequently during the night (20). A study by Dworak et al. (11) shows that adolescents have a significant reduction of sleeping

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hours after being exposed only to the TV. For Gaina et al. (15), the change in sleeping habits leads to daytime sleepiness that interferes with a lot of routines and daily activities and affects the normal functioning of the individual with an obvious negative impact on academic performance, behavioural changes, and psychological problems.

The number of sleep hours disturbance, but not the total sleeping time, is inversely associated with daily PA; for every hour of disturbance there is a 3 percent decline in the practice (18). The most common sleep complaints are related to sleeping late, the beginning of latency and total duration of insufficient sleep (23).

According to ter Wolbeek et al. (46), fatigue is a symptom with long-term high stability that is often associated to short sleep duration and a reduction of PA combined with an increased rate of absenteeism at school. This symptom is prevalent among adolescents, especially girls. Adolescent girls appear to be more vulnerable to symptoms of fatigue and comorbidity than boys. However, the relationship between fatigue and depression, anxiety and related symptoms of chronic fatigue syndrome is not unique to just one gender (45). Girls show a greater need for sleep than boys and show significantly more fatigue, mood swings, cognitive problems and increased sleepiness during the day (32). However, the relationship between PA and the experience of fatigue and tiredness was not conclusive in our study. The dualistic approach failed to capture the multidimensional nature of this complex phenomenon. The lack of an objective test to measure fatigue makes this aspect unappealing as an object of research and contributes to the lack of scientific unanimity (40).

An investigation by Patel and Hu (36) suggests that short sleep may have consequences such as fatigue (8) that may lead to reductions in physical activity levels. In addition, cross-sectional studies in children have found short sleep durations to be associated with increased television viewing and reduced participation in organized sports (24, 49). Dinges et al. (8) found that short sleep durations were associated with reduced reported physical activity (37).

This research aims to understand the relationship between the hours spent doing sedentary activities, sleeping difficulty, and fatigue and the practice of PA among adolescents of both genders between the ages of 11 and 16. It seeks to understand how the variables interact to increase or decrease the levels of PA practice.

MATERIAL AND METHODS

This research is based on the data from the 2006 World Health Organization collaborative cross-national study, Health Behaviour in School-aged

Children (HBSC) (27). Schools or classes were randomly sampled in each participating country (cluster sampling design) to obtain a minimum sample size for each country of 1536 students per age group (mean age desired was 11.5, 13.5 and 15.5) in order to ensure a 95 percent confidence interval of ± 3 percent for prevalence estimates. Participation was anonymous and voluntary and the study adhered to all national ethical guidelines for each country involved.

Methodological issues are the focus of a specific methods group within the European network (www.hbsc.org) and were published elsewhere (6).

Data were collected using standardized self-completion questionnaires administered in the classroom. The questionnaire was developed by an interdisciplinary research group from the participating countries and a translation/back translation procedure was used to guarantee language equivalence.

The cluster analysis was the class. Schools were randomly selected from an official list (Ministry of Education) after stratification by the five education regions (North, Centre, Lisbon and Vale do Tejo, Algarve, Alentejo). Classes were selected so the number of children was proportional to the number of same-grade pupils for each region. Classes were randomly selected from the three grades (6th, 8th and 10th) and gender was not considered in this selection, assuming that a balanced distribution would happen randomly.

This study followed all rules for research in humans, specifically minors: the questionnaire was approved by an ethical committee (S. João Hospital-Porto), the Ministry of Education, and the five education directions; each school and parent-informed consent was required through the parent's school committee. The questionnaire was validated by prior studies as the recommendation of research protocol (6).

Questionnaires were sent by regular mail and distributed in classes by a teacher, to whom a letter was addressed with instructions and a letter to read to the pupils. Questionnaires were received back by mail. During the HBSC study, one school refused to participate because it had a recent flood, while no pupils refused to fill out the questionnaire. The exclusion criteria were blank or not filled, with no gender or age (insignificant number below 10 questionnaires in the entire sample). Pupils who missed school on the day of evaluation were not included. It was not possible to estimate this number due to logistical reasons.

Sample and data collection

From a national list stratified by region, 136 Portuguese public schools were randomly selected, taking the class as the unit of analysis. The

Table 1. Questions used in research and its codification.

<i>Questions</i>	<i>Codification</i>
Are you a boy or a girl?	a) Boy; b) Girl
When were you born?	
In the last 7 days, how many days did you practice PA totalling at least 60 minutes per day?	0 to 7 days
Over the past six months, how often did you feel: a) headaches, b) stomachache, c) backache, d) sadness/depression, and) anger or bad mood, f) nervous, g) difficulties in falling asleep, h) and dizziness, i) sore neck and shoulders, j) fear, l) fatigue and exhaustion	1 – almost every day; 2 – more than once a week; 3 – almost every week 4 – almost every month; 5 – rarely or never
During your free time, how many hours per day do you watch TV (including videos and DVD's) during the week? And during the weekend?	a- no, b- approx. 30 m/day,
During your free time, how many hours per day do you use to play computer or console (Playstation, Xbox, etc.)? And during the weekend?	c- 1h/day d- 2h/day, e- 3h/day,
During your free time, how many hours per day do you use the computer (to talk/chats, surf the Internet, or send email, homework, etc.)? And during the weekend?	f- 4h/day, g- 5h/day, h-6h/day, i- 7h/day or more

questionnaire was delivered to students by teachers during their classes. The sample consisted of 4877 individuals. It is a representative sample of students attending the 6th, 8th and 10th grade in regular school in Portugal. From these 4877 pupils, 50.4 percent were girls and 49.6 percent boys. They were distributed as follows: 31.7 percent in the 6th grade, 35.7 percent in the 8th grade and 32.6 percent in the 10th grade. The study was carried out with the consent of the school and the parents of the teenagers involved.

Instrument

The instrument used was a questionnaire, “Behaviour and Health in Schoolchildren.” Countries participating in the HBSC study included all required items of the questionnaire covering different aspects of health: demographic, behavioural and psychosocial problems. All questions followed the format specified in the protocol (6) comprising demographic questions (age, gender, socioeconomic status), positive health issues, alcohol, tobacco and drugs, physical activity, sex behaviour, violence and injuries, family, peer group and leisure, group culture and attitudes and knowledge regarding HIV/AIDS, sleeping difficulty and fatigue. Given the purpose of the study, and according to the extensive literature reviewed, a set of variables was selected from the 2006 HBSC survey shown in Table 1. A more detailed analysis of the variables can be found in the international study (6). It was necessary to re-encrypt the results to improve the understanding of the results (Table 2).

Statistical analysis

The processing and data analysis were done with SPSS version 16 for Windows (SPSS, Chicago IL, USA).

Initially, through the chi-square (χ^2) test, this study sought to understand the relationship between the biological characteristics of individuals (gender and age), daily frequency during the week and weekend of sedentary behavior, and PA practice. To identify significant differences between variables ($p < 0.05$) we considered as residual set the value $\geq |1.9|$. Subsequently, we proceeded to attempt to explain the practice of PA using the multiple linear regression and multiple logistic regression tests, with stepwise method and significant variables to control each other.

RESULTS

In Table 3 we can find the test results χ^2 , the levels of PA practice of adolescents and biological variables (age and gender), psychological and somatic variables (sleeping difficulty and fatigue) and variables of sedentary behaviours (watching TV/DVD, and play or use the computer during weekdays and on weekends). Of the 4877 adolescents in the sample, 1857 (38.1 percent) practice PA less than three times a week and 2930 (60.1 percent) claim to practice it three or more times per week. With respect to gender, we can see that boys practice PA significantly more ($\chi^2 = 3.1, p < 0.05$) than girls. Moreover, teenagers under 12 practice PA more regularly during the week (66.5 percent) that older adolescents, who have higher rates of practice less than three days a week (55.9 percent). Concerning the perception of fatigue and sleeping difficulties, both groups of adolescents reported "rare" and "frequent" practice of PA more than three times a week. However, in the study variables the difference between regular practitioners (≥ 3 days per week) and non-regular practitioners (< 3 days per week) is significantly more ($\chi^2 = 18.04, p < 0.05$) in the

Table 2. Construction of variables and their designation.

<i>Variables</i>	<i>Re-encryption</i>
Age	1- <12; 2- 12 to 15; 3- > 15
Gender	a) Boy; b) Girl
Physical activity	1<3 days; ≥3 days
Difficulty falling asleep	1- Rarely; 2- Sometimes; 3 - Often
Symptom of fatigue and exhaustion	
Watch TV and DVD during the week	
Watch TV and DVD during the weekend	
Playing games during the week	
Playing games during the weekend	1 - < 3h/day; 2 - 3-5h/day; 3 - > 5h/day
Computer use during the week	
Computer use during the weekend	

occasional record of these symptoms when compared to adolescents perceiving them with a greater frequency.

Regarding "watch TV/DVD during the week," some significant differences were found ($\chi^2 = 7.95, p < 0.05$) in the regular practice of PA, registering a decrease in teenagers who practice three hours or more per week when they watch TV/DVD 3-5 hours a day (58.8 percent) compared to adolescents that watch it less than 3 hours a day (62.9 percent). We can find the same trend during the weekends, registering significant differences only in adolescents that watch it more than 5 hours a day, 42.2 percent practice PA less than three times per week.

In the variable playing computer games during the week ($\chi^2 = 18.46, p < 0.05$) or during the weekend ($\chi^2 = 35.5, p < 0.05$) there were significant differences regarding the increase of the number of hours of playing computer games associated with an increase in regular practice of PA. There were no significant differences in the amount of time spent daily on the computer during the week and weekends and the regular practice of PA.

Table 4 allows us to observe the results of the multiple regression analysis, which identify the variables that are significant predictors for the practice of PA in adolescents.

The significance obtained for the model is low ($R^2_a = 0.1$), but this is a model with an interesting combination of significant associations between the variables gender, age, watching TV/DVD and use the computer only during weekends.

Table 5 presents the adjusted odds ratios of logistic regression statistics for the variables of gender, age, fatigue, sleeping difficulty and frequency of sedentary behaviours during the week and weekend.

There is a probability of 70 percent for increased the physical activity practice, if the subject is a boy (OR = 0.3, $p < 0.05$). However, the practice decreases by 10 percent per year of age of the subjects (OR = 0.9, p

< 0.05). A positive association was also identified between the increase of PA and frequently watching TV/DVD on weekends (OR = 1.2, $p < 0.05$).

Seeking to understand the consistency of the gender variable, we conducted a test to find the model that explains the practice of PA of boys and girls. In the case of girls we found that it decreases by 10 percent per year of age (OR = 0.9, $p < 0.05$). There was a positive association between the increase of PA and frequently watching TV/DVD on weekends (OR = 1.2, $p < 0.05$) and playing computer games during the week (OR = 1.6, $p < 0.05$). Regarding boys, only a meaningful relationship with the age variable could be established, which presents the same trend of the information above (OR = 0.9, $p < 0.05$).

As the variable of age of the predictors of PA is more consensual, we tried to understand the differences between age groups. In younger adolescents (under 1), the only significance found was the gender, in which the probability of practicing PA increases by 60 percent if the subject is a boy (OR = 0.4, $p < 0.05$). This probability is confirmed and declines in older adolescents (OR = 0.3, $p < 0.05$). In adolescents between 13 and 15 there was an association with watching TV/DVD during the weekends (OR = 1.3, $p < 0.05$).

As is obvious from the data collected in this study there is not a direct relationship between sleeping difficulty and fatigue and the practice of PA, unlike what we expected when we first started the study.

DISCUSSION

This study aims to understand the relationship between the practice of PA, the regular practice of various types of sedentary behavior and the perception of symptoms of fatigue and sleeping difficulty.

There is a positive relationship between the practice of PA and male adolescents (34), and this is one of the most reliable evidence in this study, which is often

Table 3. Analysis of independent variables according to the level of practice of physical activity of adolescents.

	PA per week				χ^2		PA per week				χ^2	
	< 3 days		≥ 3 days				< 3 days		≥ 3 days			
	n	%	n	%			n	%	n	%		
Gender * (n=4787)						3.1	Watch TV and DVD during the weekend* (n=4675)					
F	1237	51.1	1186	48.9	< 3 h		454	36.8	780	63.2	8.47	
M	620	26.2	1744	73.8	3 to 5 h	831	38.2	1344	61.8			
					> 5 h	534	42.2	732	57.8			
Age * (n=4658)						38.06	Playing computer games during the week* (n=4692)					
≤ 12	450	33.5	892	66.5	< 3 h		1428	40.7	2077	59.3	18.46	
13 to 15	578	37.1	981	62.9	3 to 5 h		284	34.1	550	65.9		
> 15	774	44.1	983	55.9	> 5 h	116	33	236	67			
Fatigue * (n=4741)						18.04	Playing computer games during the weekend* (n=4675)					
Rarely	791	35.6	1431	64.4	< 3 h		1180	42.4	1606	57.6	35.5	
Sometimes	640	40.4	946	59.6	3 to 5 h		443	35.6	800	64.4		
Frequently	402	43.1	531	56.9	> 5 h	198	30.4	454	69.6			
Difficulty falling asleep* (n=4744)						8.01	Computer use during the week (n=4679)					
Rarely	1249	37.7	2068	62.3	< 3 h		1393	39	2179	61	2.7	
Sometimes	303	39.2	469	60.8	3 to 5 h		319	39.6	486	60.4		
Frequently	285	43.5	370	56.5	> 5 h	104	34.4	198	65.6			
Watch TV and DVD (week)* (n=4692)						7.95	Computer use during the weekend (n=4653)					
< 3 h	769	37.1	1306	62.9	< 3 h		1232	39.3	1900	60.7	3.48	
3 to 5 h	831	41.2	1184	58.8	3 to 5 h		392	39.3	605	60.7		
> 5 h	227	37.7	375	62.3	> 5 h	184	35.1	340	64.9			

Note: * χ^2 ; p < 0.05; Adjusted residual $\geq |1.9|$ are considered significant (**in bold**)

seen with a greater prevalence of physical inactivity and lower PA between girls (5, 9). The same is true for leisure activities, which notes that girls spend more time accomplishing schoolwork, while boys practice more sports and spend more hours in leisure activities and with friends (45). Pate et al. (35) recorded a decrease of 4 percent of PA in girls, which corresponded to a decrease of 2.16 minutes of moderate to vigorous daily PA.

Age was the strongest predictor of PA, where there is an increase in early adolescence that starts decreasing after 13 in both sexes (21). The age is associated with a decrease in practice; this study recorded a 10 percent decline per year of age of the individual. This indicator

is in accordance with the results of several investigations (2, 22, 28).

For some authors (10), the maturation is relevant to the subject, even for male adolescents, because boys maturing earlier are more active initially. However, these boys experience a greater decline in the practice of PA compared to those showing signs of aging later. In the models developed there were no associations with fatigue and sleeping difficulty. The results for fatigue and exhaustion contradict the investigations of ter Wolbeek et al. (45, 46), which found that adolescents who show a persistent pattern of fatigue experienced lower rates of physical activity, sleeping less and with higher levels of depression. In fact, some

Table 4. Explanatory model of the practice of physical activity.

<i>Variable to explain</i>	<i>Variables included</i>	β	<i>t</i>	<i>P</i>	R^2_a
Practice of PA	Constant	5.1	22.7	0.000	0.104
	Gender	1.13	20.02	0.000	
	Age	-0.15	-9.87	0.000	
	Computer usage during the weekend	0.04	3.109	0.002	
	Watch TV and DVD during the weekend	-0.03	-2.36	0.018	

investigators (24, 49) have found short sleep durations to be associated with increased television viewing and reduced participation in organized sports. The study by Spruyt, O'Brien, Cluydts, Verleye and Ferri (43) also found that at least 62 percent of adolescents in the study reported at least one sleep problem in the past six months. In the study by Yu et al. (50) with 500 adolescent twins, relationships between hours of sleep and the amount of PA practice were not significant, although it was found that the length of hours of sleep decreased with age and that did not differ from gender. According to Findlay (12), the major reason for adolescent fatigue and sleepiness is attributable to lifestyle issues that cause shorter periods of rest. However, despite this evidence and a lower perception of physical energy, we did not find a relationship with the practice of PA, maybe because of the subjective nature of the issue.

To watch TV/DVD during the weekends also showed a statistical significance, noting that teens who often occupied their free time with this activity had higher rates of PA. This interesting indicator is understandable given the longer time that young people have during weekends. This result allows us to understand the difficulty of establishing a cause-effect relationship between watching TV and the practice of PA as reflected in the contradictory data of different investigations. In this sense it also points to the research by Van den Bulcke and Hofman (48) by stating that the time spent watching TV does not predict the time spent exercising either longitudinally or transversely. For Ekelund et al. (12), watching TV and PA may be separate and different entities while being associated with adiposity and metabolic risk. In terms of TV consumption indicators, boys report spending more hours watching TV (34) and other screen activities (39). The average time of exposure to screens (TV and PC) increases with age and decreases with socioeconomic status, where watching TV occupies most of the leisure time (4) and is the favorite activity of adolescents (73 percent), followed by videogames (19 percent), and computer use other than for games (6 percent). The increased use of screen activities is associated with lower PA for boys spending more than 25 percent of the time of exposure to the screen playing video games and less time

sleeping (33). The male adolescents actually spend more time with sedentary behaviours, but also do more exercise than girls (44).

As for Nelson and Gordon-Larsen (29), adolescents with a higher consumption of hours of TV/DVD are less likely to have positive behaviours; adolescents between 5 and 15 years old have higher levels of BMI, lower fitness cardio-respiratory, an increased smoking probability and high cholesterol (19). The extensive review of scientific studies among adolescents on watching TV conducted by Gorely, Marshall and Biddle (17) concluded that gender, body fat, cholesterol, levels of aerobic fitness, strength and physical activity were independent variables for watching TV. According to Crespo et al. (5), increased television watching is associated to a higher prevalence of obesity among girls, but not among boys. Children who watched the most number of hours of television a day had the highest prevalence of obesity. Television viewing in childhood and adolescence is associated with overweight, poor fitness, smoking, and raised cholesterol in adulthood. Excessive viewing might have long-lasting adverse effects on health (19).

Devís-Devís et al. (7) found significant predictors of screen media time usage: type of school, students from state/public school spent more time on this activity than their private school counterparts; older adolescents (14 and 16 years old) were more likely to use computer/videogame and mobile phone than younger adolescents; the more accessibility to household technology the more likely the use of computer/videogames and mobile phones. Boys spent significantly more time on mobile phones than girls.

Television viewing might not only displace more energetic activities (contributing to poor fitness and obesity), but it also encourages poor dietary habits, violent behaviour, and substance abuse due to the messages conveyed through program content and advertising (1). Age-specific data (25) suggest TV viewing decreases during adolescence, but those considered "high users" at young ages are likely to remain high users when older.

As major limitations of this study, we can identify the global nature of the instrument used for data

Table 5. Logistic regression for gender and of practice physical activity.

Variable	PA	PA Fem.	PA Masc.	PA ≤12 years	PA 13-15	PA ≥15
	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Gender						
F (1)	-	-	-	-	-	-
M	0.3 [0.3-0.4]*	-	-	0.4 [0.3-0.5]*	0.3 [0.3-0.4]*	0.3 [0.3-0.4]*
Age	0.9 [0.8-0.9]*	0.9 [0.8-0.9]*	0.9 [0.8-0.9]*	-	-	-
Difficulty falling asleep						
Rarely (1)	-	-	-	-	-	-
Frequently	1.0 [0.8-1.2]	0.9 [0.8-1.2]	1.2 [0.9-1.6]	1.3 [0.9-1.8]	1.0 [0.7-1.4]	1.1 [0.8-1.4]
Fatigue						
Rarely (1)	-	-	-	-	-	-
Frequently	1.0 [0.9-1.3]	1.2 [0.9-1.4]	1.0 [0.8-1.3]	1.1 [0.8-1.6]	1.1 [0.8-1.5]	1.0 [0.8-1.3]
Watch TV and DVD (week)						
Sometimes (1)	-	-	-	-	-	-
Frequently	0.9 [1.1-1.4]	1.0 [0.8-1.3]	1.0 [0.8-1.2]	1.2 [0.9-1.7]	0.8 [0.6-1.0]	0.9 [0.7-1.2]
Watch TV and DVD (weekend)						
Sometimes (1)	-	-	-	-	-	-
Frequently	1.2 [1.1-1.2]*	1.2 [1.1-1.5]*	1.1 [0.9-1.4]	0.9 [0.7-1.3]	1.3 [1.1-1.7]*	1.2 [0.9-2.0]
Playing computer games (week)						
Sometimes (1)	-	-	-	-	-	-
Frequently	1.2 [0.9-1.5]	1.6 [1.1-2.6]*	1.0 [0.8-1.2]	0.9 [0.5-1.5]	1.3 [1.0-1.7]	1.3 [0.9-2.0]
Playing computer games (weekend)						
Sometimes (1)	-	-	-	-	-	-
Frequently	1.0 [0.8-1.5]	0.9 [0.6-1.3]	1.1 [0.8-1.5]	1.3 [0.9-2.0]	0.9 [0.6-1.3]	0.8 [0.6-1.1]
Computer use (week)						
Sometimes (1)	-	-	-	-	-	-
Frequently	0.9 [0.6-1.1]	0.9 [0.6-1.3]	0.8 [0.5-1.2]	0.6 [0.3-1.2]	0.7 [0.4-1.2]	1.1 [0.8-1.6]
Computer use (weekend)						
Sometimes (1)	-	-	-	-	-	-
Frequently	0.9 [0.7-1.1]	0.8 [0.6-1.2]	0.9 [0.6-1.2]	1.5 [0.9-2.7]	0.8 [0.6-1.3]	0.8 [0.8-1.1]
R²_N	0.1	0.03	0.01	0.08	0.09	0.08
X²_{HL}; p	5.44; 0.71	10.56; 0.24	5.02; 0.76	5.5; 0.7	4.26; 0.76	6.2; 0.62

Note: PA – Physical activity (0 to 7 days/week); OR means odds ratio; **R²_N** - Nagelkerke test; **X²_{HL}; p** - Hosmer e Lemeshow test; *p < 0.05

collection, which aims to characterize various aspects of health of young people. Other limitations underscore the difficulty that some young people have in reporting some variables with precision and accuracy. These limitations could be resolved by reducing the number of questions in the collection instrument and promoting information sessions on the objectives and aims of the instruments.

The results of this investigation conclude that there is no relationship between the practice of PA of Portuguese adolescents with symptoms of exhaustion and sleeping difficulty and sedentary behaviours. However, the explanation of the practice of PA is associated with the male gender, age and watching TV/DVD on the weekend.

The key findings of this investigation state that regular

practitioners perceive fewer symptoms of physical fatigue and sleeping difficulties; the practice of physical activity is not associated with fatigue and sleeping difficulty, and teens who watch more TV on weekends are also those with higher rates of physical activity.

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