



Comparison between girls and boys lifestyle profile and physical activity

Comparaç o do perfil de estilo de vida e a pr tica de atividade f sica entre meninas e meninos.

AUTHOR'S

Tatiana Affornali Tozo^{1,2}
Beatriz Oliveira Pereira¹
Francisco Jos  de Menezes J nior²
Cristianne Morgado Montenegro¹
Carla Marisa Maia Moreira³
Neiva Leite²

1 Universidade do Minho, Instituto de Educa o, Braga, Portugal.

2 Universidade Federal do Paran , Departamento de Educa o F sica, Curitiba, Paran , Brasil.

3 Universidade do Porto, Centro de Investiga o em Atividade F sica, Sa de e Lazer, Porto, Portugal.

CORRESPONDING

Tatiana Affornali Tozo

E-mail: tatinali@yahoo.com.br

Address: Paulino Siqueira Cortes n  1986, Bairro: Silveira da Motta, S o Jos  dos Pinhais, Paran , Brasil.

CEP: 83005-030.

DOI

10.12820/rbafs.26e0188



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ABSTRACT

The aim of this study was to compare lifestyle profile and physical activity between girls and boys. A total of 336 students 11 to 17 years old participated in the study (51.5% female). Height, body mass, sexual maturation and z-score body mass index (BMI-z) were assessed. The level of physical activity (PA) was determined through the International Physical Activity Questionnaire (IPAQ). Lifestyle was assessed using the Individual Lifestyle Profile questionnaire (PEVI), computing the total scores from five components and considering the following cutoff points: >30 points = favorable PEVI; and ≤30 points = unfavorable PEVI. Results showed 35.1% of the students were considered overweight, 74.78% did not comply with the recommendations for physical activity and 31.5% presented unfavorable PEVI. There was a difference between boys and girls in moderate to vigorous physical activity (MVPA) ($p = 0.048$). Boys presented better lifestyle ($p = 0.06$) and had, on average, more light PA ($p < 0.01$), moderate PA ($p < 0.01$), vigorous PA ($p < 0.01$) and MVPA ($p < 0.01$) than girls. Girls with favorable PEVI had higher average levels of light PA than those with unfavorable PEVI ($p < 0.001$). It was concluded that boys are more active during the week when compared to girls. However, they also present fewer concerns with preventive behaviors and relationships. Light PA was higher in girls with a favorable lifestyle profile.

Keywords: Lifestyle; Physical activity; Adolescent behavior.

RESUMO

O objetivo deste estudo foi comparar o perfil de estilo de vida e a pr tica de atividade f sica entre meninas e meninos. Participaram do estudo 336 escolares, de 11 a 17 anos de idade (51,5% sexo feminino). Foram avaliados a estatura, massa corporal, maturaç o sexual e  ndice de massa corporal escore z (IMC-z). O n vel de atividade f sica (AF) foi analisado pelo International Physical Activity Questionnaire (IPAQ). O estilo de vida foi avaliado por meio do question rio Perfil do Estilo de Vida Individual (PEVI), analisando o total de escores dos cinco componentes, considerando-se como pontos de corte: >30 pontos = PEVI favor vel e ≤30 pontos = PEVI desfavor vel. Observou-se que 35,1% dos escolares foram considerados acima do peso, 74,78% n o cumprem as recomenda es de atividade f sica e 31,5% apresentaram PEVI desfavor vel. Existiu diferen a entre meninos e meninas para a pr tica de atividade f sica moderada e vigorosa (AFMV) ($p = 0,048$). Os meninos apresentaram melhor estilo de vida ($p = 0,06$) e praticam em m dia mais AF leve ($p < 0,01$), AF moderada ($p < 0,01$), AF vigorosa ($p < 0,01$) e AFMV ($p < 0,01$) do que meninas. Enquanto as meninas com PEVI favor vel praticam em m dia mais AF leve do que aquelas com PEVI desfavor vel ($p < 0,001$). Concluiu-se que meninos praticam mais AF na semana em rela o  s meninas, entretanto possuem menor preocupa o com comportamentos preventivos e relacionamentos. A pr tica de AF leve foi maior em meninas com perfil de estilo de vida favor vel.

Palavras-chave: Estilo de vida; Atividade f sica; Comportamento do adolescente.

Introduction

Childhood and adolescence can be considered critical stages for health since there is evidence that habits acquired in this period may extend through adulthood¹. More than change in nutritional behavior, the decline in physical activities and increase in sedentary time are the main factors adjacent to childhood obesity^{2,3}. These habits reveal the tight relationship between lifestyle and

the development of health issues since they represent risk behaviors and impact negatively the health of young populations⁴. During this time there are important biological, psychological, and social transformations with the adoption of life-long patterns and behaviors. These can influence the development of comorbidities associated to obesity⁵, considered a multifactorial causality that involves genetic, physiological, environmen-

tal, cultural, social, and psychological aspects^{6,7}.

The lifestyle includes several components of human behavior, representing situations that can be healthy or not, revealing many aspects of the day-to-day to be considered in terms of risk behaviors and impacts on population health. Therefore, the unfavorable lifestyle, which includes low levels of physical activity, inadequate eating habits and risk behaviors, is associated to cardiometabolic changes⁵ as well as low cardiorespiratory fitness⁸, muscle strength⁹, and Vitamin D concentrations³. The unfavorable lifestyle profile in children and youth favors excessive weight and other associated diseases. The analysis of this profile is an important factor to determine health¹⁰. Regular physical activity, on the contrary, promotes improvements in self-perception and physical control in adolescents⁷, a healthy profile, and increased cardiorespiratory fitness⁸.

Thus, studying the relationship between lifestyle profile and physical activity level is of extreme importance since most research have not assessed these variables in combination, but instead, separately, which makes an integrated analysis difficult¹¹. Moreover, it is of major importance to compare the lifestyle of boys and girls based on physical activity level¹².

Therefore, with the need to adopt preventive behaviors, the assessment of lifestyle and levels of physical activity in children and adolescents are important to identify subgroups with risk factors and can guide strategies, described as actions to health promotion, which can have an integrated analysis to the planning of preventive interventions as a way to reduce comorbidities that may develop in the youth population¹³. Additionally, it is a multidimensional construct that includes physical, psychological, and social health that represents quality of life in the younger population and relate to the parameters of the individual lifestyle profile such as eating habits, control of stress, physical activity, relationships, and preventive behaviors. So, the aim of this study was to compare, in an integrated manner, the lifestyle profile and physical activity between girls and boys.

Methods

This is a cross-sectional study conducted during the months of August through December of 2017, presented to the administration of two private middle and high schools in the city of Sao Jose do Pinhais, Parana, in southern Brazil. The sample was selected by convenience and was comprised by 336 volunteer children

and adolescents of both sexes aged between 11 and 17 years old (mean = 14.58; SD = 1.61). Girls were 173 (mean = 14.72; SD = 1.62) and boys were 163 (mean = 14.44; DP = 1.59) students enrolled in middle or high school. After the institutions consented, researchers visited the classroom to invite and present the objectives of the study to students. The proportional stratified sampling technique was used so schools with greater population contribute more to the sample. Data collection with survey and anthropometric assessments were directed by the researcher in charge, along with trained professionals in the day of the evaluations.

Students who were pregnant, had limitations that prevented them from participating in any of the study procedures, and did not have a consent term and an assent term signed were excluded. This study was approved by the Research Ethics Committee from the Pontiff Catholic University of Parana (PUC-PR) under the protocol number CAAE71324017.1.0000.0020/2017. The sample power was calculated *a priori* in GPower v3.1 software for t-test statistics when comparing boys and girls. The effect size was attributed (d) 0.50, alpha = 0.05, and power of 0.95. Based on these parameters, the sample size was calculated, a minimum of 210 adolescents. Moreover, the sample power *a posteriori* was calculated according to the final sample size (336 adolescents). Therefore, attributed the effect size of 0.50, alpha of 0.05, and that resulted in a sample power of 0.995.

The lifestyle profile was assessed through the "Individual Lifestyle Profile Questionnaire" (*Perfil do Estilo de Vida Individual*, in Portuguese) or PEVI¹⁴. To summarize, the survey includes five fundamental aspects of people's lifestyles associated to psychological well-being and several degenerative chronic diseases. It is comprised of 15 items grouped into 5 main components: nutrition; physical activity; preventive behavior; relationships; and stress control. Considering each student can score up to 45 points in the sum of all 15 questions, defining the following cut-points: ≥ 30 points = favorable PEVI or < 30 points = unfavorable PEVI.

The somatic maturation time was predicted by the time for the peak height speed (PHS), from the equations proposed by Moore et al.¹⁵ presented in years for PHS using age group and height. The anthropometric measures were collected at school, in a standardized manner, following the procedures determined by the Anthropometric Standardization Reference Manual¹⁶. Height was measured with a portable stadiometer with resolution of 0.1 centimeters (cm). Body mass was as-

sessed with a portable scale model PLENA, with resolution of up to 100 grams and capacity for 150 kilograms.

Body mass index (BMI) was determined to verify the nutritional status of the participants in this study, calculated by dividing body mass (kg) by the square of height (m²) using the diagnosis if the anthropometric state. Furthermore, z-score BMI (BMI-z) was calculated according to the growth reference data for 5-19 years old¹⁷ using the WHO Anthro Plus[®] software, version 1.0.4. Participants were classified as eutrophic if BMI-z was ≥ -2 and $< +1$ and overweight if BMI-z ≥ 1 .

The level of physical activity was assessed by the International Physical Activity Questionnaire (IPAQ) in its short form, validated for adolescents¹⁸. The questions in the survey refer to physical activity during the week previous to the assessment to estimate the time spent in physical activity per week. Next, the level of physical activity was classified according to the World Health Organization¹⁹, which suggests children and adolescents 5-17 years old should have at least 60 minutes of moderate-to-vigorous physical activity (MVPA) daily, with a weekly volume of 420 minutes.

Statistical analysis was conducted using the Statistical Package for the Social Science (SPSS), version 24. The normality of the data was tested using the Shapiro Wilk test. For comparison of continuous variables, Student's t-test of independence for parametric variables, and Mann-Whitney U test for non-parametric variables. Chi-Square test was used to compare the

proportions. One-way ANCOVA was used to verify differences for sex and the PEVI categories for the physical activity variables and PEVI score. The chronological age and somatic maturation were used as covariants. For the main statistic, non-parametric variables were normalized by log10 or squared root. The level of significance was $p < 0.05$ for all analysis.

Results

Sample characteristics can be found in Table 1. Results showed 35.1% of adolescents were considered overweight, 74.8% did not meet the guidelines for physical activity, and 31.5% had unfavorable PEVI. When comparing sex, boys presented more MVPA than girls ($p = 0.048$) but there were no significant differences in BMI ($p = 0.122$) and PEVI ($p = 0.860$).

According to the frequency of responses for PEVI (Table 2), boys presented higher proportions of positive responses for questions related to physical activity, especially in terms of participating in physical education classes in school, with statistically significant differences (0.005). Additionally, being physically active, playing sports, dance, or wrestling outside of school ($p < 0.001$) and walking or cycling for daily commute ($p = 0.001$) was higher for boys than girls. On the other hand, girls had higher proportions of positive answers than boys for preventive behaviors, related to avoiding risky situations or violent persons ($p = 0.026$) and relationships, questioning the school environment and

Table 1 – Sample characteristics

	Total (n = 336)		Girls (n = 173)		Boys (n = 163)		(Boys vs Girls)	
	Mean	SD	Mean	SD	Mean	SD	T or U	p
Age group* (years)	14.51	(13.3-15.9)	14.74	(13.5-16.0)	14.35	(13.1-15.6)	1.69	0.090
Maturation (years)	1.45	1.51	2.18	1.27	0.68	1.36	9.00	<0.001**
Body mass* (kg)	56.25	(47.9-64.6)	54.70	(46.8-62.0)	58.90	(49.2-70.8)	-3.20	0.001**
Height (cm)	162.14	9.62	158.90	7.41	165.58	10.49	6.77	<0.001**
BMI-z	0.51	1.22	0.37	1.16	0.65	1.27	2.13	0.034**
	n	%	Freq.	%	Freq.	%	Chi ²	p
BMIz classification								
Normal	218	64.9	119	54.6	99	45.4	2.39	0.122
Overweight	118	35.1	54	45.8	64	54.20		
MVPA (WHO)								
Sufficiently active	85	25.2	36	42.4	49	57.6	3.92	0.048**
Insufficiently active	251	74.8	137	54.8	114	45.2		
PEVI								
Favorable	230	68.5	118	51.3	112	48.7	0.03	0.860
Unfavorable	106	31.5	55	51.9	51	48.1		

SD = standard deviation; BMIz = z-score body mass index; MVPA = moderate-to-vigorous physical activity; PEVI = individual lifestyle profile; *U test – presented in median and interquartile intervals; ** level of significance of 5%.

relationship with teachers ($p = 0.003$).

Table 3 presents the comparison between physical activity variables and PEVI score between boys and girls. According to the ANCOVA, boys were on average more active than girls at light ($p < 0.01$), moderate ($p < 0.01$), vigorous ($p < 0.01$) and MVPA ($p < 0.01$). Though not significant, there was a tendency for higher PEVI scores in boys than girls ($p = 0.06$).

Table 4 presents the comparison between physical activity and PEVI scores for boys and girls. The results show girls with favorable PEVI had higher levels of light activity than those with unfavorable PEVI ($p < 0.001$). There were no significant differences between the PEVI categories for boys, neither for moderate physical activity, vigorous physical activity, and MVPA for girls.

Discussion

The purpose of this study was to compare the quality of the lifestyle profile and levels of physical activity in girls and boys. The findings showed that a third of the children and adolescents were overweight and two thirds

Table 3 – Comparison between boys' and girls' physical activity intensity levels and lifestyle profile.

	Girls (n = 174)		Boys (n = 163)		p
	Mean	SD	Mean	SD	
Light PA (min)	196.22	245.71	265.95	326.59	<0.001
Moderate PA (min)	194.34	285.81	261.63	580.60	0.010
Vigorous PA (min)	88.88	181.10	143.15	225.59	<0.001
MVPA (min)	283.22	352.02	404.78	672.45	<0.001
PEVI (score)	30.95	5.09	31.47	5.44	0.061

SD = standard deviation; PA = physical activity; MVPA = moderate to vigorous physical activity; PEVI = individual lifestyle profile. Analysis were adjusted by chronological age group and somatic maturation.

did not engage in sufficient physical activity. Furthermore, it was shown that one third of the students had a lifestyle profile considered unfavorable. Additionally, girls with favorable PEVI were more physically active in light activity than the ones with an unfavorable PEVI. These results showed the fragility of attitudes that benefit health of young students, which confirms what other studies have found concerning overweight

Table 2 – Frequencies in positive and negative responses between boys and girls.

	Girls (%)		Boys (%)		(Boys vs Girls) p-value
	Positive	Negative	Positive	Negative	
Nutrition					
A	55 (31.8%)	118 (68.2%)	62 (38.0%)	101 (62.0%)	0.277
B	105 (60.7%)	68 (39.3%)	93 (57.1%)	70 (42.9%)	0.571
C	54 (31.2%)	119 (68.8%)	47 (28.8%)	116 (71.2%)	0.722
Physical activity					
D	151 (87.3%)	22 (12.7%)	157 (96.3%)	6 (3.7%)	0.005*
E	84 (48.6%)	89 (51.4%)	123 (75.5%)	40 (24.5%)	<0.001*
F	63 (36.4%)	110 (63.6%)	90 (55.2%)	73 (44.8%)	0.001*
Preventive behavior					
G	149 (86.1%)	24 (13.9%)	144 (88.9%)	18 (11.1%)	0.550
H	149 (86.1%)	24 (13.9%)	124 (76.1%)	39 (23.9%)	0.026
I	152 (87.9%)	21 (12.1%)	142 (87.1%)	21 (12.9%)	0.967
Relationships					
J	160 (92.5%)	13 (7.5%)	149 (91.4%)	14 (8.6%)	0.872
K	131 (75.7%)	42 (24.3%)	108 (66.3%)	55 (33.7%)	0.073
L	163 (94.2%)	10 (5.8%)	136 (83.4%)	27 (16.6%)	0.003*
Stress control					
M	100 (57.8%)	73 (42.2%)	108 (66.3%)	55 (33.7%)	0.138
N	140 (80.9%)	33 (19.1%)	128 (78.5%)	35 (21.5%)	0.681
O	144 (83.2%)	29 (16.8%)	134 (82.2%)	29 (17.8%)	0.916

A = You are used to eating well for breakfast; B = You eat fruits and vegetables daily; C = You avoid fried and other greasy foods.; D = You participate in Physical Education classes at school; E = You are physically active through exercise, sport, dance, or wrestling outside of school Physical Education; F = You usually walk or cycle in your daily commute; G = You are informed and seeks to prevent sexually transmissible diseases; H = You avoid risk situations and violent people; I = You know and avoid the risks of smoking, alcohol abuse, and other drugs; J = You seek to cultivate friendships and is satisfied with your relationships; K = Your leisure time includes meeting with friends or recreational activities in groups; L = The school environment and your relationship with teachers are good; M = You are satisfied with your body and your way of being; N = You think it is normal the level of pressure from your parents to succeed in school; O = Imagining how your future will be is stimulating. *level of significance of 5%.

Table 4 – Comparison of physical activity variables and favorable or unfavorable lifestyle profiles.

Girls (n = 174)						
	PEVI favorable (n = 118)		PEVI unfavorable (n = 56)		F	p
	Mean	SD	Mean	SD		
Light PA (min)	244.47	264.27	94.55	160.65	14.24	<0.001
Moderate PA (min)	213.01	313.13	155.00	214.55	1.59	0.205
Vigorous PA (min)	99.58	199.22	66.34	134.05	1.22	0.273
MVPA (min)	312.58	385.91	221.34	259.25	2.61	0.101
Boys (n = 163)						
	PEVI favorable (n = 112)		PEVI unfavorable (n = 51)		F	p
	Mean	SD	Mean	SD		
Light PA (min)	263.53	305.98	271.27	371.06	0.01	0.926
Moderate PA (min)	301.56	683.61	173.94	208.10	1.81	0.180
Vigorous PA (min)	134.00	180.21	163.24	303.61	0.48	0.485
MVPA (min)	435.56	755.66	337.18	436.59	0.85	0.353

SD = standard deviation; PA = physical activity; MVPA = moderate to vigorous physical activity; PEVI = individual lifestyle profile. Analysis were adjusted by chronological age group and somatic maturation.

and low levels of physical activity^{11,20}.

Santos et al.²¹ observed that sedentary behavior, physical inactivity and other inappropriate factors influence the increase in overweight and obesity and affect the appropriation of an unhealthy lifestyle in adolescence. Therefore, we highlight that this study showed the need to analyze variables pertaining to the individual lifestyle profile as well as levels of physical activity. The present study revealed that one third of students had a lifestyle profile considered unfavorable on what refers to actions with a great influence in general health and lifestyle, which shows that changes in behavior are a great challenge to youth. Similarly, Simões et al.²² reinforced the increase in prevalence of overweight in children and adolescents, highlighting the importance of preventive measures as well as therapeutic programs for a decrease in obesity.

In regards to the scores for lifestyle questions, girls had higher concerns with behaviors relates to prevention and relationships. Also, girls with favorable PEVI showed higher levels of light physical activity, suggesting girls do not participate regularly in physical activity or sport outside of the school environment and daily active transportation, which reinforces the importance of behavior change for chronic disease prevention. Boys had higher levels of physical activity overall, however, when analyzing favorable and unfavorable PEVI there were no statistically significant differences among the

physical activity categories. Our results confirm data previously published, that girls are less physically active than boys²³.

Studies suggest that the prevention of health and risk behaviors are related to the benefits of physical activity^{19,24}, as the results observed in this study with boys, who were on average sufficiently active according to the physical activity recommendations²². However, when analyzing preventive behaviors and relationship patterns, an important aspect of this study, the findings showed that boys had negative attitudes toward these components. The relevance of these results points to the need to adopt healthy habits for promotion and protection to health, as well as the reduction of non-communicable chronic diseases^{25,26}.

The present study revealed important data, being the first study comparing the integrated lifestyle profile and according to physical activity levels for boys and girls¹⁸. In this perspective, the most relevant patterns of students are approached by the components analyzed, which allowed us to identify that boys engaged in more MVPA than girls. A study in Brazil observed the low prevalence of in physical activity levels, predominantly for females²⁷. Flausino et al.²⁹ found that the overall average of the lifestyle dimensions was relatively low, which shows a lack of attention or care with a series of aspects, including physical activity levels. This justifies the importance of a global and concise evaluation over

the main factors associated to lifestyle.

In agreement with what was found in this investigation, youth health can be affected by habitual behaviors since the unfavorable lifestyle reflects negatively on health, increasing the chances of problems and the presence of comorbidities related to sedentary behavior and overweight^{5,10}. The life habits for children and youth are directly related to family and social behavior with the tendency of global increase in sedentary recreation activities²⁸ and factors such as lack of Vitamin D which are related to poor nutrition, low solar exposure, and decrease in physical activity engagement³. These social changes lead to adaptive physiological responses to day-to-day behavior, which are not always favorable to health, especially in individuals who may have a genetic predisposition⁶. Therefore, it is also important to assess cardiorespiratory fitness to diagnose the potential of physical fitness in school-aged youth⁸.

Thus, the main contribution of this study refers to the comparison analysis between sex and lifestyle profile and their association with the distinct physical activity intensities (light, moderate, vigorous, and MVPA). Nonetheless, in order develop prevention programs sufficiently efficient in its results, it is essential to have an epidemiological investigation that describes the pattern of distribution of physical activity in school-aged children as a diagnosis for youth population health³⁰. However, the limitations in this study must be considered, especially the fact that it is a cross-sectional study which prevents finding association between cause and effect. Furthermore, the sample selected by convenience.

We concluded that two thirds of the school-aged youth had favorable PEVI and that boys were more active than girls at light, moderate, and vigorous physical activities. Girls were more concerned about disease prevention and relationships than boys. Light physical activity seems to be an important indicator of favorable PEVI for girls. These results suggest the need to implement intervention programs and development of strategies for behavior change in early life stages for boys and girls. Also, they reveal the importance of future research on knowledge of quality of lifestyle so there are actions incentivizing adherence to healthy habits, aiming to promote and protect the health and decrease the vulnerability of children and adolescents.

Conflict of interest

The authors declare no conflict of interest.

Funding

This study was supported by the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES) – funding code 001, Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq)* and by National Funds through the FCT – *Fundação para a Ciência e a Tecnologia* within the CIEC project (*Centro de Investigação em Estudos da Criança da Universidade do Minho*) with the reference UIDB/00317/2020.

Authors' contributions

Tozo TA, elaborated the initial study, worked on the analysis and interpretation of data, wrote, revised, and was responsible for the final version of the manuscript. Pereira BO, collaborated in idealizing the study, analysis and interpretation of results, critical review and approval of final version to be published. Menezes Junior JF, participated in the development of the manuscript and critical review of the final content. Montenegro CM, participated in the development of the manuscript and critical review of the final content. Moreira CMM. Collaborated in the analysis, interpretation of results, critical review, and approval of the final version to be published. Neiva L collaborated in the idealization of the study, analysis and interpretation of results, critical review, and approval of the final version to be published.

Institutional ***

This manuscript is a part of the doctoral thesis of Tatiana Affonali Tozo - Universidade do Minho under cotutela regime with the Federal University of Parana (UFPR).

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Received: 17/07/2020

Approved: 23/10/2020

Quote this article as:

Tozo TA, Pereira BO, Menezes Júnior FJ, Montenegro CM, Moreira CMM, Leite N. Comparison between girls and boys on lifestyle profile and physical activity. *Rev Bras Ativ Fís Saúde*. 2021;26:e0188. DOI: 10.12820/rbafs.26e0188