

# The influence of gender on the practice of physical activity in high school adolescents in the city of Manaus

## A influência do gênero sobre a prática de atividade física em adolescentes do ensino médio na cidade de Manaus

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### Abstract

Obesity is a public health problem that has been growing, especially in developing countries. It is associated with genetic factors as well as with cultural factors, overeating, and leading a sedentary lifestyle. The aim of this study was to compare sedentary behaviors and levels of physical activity, based on gender, among high school teenagers studying in the state public school system in the city of Manaus, AM, Brazil. The final sample consisted of 864 adolescents of both genders within the ages of 15 and 19 years old. The information was collected by means of a formulated questionnaire and adapted based on COMPAC2. The results were presented using descriptive statistics and a comparison between groups (male and female) was performed using a chi-squared test. The male student group (M) presented higher levels of participation in the physical activities and presented more time dedicated to these activities than the female group (F) which stated preference for computer use and participation in cultural activities. Moreover, 64.3% of the young men and 35.5% of the young women claimed to dedicate between 30 and 60 minutes or more per day to the practice of physical activity. The most used means of transportation to and from school was on foot (M: 62.3%; F: 57.8%). In regards to sedentary behavior, 60% of those assessed stated that they spend more than 2 hours watching television programs each day and 52% of the young men and 42.8% of the young women stated the use of a computer for more than 2 hours each day. The results reveal that the practice of physical activity and sedentary behavior is gender dependent, since the female students practiced less physical activities and therefore presented more sedentary habits.

**Keywords:** Teenagers. Sedentary Lifestyle. Motor Activity.

### Resumo

A obesidade é um problema de saúde pública que cresce especialmente em países em desenvolvimento, estando associado tanto a fatores genéticos quanto a fatores culturais como o excesso de alimentação associados a elevados níveis de sedentarismo. O objetivo deste estudo foi comparar os comportamentos sedentários e níveis de atividade física, em função do gênero, nos adolescentes do ensino médio na rede pública estadual da cidade de Manaus, Brasil. Participaram do estudo 864 adolescentes de ambos os gêneros com idade entre 15 e 19 anos. As informações foram coletadas por meio de questionário formulado e adaptado com base no COMPAC2. Os resultados foram apresentados utilizando a estatística descritiva e a comparação entre os grupos (masculino e feminino) foi realizada por meio do teste Qui-quadrado. O grupo de alunos do sexo masculino (M) apresentou maior participação nas práticas físicas e mostrou maior tempo de dedicação nessas atividades do que o grupo feminino (F), já que este último declarou preferência ao uso do computador e à participação em atividades culturais. Além disso, 64,3% dos rapazes e 35,5% das moças declararam dedicar entre 30 e 60 minutos ou mais por dia para a prática de atividade física. A forma mais usada de deslocamento até a escola foi a pé (M: 62,3%; F: 57,8%). Em relação aos comportamentos sedentários 60% dos avaliados afirmaram passar mais de 2 horas assistindo programas de televisão e 52% dos rapazes e 42,8% das moças declararam usar o computador por mais de 2 horas diárias. Os resultados revelaram que as estudantes do sexo feminino praticam menos atividades físicas que os estudantes do sexo masculino.

**Palavras-chave:** Adolescentes. Estilo de Vida Sedentário. Atividade Motora.

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## INTRODUCTION

Physical activity (PA) is defined as any body movement made by the musculoskeletal system, resulting in a significant increase in energy expenditure<sup>1</sup>. There is some evidence that the practice of PA during adolescence can be associated with the levels of PA throughout adult life<sup>2</sup>. Furthermore, there is some evidence that the practice of physical activity is beneficial to skeletal health (mineral content and bone density) and to the control of blood pressure<sup>3</sup>, also contributing to a sense of well-being. It has been observed in literature that associating healthy nutritional habits with adequate levels of PA demonstrates a lower risk of obesity<sup>5</sup>, cardiovascular disease, type II diabetes, cancer<sup>6</sup>, hypertension<sup>3</sup>, and osteoporosis<sup>7</sup> among others.

However, sedentary behavior is a multifactorial consequence, especially among the youth population. Hours wasted watching television, playing video games and using the computer have been highlighted as contributing factors. Also factored in is the amount of time spent on intellectual activities (homework, reading, graduate courses), work (paid or not) and the absences in physical education classes<sup>9</sup>. In many cases, the physical education classes are the few moments where PA is practiced. However, what has been observed is the drop in participation of these teenagers in physical education classes<sup>10</sup>, being that the intensity of the activities practiced among those who do participate isn't considered moderate to vigorous<sup>11,12</sup>.

In order for the benefits of PA to be reached during adolescence, it is recommended that the activities be of moderate to vigorous intensity for at least 60 minutes, at least three days per week<sup>13,14</sup>. Despite studies proving the importance of physical activity as a factor of health promotion and disease prevention, the prevalence of those exposed to low levels of physical activity is high and affects all age groups<sup>15,16</sup>, being more notable among women with lower levels of schooling<sup>17</sup>. Information about other regions in Brazil is well-known<sup>18</sup>, however in the northern region there have been few studies that have sought out to investigate the levels of physical activity and sedentary behavior among students<sup>19</sup>. In light of this

context, the aim of this study was to compare sedentary behaviors and levels of physical activity, based on gender, among high school teenagers studying in the state public school system in the city of Manaus, AM, Brazil.

## MÉTODOS

### *Experimental Procedures*

This study was descriptive and comparative, transversal, population-based, following high school adolescents in the city of Manaus-AM. The first step was a meeting with the Educational Secretary of the State (SEDUC) where a term of consent was requested for the application of the questionnaire. Along with that, contact with the SEDUC high school management was made in order to collect precise information about the students between the ages of 15 and 19 years old, who were enrolled and actively studying in high school in the municipality of Manaus. With this information collected, a sample representing the municipality was calculated, per school, high school grade and class. Thereafter, 19 schools were selected to participate in the study.

Next, we contacted the school directors (either in person or by telephone) in order to schedule the first visit. 3 visits were made at each of the selected schools, in which the first visit aimed to explain to the selected group the reason behind the study, how it would be performed, the objectives of the study, the importance of the participation of all involved and the informed consent forms were presented. The students who were older than 18 years old signed their own forms, however underage students had their legal guardians sign on their behalf. Two days after the first visit, a second visit was arranged in order to collect the forms signed by the underage students' legal guardians and following that, a third visit was made in order to apply the questionnaire.

Prior to the application of the questionnaire, a training was performed following the model adapted by the Federal University of Santa Catarina Center for Research in Physical Activity (NUPAF-UFSC), in which an instruction manual of the COMPAC 2 methodology that is used for

surveys within the states of Santa Catarina and Pernambuco was included. Besides this, a pilot application allowed us to assess the average time it took to fill out the questionnaire and to clarify any possible doubts the students had. The pilot was applied in a group studying in the second period of Physical Education at the Federal University of Amazonas (UFAM).

The application of the questionnaire was performed during school hours and it wasn't necessary for the students to leave their classrooms. In order to minimize errors of interpretation and delay in filling out response cards, a trained assessor read out the entire questionnaire, clarifying any possible doubts. The response cards were assessed by an optical reader at the vestibular (University entrance exam) commission (CONVEST) of the Amazonas Federal University.

### **Sample description**

This study is a secondary analysis of the data collected through the cross-sectional transversal epidemiological study of the "Lifestyle and indicators of health of high school students in Amazonas" study, in collaboration with NUPA/UFSC, with approval from the ethics in research committee of the Amazonas Federal University (CAAE 0302.0.115.000-11).

The sample process was performed in three stages: I - Educational units in each of the six districts of the capital, according to SEDUC distribution; II - Schools (considering size: large - more than 500 students, medium - 200-499 students, and small - less than 200 students); and class groups (randomized by conglomerate, according to relationship provided by SEDUC). In order to calculate the number of teenagers for the sample, we considered the proportionality of daytime and nighttime students, representability by sex, size of school and geographical region. A sample calculation considering a confidence interval of 95% and tolerable error of 2% was used. Since the sample was done by conglomerates (intact groups), the initial calculated size was multiplied by two (effect of sample design - DEFF). With this, around 1054 teenagers were estimated, the minimum number of the sample, already considering a security margin of 25% in

the cases of lost data.

Individuals of both sexes participated in the study, within the ages of 15-19 years old, enrolled in public schools, studying in high school in the municipality of Manaus, Amazonas. The inclusion criteria of the study were: being a student studying in the state schooling system, studying within the 1st and 3rd high school grades in the year of 2011, in the municipality of Manaus, belonging to a selected school and class group and having the informed consent form (TCLE) signed, in the cases of underage students, the TCLE was to be signed by a legal guardian. The exclusion criteria were: not being a student studying in the state schooling system, not being a high school student in 2011, not wanting to participate in the study or not having authorization of a legal guardian.

Following the sample plan, 1054 subjects answered the questionnaire, those who did not meet the inclusion criteria were excluded, as were subjects who did not completely fill out the questionnaire (n=190). The final sample included 864 teenagers (table 1).

**Table 1** – Sample distribution (n=864), according to study description, Manaus (AM), Brazil, 2011.

Sex	N	%
Male	390	45.1
Female	474	54.9

### **Sample description**

The questionnaire used was called "Lifestyle of the Manauara (native of the city of Manaus-AM) Adolescent"; based on and adapted from the COMPAC 2 questionnaire (Behavior of the Catarinense (native of the state of Santa Catarina) Adolescent.)

The questionnaire consisted of 49 questions and was subdivided in the 6 following topics: Personal Information; Physical Activities and Sedentary Behaviors; School Environment and Physical Activity Perception; Dietary Habits and Weight Management; Consumption of Alcohol and Tobacco and Health Perception and Preventive Behavior.

The present study focused on the "Physical Activity and Sedentary Behaviors" topic that

was covered from question 11 to 23.

They were related to physical activity and included the means of transportation used to school or work (on foot, bicycle, car, bus or motorcycle), leisure activities and the practice of sports. Those who accumulated less than 20 minutes of intense activity per day or less than 60 minutes of moderate physical activity at least 3 times per week were considered insufficiently active<sup>14,15</sup>.

As far as sedentary behaviors, 3 questions were used for analysis: 1) "How many hours per day do you spend watching TV?", 2) How many hours per day do you spend using a computer and/or playing videogames?", and 3) "How much time do you spend seated, talking with friends, playing cards or dominoes,

talking on the phone, driving or as a passenger, reading or studying (not considering time spent watching TV and using a computer and/or playing videogames)?". More than 2 hours of watching TV and playing videogames per day was considered excessive<sup>21</sup>.

### Statistical analysis

The normality of the data was verified using the Kolmogorov-Smirnov test and a non-parametric distribution was presented ( $p < 0.05$ ). The influence of gender on the on the assessed items related to physical activity and sedentary behavior were verified using the chi-squared test and the alpha level was 0.05. This data was obtained using SPSS 17.0 for Windows.

## RESULTS

The analyses revealed that in regards to physical activity, the boys demonstrated higher levels of participation in physical activity compared to the girls ( $p = 0.01$ ), who demonstrated higher levels of computer use ( $p = 0.01$ ) and higher levels of participation in cultural activities ( $p = 0.01$ ) than the boys. Consequently, the boys showed more days spent doing moderate to vigorous physical activity (5 to 7) than the girls ( $p = 0.01$ ), table 2.

The values of the time spent practicing moderate to vigorous physical activity differ significantly between the boys and girls ( $p = 0.01$ ), since 64.3% of the boys spend an average of 30 to 60 minutes or more per day practicing these activities compared to 35.5% of the girls, table.

This PA is practiced with satisfaction since 79% of the boys confirmed that they partially or fully agree with the phrase "I enjoy doing physical activity" compared to 70.2% of the girls. When questioned about their physical activity habits, 49% of the boys affirmed that they have been active for more than 6 months, compared to 30.4% of the girls, ( $p = 0.01$ ). Furthermore, the girls demonstrated less desire to become active (12.4%) compared to the boys (5.4%),  $p = 0.01$ .

As far as the most commonly used means of transportation used to get to school, more boys

(62.3%) and girls (57.8%) stated that they go on foot ( $p = 0.40$ ), followed by bus, boys (21.5%) and girls (26.6%). 69.7% of the boys stated that it takes them from 10-30 minutes to get to school, a value fairly similar to the girls (68.2%),  $p = 0.52$ .

The boys did not differ from the girls in the number of hours spent watching TV on school days ( $p = 0.91$ ) and on weekends ( $p = 0.23$ ), although 60.8% of the boys and 63.3% of the girls stated that they spend more than 2 hours per day with this activity during school days, these values did not change too much during the weekends since 59.7% of the boys and 63.9% of the girls continued to spend the same number of hours watching TV, table 4.

As far as computer use, 52% of the boys reported using theirs for more than 2 hours daily, compared to 42.8% of the girls; these values were statistically different ( $p = 0.042$ ). Another interesting point was the time spent seated on weekdays and weekends.

The boys stated that they spend 57.2% of their day seated during the week compared to 48.2% of the girls ( $p = 0.79$ ). However, during the weekends, the girls demonstrated a rate of 66.5% compared to 64.1% from the boys ( $p = 0.13$ ).

**Table 2** – Absolute and relative values of the table crossed between sexes (dependent variable) and preferred leisure activity and days per week spent practicing moderate and vigorous activity (independent variable), (n=864), Manaus (AM), 2011.

		Leisure Activity								
Gender	Measure	A	B	C	D	E	F	G	H	Total
Male	Absolute	200	19	9	38	77	13	3	31	390
	Relative (%)	51.3	4.9	2.3	9.7	19.7	3.3	0.8	7.9	100.0
Female	Absolute	182	15	28	4	126	62	5	52	474
	Relative (%)	38.4	3.2	5.9	0.8	26.6	13.1	1.1	11.0	100.0

  

		Days spent practicing physical activity								
		0	1	2	3	4	5	6	7	
Male	Absolute	37	62	65	58	40	50	33	45	390
	Relative (%)	9.5	15.9	16.7	14.9	10.3	12.8	8.5	11.5	100
Female	Absolute	103	73	75	58	37	58	20	50	474
	Relative (%)	21.7	15.4	15.8	12.2	7.8	12.2	4.2	10.5	100

\*Legend: A = Physical activity; B = board games; C = watching TV; D = playing videogames; E = using the computer; F = cultural activities; G = manual activities; H = other activities.

**Table 3** – Absolute and relative values of the table crossed between sexes (variable dependent) and time spent per day practicing moderate and vigorous physical activity (variable independent) (n=864), Manaus (AM), Brazil, 2011.

		Time spent per day practicing physical activity					Total
Gender	Measure	not practicing	<30 minutes	From 30 to 59 minutes	=>60 minutes	Total	
Male	Absolute	62	77	89	162	390	
	Relative (%)	15.9	19.7	22.8	41.5	100.0	
Female	Absolute	146	160	105	63	474	
	Relative (%)	30.8	33.8	22.2	13.3	100.0	

**Table 4** – Absolute and relative values of the table crossed between sexes (variable dependent) and time spent (hours) watching TV (variable independent) (n=864). Manaus (AM), Brazil, 2011.

		School days *						
Gender	Measure	Don't watch TV	=< 1h	>1<2h	>2<3h	>3<4h	=>4h	Total
Male	Absolute	35	72	46	77	81	79	390
	Relative (%)	9.0	18.5	11.8	19.7	20.8	20.3	100
Female	Absolute	46	82	82	84	80	136	474
	Relative (%)	9.7	17.3	17.3	17.7	16.9	28.7	100

  

		Weekends						
Gender	Measure	Don't watch TV	=< 1h	>1<2h	>2<3h	>3<4h	=>4h	Total
Male	Absolute	42	64	51	60	54	119	390
	Relative (%)	10.8	16.4	13.1	15.4	13.8	30.5	100
Female	Absolute	49	82	40	75	85	143	474
	Relative (%)	10.3	17.3	8.4	15.8	17.9	30.2	100

## DISCUSSION

The present study observed that the boys presented higher levels of participation in physical activity, as well as more days spent practicing moderate to vigorous activity (5 to 7) than the girls who demonstrated preference for computer use and cultural programs. Other studies have also revealed that boys have been practicing more physical activity than girls<sup>22, 23</sup>.

In regards to gender, national<sup>24, 25</sup> and international<sup>26-28</sup> studies have demonstrated a high rate of sedentary behavior in female teenagers when compared to male teenagers. However, there have been exceptions to the literature, such as in rural areas in Mozambique, in which the female teenagers presented higher levels of physical activity than male teenagers<sup>29</sup>.

Among the causes for the abovementioned situations, Abreu<sup>30</sup> revealed that the girls practiced less physical activities due to cultural factors, such as the types of children games, division of chores between brothers and sisters, the lack of interest coming from the family in terms of encouraging the girls to live a more active life, media reinforcement and other spheres of influence in both normal and informal education.

In regards to the time spent practicing PA, as was already mentioned<sup>14,15</sup>, the necessary time would be between 20 to 30 minutes of vigorous activity every day or 60 minutes of moderate to vigorous activity for at least 3 days per week, which left 64.3% of the boys and 35.5% of

the girls within this margin. This demonstrated that more than half of the girls in the study don't spend the minimum amount of time on PA, allowing them to be more pre-disposed to developing health problems in the future.

In terms of what means of transportation used to get to school, the boys didn't differ too much from the girls; 62.3% and 57.8%, respectively, go on foot, followed by the bus; boys 21.5% and girls 26.6%. The time also didn't differ too much. 69.7% of the boys and 68.2% of the girls took an average of 10 to 30 minutes to arrive at school. A study done in China characterized individuals whose only form of physical activity was walking to school as "low activity levels." Another study done in Caxias do Sul/RS verified that 61.9% of teenagers got around in an active way, however this was more prevalent among the girls<sup>22</sup>, which differs with the results of the present study where no significant differences were noted between genders. The results of the study done by Silva and Lopes are closer to this study where 70% of students got to school in an active manner.

As for the time spent on activities which are considered low energy output, such as watching TV or using a computer, other studies both disagree and corroborate with the present study.

## CONCLUSION

We can conclude that gender is a determining factor when it comes to the level of practice of physical activity. However, it was not clear which factor may trigger this type of behavior.

For example, in Finland, Tammelin et al. reported that 23% of teenagers spend more than 4 hours per day watching TV and 14% used computers or videogames for more than 2 hours per day, whereas these individuals were the ones who demonstrated to be the most inactive. In Scotland<sup>34</sup>, the excess time spent on watching TV was 6% during weekdays and 25% on weekends, being that 50% of these adolescents do not perform any kind of physical activity during the week and this rate increases to 62% on weekends. A study done in the United Kingdom<sup>35</sup> observed a period of 3 hours after school hours and verified that only 20 minutes of this time was spent on moderate physical activity and that the time spent on sedentary behaviors was 35 minutes among the boys and 50 minutes among the girls. Some studies suggest reducing the time spent on watching TV and computer use as a means to increase the practice of physical activity among teenagers, based on the idea that this would allow for more time to be available and would motivate them to discover a more physical activity to occupy their time<sup>33,34,36</sup>. It is important to decrease the time spent on sedentary behaviors since these behaviors may corroborate with the increase of overweight and obese people in our population<sup>37</sup>.

Future studies need to outline which factors are associated with different levels of involvement in the practice of regular physical activity.

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