

# Identification of physical activity level of school adolescents: sports based high intensity physical education classes

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## Abstract

This study aimed to identify undertaken activities during Physical Education (PE) school classes, such as their content and intensity, and investigate the relationship between PE school classes and the level of physical activity of the students. Fifty school adolescents averagely aging 14.3 years, 1.63m, height and 57.4kg body mass were evaluated. Intensity of PE classes was measured by heart rate monitoring. A PE class content observation instrument was utilized in order to evaluate the sessions. Additionally, IPAQ was used to assess the level of physical activity of the participants. 20% of the students were found to be overweight considering their age. It was noticed that 78% underwent from moderate to high intensity sports activity throughout the classes, without significant gender differences. 96% of the studied subjects were classified as active or very active. Therefore, most of the analyzed adolescents performed satisfactory physical activity, ensuring a high level of physical activity.

**KEYWORDS:** Heart Rate Monitoring; Physical Activity Intensity; Scholar Physical Education; IPAQ; Active Lifestyle Promoting.

## Introduction

The discipline "Physical School Education", according to GAYA et al<sup>1</sup>, can be considered as a strong educational tool related to the promotion of health in the school environment, promoting, within its context, moments of reflection about the importance and the existing meanings involved in the practice of physical activities. This, according to researchers of the subject, is able to promote in its practitioners several improvements related to the body composition of schoolchildren, significantly reducing the number of sedentary students, since for many children, this is the only time of regular practice of physical activities<sup>2,3</sup>.

World Health Organization recommendations that children and adolescents between the ages of five and 17, at least 60 minutes a day, resulting in at least 300 minutes of moderate and vigorous

physical activity<sup>4</sup> come being widely accepted in scientific circles. However, there are literatura reports which show that physical activities performed during School Physical Education classes are considered to be insufficient in intensity and duration and are thus incapable of promoting a significant improvement over physical conditioning in the children and adolescents participating in the research<sup>5</sup>.

Studies in Brazil on the subject have been quite accomplished. Based on these surveys, it is noticed that in the South and Southeastern regions of the country, research on the intensity of the physical activities carried out during the School Physical Education classes is already well founded. However, research of this nature is still scarce in the north and northeast regions. Therefore, it is necessary to evaluate the levels

of physical activity of the young population, in order to better understand important aspects of their habits, in order to plan interventions and

strategies in the prevention of future diseases associated with the sedentary lifestyle, especially in the context of schools located in these regions.

## Method

This study is characterized by being a transverse, original and descriptive investigation, because according to LEOPARDI et al.<sup>6</sup>, it is configured by the need to explore the unknown, which needs more information. Data collection was performed observationally, with no intervention of the researcher in physical education classes<sup>7</sup>.

### Participants and study outline

Initially a survey of all public schools in the city of Fortaleza (Ceará state, Brazil) was performed, which summed up to 176 schools. A random and blind lottery was carried out to determine the regional analyzed. Next, all the schools (seven schools) belonging to the region (Region IV) were contacted by telephone to identify which ones had eighth and ninth grade classes and how many classes each school had. After this identification, a sample calculation was performed to define the number of physical education classes that represented all of them, of which 14 classes of physical education represented all the others of the regional. One of these seven schools was excluded from the study due to a refusal to participate.

After the draw of the physical education classes, a visit was made to each class to explain the research objectives for director, physical education teachers and students. Then, a new draw of the volunteer students was made, the free and informed consent form was given, and the volunteers were asked to wear light exercise clothes in the next class. On the second visit we requested the presence of the volunteers before the beginning of the education class to measure the anthropometric variables, IPAQ application, preparation of the cardiac monitors and explanation of how all cardiac frequency collection would be given.

The heart rate analyses and classes contents were all performed in the sports court. The evaluator 1 was responsible for the analysis of the characteristics and contents executed in the

physical education classes. Evaluators 2, 3, 4 and 5 were responsible for the collection of cardiac frequencies. Nevertheless, the teacher was asked to carry out the class according to previous planning so as not to influence the analysis.

All participating students and their parents were informed about the research aims, signing the informed consent form. The study was analyzed by the Research Ethical Committee, through the Brazil Platform System, being approved on the on July 5<sup>th</sup> 2014 (process n. 0345/14) and was registered in the Scientific Committee at Universidade Federal do Ceará's Physical Education Institute.

### Body Composition Evaluation

Procedures for the collection of body mass and height data were made according to ROSA<sup>8</sup>. For the purpose of measuring weight and height, a digital scale (make Filizola<sup>®</sup>, model PL200) with precision of 0.1kg and maximum capacity of 150kg with a stadiometer coupled was used it. The measurement of waist circumference (WC) were was previously described<sup>9,10</sup>. WC measurements were performed using an inelastic nutritional tape (Cescorf<sup>®</sup>).

Body Mass Index (BMI) calculation and interpretation was estimated according to the Quetelet index (weight / height<sup>2</sup>) and classified as previously described<sup>11</sup>.

### Heart Rate Monitoring

Heart rate monitoring was performed using a cardiac frequency monitor model SE120 (Oregon Scientific, Portland, USA). Before the PE class has started, the transmitters were positioned on the study's participants and heart rate was measured and recorded minute by minute throughout the activity. Afterwards, the heart rate variation profile throughout the activities was traced. Following the collection of heart rate data, the activities

were classified as: very light ( $<35\% HR_{Max}$ ); light ( $35\%-54\%HR_{Max}$ ); moderate ( $55\%-69\%HR_{Max}$ ); hard ( $70\%-89\%HR_{Max}$ ); very hard ( $\geq 90\%HR_{Max}$ ); and maximum ( $100\% HR_{Max}$ ). Maximum heart rate ( $HR_{Max}$ ) was obtained using the Kamoven formula ( $220-age$ ) (POLLOCK et al)<sup>12</sup>. For the heart rate variate profile tracing, the school PE sessions were divided into 50 one minute periods, since each lesson lasts 50 minutes. Each one-minute period was also classified as: very light, light, moderate, very hard and maximum.

### School PE Lessons' Content Observation

A direct observation instrument, specially designed for this purpose, was used in attempt to evaluate the activities performed during the school PE classes. For the application direct observation instrument application, the school PE sessions were divided into 50 one minute periods. Minute by minute, likewise it's been done for the heart rate monitoring the activity type and content was registered, according to six pre-established categories adapted from GUEDES<sup>13</sup>: 1) Activity organization: moments in which the participants were being instructed by the teacher about the activities or during displacement towards the sports court; 2) Motor skill practice: activities that stimulated coordination variables, with or without materials; 3) Physical aptitude exercises: activities that could aid in the development physical aptitude, classified as aerobic, strength/resistance or flexibility exercises; 4) Recreational games: ludic activities with simple rules; 5) Sports: activities directed towards sports (fundamentals, understanding and refinement of sports gestures); and 6) Corporal expression: rhythmic activities with music.

## Results

The sample consisted of 56 school children and adolescents. A total of six students (10.7%) were excluded from the study for a number of reasons: two did not attend class during some stage of the research; one refused to take part; three failed to return the informed consent form signed by their parents. From the remaining 50 participants, 27 were males and 23 females, in a total of 14 school PE sessions. TABLE 1 shows the students anthropometric characteristics.

### Application of International Physical Activity Questionnaires (IPAQs)

The habitual level of physical activity was measured by using the International Physical Activity Questionnaires (IPAQ) – short version. The IPAQs are composed of a set of four questionnaires, with different versions for telephone use and self-administration. Their aim is to provide useful common instruments for an internationally comparable data related to physical activity and health<sup>14</sup>. After answering the questionnaires, the participants were categorized according to the IPAQ Physical Activity Classification into: sedentary, irregular A active, irregular B active, active and very active.

### Statistical Analyses

Descriptive analysis was performed through frequency distributions for the qualitative variables, with mean and standard deviation used for quantitative variables. For anthropometric comparisons, the data normalization test was performed through the D'Agostino-Pearson test, after which the student t test for the parametric data and Mann Whitney for the non-parametric data were performed. For the analysis of the heart rate throughout the physical education class, the ANOVA two way test was performed, in addition to the linear correlation analysis. The Kruskal-Wallis test was used to analyze the contents of the education classes.

In all cases confidence intervals were produced. Graphs and tables were produced for a better results presentation<sup>15</sup>. The established statistical significance criterion was 0.05 for all the hypothesis tests<sup>16</sup>.

The boys presented higher values in weight ( $p>0,03$ ), height ( $p>0,0001$ ) and waist circumference ( $p>0,02$ ) (TABLE 1). We also found that 20% of the evaluated adolescents were overweight (18%) or obese (2%), with higher levels found in males.

### Intensity of School PE Lessons

From the minute by minute heart rate data, it could

be observed that the subjects participated in strenuous physical activities. The mean cardiac frequency in all classes' 50 minutes showed that most of the individuals (78%), both male and female, went through moderate to vigorous heart rate based intensity exercise. However, there was a significant heart rate difference between gender at 25 minutes' moment, when girls heart rate, unlike boys', reached their highest values (FIGURE 1.A).

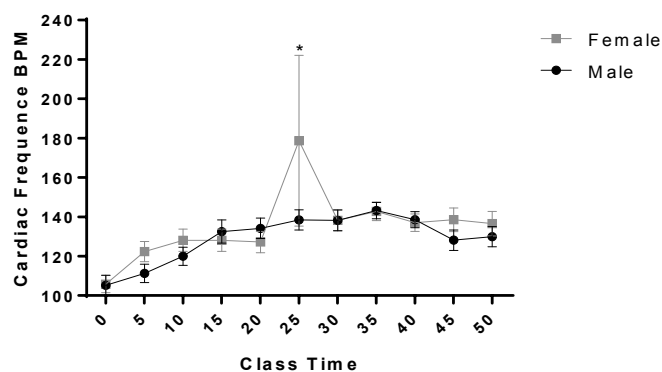
There was also a moderate linear correlation

( $p < 0,01$ ,  $r = 0,68$ ) between heartbeats frequencies for both genders (FIGURE 1.B), showing that both genders had active participation in class and that the increase in heart rate of girls increases correspondingly to boys'. Comparing cardiac frequency between 8<sup>th</sup> (female,  $148,5 \pm 5,14$ bpm; male,  $128,9 \pm 5,35$ bpm) and 9<sup>th</sup> (female,  $121,7 \pm 4,81$ bpm; Male,  $135,6 \pm 5,68$ bpm) grade students, we observed differences, but only in females ( $p < 0,03$ ), and no cardiac frequency difference between gender in all grades (FIGURE 2).

TABLE 1

Variables	Gender		p-value	Test
	Female	Male		
Age	14,44 ± 0,171	14,52 ± 0,216	0,85	Mann-Whitney
Weight (Kg)	54.2 ± 1.98	*60.7 ± 2.16	0,0303	Student's T test
Height (m)	1.6 ± 0.01	*1.7 ± 0.01	0,0001	Student's T test
BMI (kg/m <sup>2</sup> )	21.3 ± 0.69	21.7 ± 0.71	0,6530	Student's T test
Normal	21	20		
Overweight	4	5		
Obesity	0	1		
WC (cm)	68.7 ± 1.4	*73.7 ± 1.74	0,0286	Student's T test

A



B

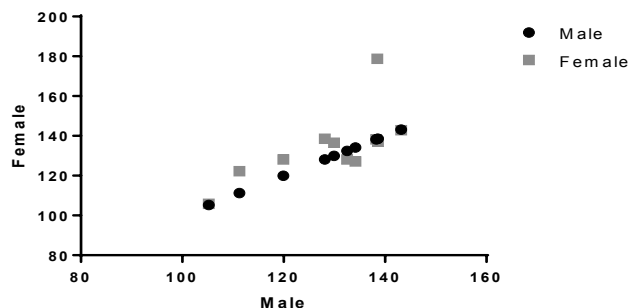


FIGURE 1

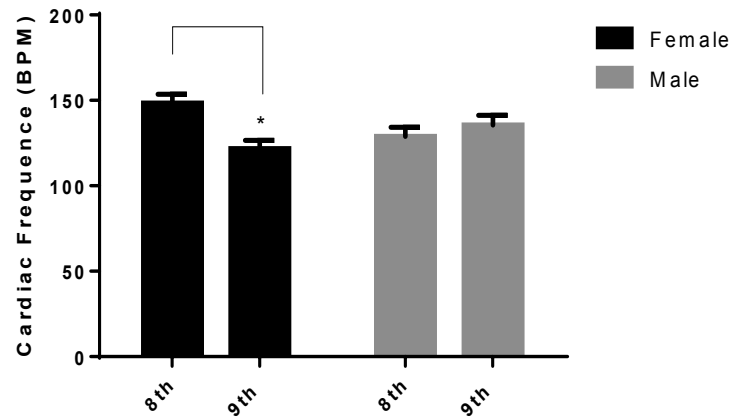


FIGURE 2

Aiming to investigate heart rate dynamics throughout the classes, the lesson was divided into 10 periods of 5 minutes each, whose heart rates were divided in gender (FIGURE 3). It was noticed that, in both gender, most of the class time was stuck among Light (female  $12,87 \pm 11,61$  min; male  $14,85 \pm 12,44$  min), Moderate (female  $16,70 \pm 10,61$  min; male  $15,15 \pm 7,5$  min) and Hard intensity (female  $16,43 \pm 13,76$  min; male  $17,18 \pm 12,08$  min). There were

no significant differences for these three intensities. However, it can be noticed the significant difference from these three intensities to the other three ones, as a minimum of the classes consisted of Very Light (female  $1,30 \pm 2,22$  min; male  $0,89 \pm 2,17$  min), Very Hard (female  $2,04 \pm 2,8$  min; male  $1,52 \pm 2,5$  min) or Maximum intensity (female  $0,65 \pm 1,37$  min; male  $0,4 \pm 1,21$  min). No significant difference was found between gender in the intensity by time ratio.

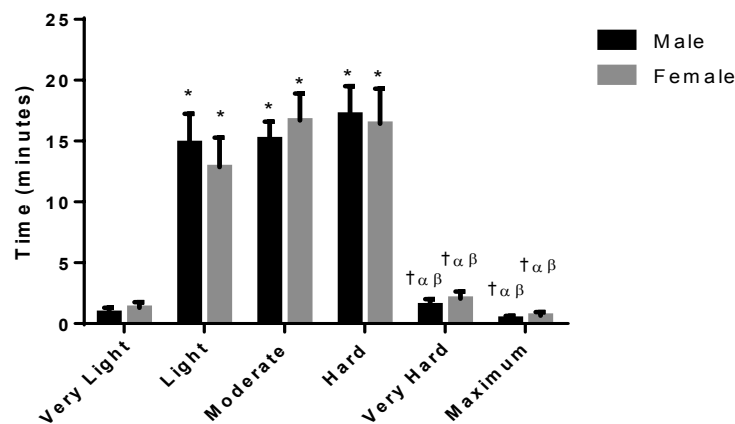


FIGURE 3

### Characterization of School PE Classes' Content

FIGURE 4 shows the time spent in each type of exercise during the school PE classes. It is noticed that in most of the sessions participants underwent sports activities, with a relatively large amount of time in some classes being spent in spatial organization, in comparison to the mean.

As we can see, Sports Activities were predominant ( $24,54 \pm 17,20$  min;  $p < 0,0001$  in comparison to Body Language, Physical Aptitude and Recreational Games), along with Management and Organization ( $16,2 \pm 8,67$  min;  $p = 0,0007$  in comparison to Recreational Games,  $p = 0,0002$  in comparison to Physical Aptitude, and  $p < 0,0001$  in comparison to Body Language) and Motor Skills ( $7,73 \pm 5,74$  min, however with no

statistic significant difference to all the other groups) in the evaluated school classes during most of the research period destined to sports practice. There was an extremely small part of the classes ( $p > 0,9999$ ) focused on Body Language (only  $1,30 \pm 0,34$  min), Physical Aptitude (only  $3,9 \pm 1,27$  min) and Recreational Games (only  $5,72 \pm 2,13$  min). In a particular class it was possible to observe that the participants remained for 40 minutes or more in sports activities. Regarding the motor skills, the participants were involved in activities that stimulated coordination, with or without the use of materials, for 6.8% of class time, approximately. Concerning physical aptitude, exercises that could aid to the development of physical aptitude, categorized as aerobic, resistance or strength

exercise as well as flexibility exercise, the students spent approximately 1.3% of their time. The recreational games used around 2.1% of total time.

### Habitual Practice of Physical Activities out of the School Environment

In order to evaluate the level of physical activity outside the school environment, the International Physical Activity Questionnaire (IPAQ), short version, was used. The results showed that most of the participants were classified as very active (66%) and active (30%). Only 4% of the adolescents (2 participants) were irregularly active or sedentary, both of them females (TABLE 2).

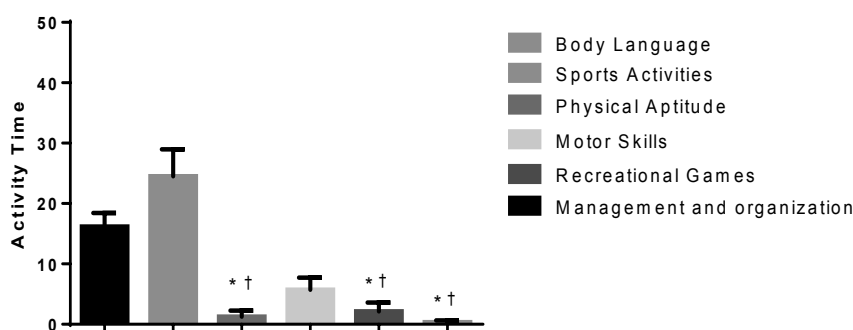


FIGURE 4

TABLE 2

Classification	Gender	
	Female	Male
Very Active	12	21
Active	9	6
Irregularly active	1	0
Sedentary	1	0

## Discussion

In the present study, we verified the level of physical activity of schoolchildren public schools, due to some studies evidencing that the practice of physical exercises in childhood and adolescence may reflect in an active habit in adult life. Considering that school physical education classes may be the only opportunities for children and adolescents to have regular and guided physical exercises<sup>2,3</sup>, we verified whether school physical education

classes, in terms of intensity and duration, are in accordance with the World Health Organization's recommendations<sup>4</sup>. Furthermore, we analyze the contents prevalent in the pedagogical practices of the physical education professional.

We identified that outside the school environment the analyzed individuals perform enough physical activities to be classified as active and very active. In addition, the students stayed most of the class

in exercises with moderate and intense intensity, being the pedagogical practices more oriented to sports activities.

### **Intensity of School PE Lessons and its lack of effectiveness in promoting accession**

In our present research, 78% of the students presented moderate to vigorous heart rates, due to the intensity of the activities, corresponding to findings that infer intensity levels among light, moderate and hard. These observations were supported by GUEDES et al<sup>17</sup>, who verified vigorous intensities during the activities due to a higher involvement in sports activities by the classes. Similarly, this correlation can be made in this study, since we also noticed a greater prevalence of sports activities.

We observed that most of the class time the young people studied remained at moderate and intense intensities, corresponding to 66% for girls and 61% for boys. These results indicate that there may be a regional variation related to the practice of more intense physical activities in school physical education classes, considering that our findings are superior to the 42% found in Minas Gerais<sup>18</sup>, to 14% in Londrina<sup>17</sup>, and 42.6% in England<sup>19</sup> with no comparison between genders.

Inversely to our findings, MARTÍNEZ-GÓMEZ et al<sup>19</sup> demonstrated that boys participate in more moderate-vigorous activities than girls. The author evaluated PE class intensity with 1994 adolescents, aged between 12 and 17, from 10 European cities, and stated that there was a variation in exercise intensity duration according to gender, where the girls performed moderate physical activity for 37 min/day, whereas the boys performed it for 42 min/day.

Although we have identified that the analyzed young people participated in more moderate-intense activities than other studies, this time is still lower than the recommendations of the World Health Organization<sup>4</sup>. However, SALLIS et al<sup>20</sup> observed that physically active individuals during youth were not the most active in adult life. They were active spectators in sporting competitions, however, most were sedentary individuals.

LAROCHE et al<sup>21</sup> have released the results from an investigation with 86 participants of the original Trois-Rivières Study, from the 70's (which a group that performed PE classes, and a group that didn't), examining their current physical activity level.

There were no current differences between the experimental and control groups neither in the frequency, duration nor volume of physical activity undertaken at the current follow-up. That shows how daily PE classes throughout primary school seemed insufficient to ensure that individuals will remain active in midlife. As we also suggest in our present study, an efficient development of a life-course approach to physical activities promotion is thus warranted.

Another important fact in school PE practice based mainly in sports activities is that the participants will not develop most of the motor abilities necessary for life, brought by this lack of practical experience and learning of other contents, such as gymnastics, general games and rhythmic activities in order to promote health. Even the accession to the classes themselves has not been proved to be efficiently promoted. Recently, BRANDOLIN, KOSLINSKI AND SOARES<sup>22</sup> have led a survey with 1,084 Brazilian high school students, from a public school in the city of Petropolis, São Paulo, showing that students with sportive high abilities have 646% more chances of feeling satisfied about the PE classes than students with low sports skills, and 228% more chances than students with average sports skills, when the classes are exclusively based on sports. Indeed, as shown in the results of a research made by NAZARIO AND VIEIRA<sup>23</sup>, children enrolled in sports centers have better levels of specific motor performances than children who only attend PE classes. However, there are variations in the level of performance in fundamental motor skills according to the specific requirements of each context. So, besides the issue about the accession to the sport, there is also an issue about the scope of the motor development promoted by very specific sports activities.

### **Characterization of School PE Classes' Content and the constant need for a wider range of stimuli**

The analysis and registration of the pedagogical practices of the school physical education classes of this study demonstrated that the predominant content was sports activities, corroborating with the existing literature<sup>24-27</sup>. The time spent in sports activities was 24.53 ± 17.19 minutes of class, similar data were found by GUEDES AND GUEDES<sup>24</sup>, where they found that of the 50 minutes made available for classes, 26.55 were carried out sports practices. Some authors mention that although

the educational objectives of School Physical Education have undergone many modifications as new tendencies have emerged, older tendencies may still influence the physical education professional formation and its pedagogical practices<sup>25,28,29</sup>, explaining the fact that sports predominate in school physical education.

Nevertheless, according to DARIDO<sup>30</sup> these contents are usually presented superficially, only from the point of view of the know-how (procedural). This can be due to the difficulty of the teacher to break the sport perspective when he had predominantly sporting experiences as a child, and may culminate in the centralization of the sport in its pedagogical practice, especially when its students expect to learn only these sports<sup>29</sup>.

According to ROSÁRIO AND DARIDO<sup>25</sup>, even when teachers seek to diversify content presented, sport remains the main content. The authors state that even when playing recreational, cooperative and playful games, activities bring elements of traditional sports. The difficulty of working on new content in school physical education classes may be related to lack of knowledge on the part of the teacher, lack of security, as well as the students' lack of adherence<sup>25</sup>, which ends up limiting the motor stimuli of the students, besides sporting modalities are more exclusive activities.

As shown by DOS SANTOS et al<sup>31</sup>, which demonstrated the need for a better adherence to physical activity at school and for activities with a larger range of motor development possibilities, like recreation and games through exercises, calisthenics, learning the fundamentals of sports, besides sports activities. Their study demonstrated a positive health effect on the group that underwent programmed physical activity with heart rate monitoring, consisting of three parts: aerobic activity (exercises for flexibility, muscular strength, rope skipping, walking, alternating running, continuous jumping, recreational games); sports games and stretching.

A study conducted by SOARES et al<sup>32</sup> detached the validity and importance of educational projects that focus in a variability in approaches that address the PE classes so that all the students could enjoy them and benefit from them. Even taking into account children with difficulties and delays in learning. The intervention was based on practical sessions aimed at fencing and circus activities with 22 children, 13 with and 9 without complaint of learning difficulty. These children with learning difficulties complaints

were the most benefited, achieving a percentage of progression higher than 20% while the other children achieved progressions between 10 and 20% in motor skills. Studies like those have shown how variation of stimuli played a central role for positive health effect and adherence to a healthier and more active lifestyle.

An American study conducted by BERNARDONI et al<sup>33</sup> has also provided possibilities of ideas that show how more diverse stimuli are more effective for more global health parameters. They examined the skeletal benefits for girls of an established resistance-training program at a local middle school, including floor and resistance exercise with progressive overload. The results made it clear how this different possibility of intervention produced maturity- and region-specific bone gains in adolescent girls. That shows us how resistance and strength training can be a possibility to the issue we noted, as it can promote the intensity and stimuli variations most needed, as it was also demonstrated by MEINHARDT et al<sup>34</sup>, who investigated how strength training also increases spontaneous physical activities outside of training. In that study, a total of 102 schoolchildren (age 10-14 years) in Switzerland were randomly assigned to PE classes or to participate twice weekly at a guided strength training program for 19 weeks. The researchers measured spontaneous physical activity energy expenditure, leg and arm strength, and body composition at baseline, after 19 weeks of training intervention, and after 3 months of washout. Targeted strength training significantly increased daily spontaneous physical activities behavior outside the training in boys. HARDMAN et al<sup>35</sup> have shown in their study with 4,207 adolescent students from the state of Pernambuco, Brazil, how understanding the attitudes, such as emotions, beliefs and feelings, of adolescents about the PE classes is important and deserves attention of parents, teachers and researchers. It was shown that those adolescents prefer physically active leisure activities other than only sports based activities.

### **Habitual Practice of Physical Activities out of the School Environment**

The World Health Organization<sup>4</sup> recommends that children and adolescents practice moderate physical activity every day with 60 min minimum duration and vigorous activity three times per week. Hence, we cannot state that the participants in this research are active dealing only with cardiac



frequency, since the maximum duration of a PE class is 50 min. Considering the time needed for administration and space organization, the students remained in the PE lesson *per se* for around 33 minutes, not corresponding to the time in these intensities. Beyond that, PE school classes do not occur daily. These data are consistent with the findings of DOMINGUES et al<sup>18</sup>, which verified that the students were active during 33.5 minutes, and the remaining time had been spent in organizational and administrative activities. Other authors registered even shorter time periods spent in activities, with 26.5 minutes<sup>36</sup> and 25 minutes<sup>24</sup>.

The IPAQ results from our study demonstrates that most of the participants performed physical activity out of the school environment in a satisfactory manner in order to generate health benefits, following the recommendations of physical activity for this age group. 66% were classified as very active and 30% as active. Similar results were encountered by BARNETT et al<sup>37</sup>, with 98.9% of the adolescents performing moderate to vigorous physical activity. ARRUDA AND LOPES<sup>38</sup>, observed that, within all age groups, adolescents were mostly moderately active or active, with the lowest percentages of active and moderately active individuals within the ages of 10 (60.9%), 11 (66.4%) and 13 (64.8%) and the highest values at the ages of 12 (75%), 15 (77.4%) and 16 (75%), with a higher proportion of active adolescents registered in public schools when compared to private schools. HALLAL et al<sup>39</sup> observed, through questionnaires and data from PeNSE (National Research of School Health), that less than 40% of the youngsters are active. SILVA AND MALINA<sup>40</sup> studied the level of physical activity within adolescents in the city of Niteroi, Brazil, estimated through the use of the Physical Activity Questionnaire for Children (PAQ-C), where they concluded that the participation in physical activity diminishes with age relating to all types of exercise, independent of intensity. The authors found a prevalence of sedentarism of 33.6% (boys) and 52.5% (girls) and 15.2% (boys) and 5.9% (girls) moderately active, showing a high prevalence of sedentarism within both genders. ADAMI et al<sup>41</sup> gathered data from three public schools in the urban area of Florianópolis, Brazil, and noted that the minimal level of physical activity to obtain health benefits was not performed by the majority of the sample: 42.9% (girls) and 29.4% (boys).

GARCINUÑO et al<sup>42</sup> investigated physical activity

levels and observed that 71.5% of the adolescents were classified as active or very active, with an inverse correlation between physical activity and blood pressure. Another research<sup>43</sup> studied the long term effects of a health education intervention programme with school goers in Crete, Greece. The programme was based upon theoretical interventions through textbooks dealing with issues such as nutrition, physical activity, physical aptitude, dental hygiene, tobacco dependence and accident prevention. The authors noted that, after a 10-year intervention period, there was a decline in chronic disease risk factors due to a reduction in total cholesterol. SHENG AND GAO'S research<sup>44</sup>, using a pedometer, showed that more than 60% of the evaluated adolescents performed 60 minutes of moderate intensity physical activity per day. In São Paulo, the general prevalence of physical inactivity in adolescents (from public schools) was 62.5%, with increasing physical inactivity with increase in age<sup>45</sup>. Other previous observations showed that the proportion of adolescents classified as sufficiently active was 49.2% in the 1<sup>st</sup> year of high school, however, the proportion lowered in the 2<sup>nd</sup> year, with 36.5% classified as sufficiently active, and this proportion lowered even further to 19.8% in the 3<sup>rd</sup> year<sup>46</sup>. In Maringá, Brazil, it was observed that more than half of the evaluated adolescents (56.9%) do not have a habit of performing physical activity for more than 300 minutes per week<sup>47</sup>. As found in other studies<sup>37,39,42,48-54</sup>, in this research it was observed that boys were more active, with 77.7% been classified as very active, when only 52.1% of the girls obtained such classification.

Although the number of participants was fairly small, previous studies<sup>55,56</sup> present similar samples for equivalent data. Nevertheless, it is worth mentioning that a sample calculation was performed corresponding to the number of physical education classes, and the remaining points of the study were randomly assigned to blind, aiming to guarantee a minimum external influence on the data obtained. Although the methodology of stipulating exercise intensity through heart rate monitoring is not so precise, this method is widely used in the literature<sup>55,57,58</sup>, being therefore, an interesting method for these types of study. However, it was decided to use IPAQ due to its representativeness in the world scientific environment<sup>34,45,59</sup>, as well as being tested for its validity and reproducibility previously reported in Brazil<sup>60,61</sup>.

From the results obtained, we can conclude that the classes were predominantly composed of pedagogical sports practices, which may limit the motor stimuli and knowledge of the body culture of the students' movement. Nevertheless, classes were able to provide moderate and high intensity

for most of the class time, however, the time students spent was insufficient to promote health benefits. In contrast, we observed that those with IPAQ who practice physical activities outside the school environment are sufficient to classify them as active and very active.

## Resumo

Identificação do nível de atividade física em adolescentes: aulas de educação física de alta intensidade baseada em esportes

Este estudo teve como objetivo identificar as atividades realizadas durante as aulas de Educação Física (EF), assim como seu conteúdo e intensidade, investigando o relacionamento entre as aulas de EF e o nível de atividade física dos alunos. Cinquenta adolescentes da escola com média de idade de 14,3 anos, 1,63 m, altura e 57,4 kg de massa corporal foram avaliados. A intensidade das aulas de EF foi medida a partir do monitoramento da frequência cardíaca. Um instrumento de observação do conteúdo da aula de EF foi utilizado para avaliar as sessões. Além disso, o IPAQ foi utilizado para avaliar o nível de atividade física dos participantes. Em 20% dos estudantes encontrou-se excesso de peso, considerando sua idade. Observou-se que 78% foram submetidos à atividades esportivas de moderada a alta intensidade ao longo das aulas, sem diferenças significativas de gênero e 96% dos indivíduos estudados foram classificados como ativos ou muito ativos. Portanto, a maioria dos adolescentes analisados realizou atividade física satisfatória, garantindo um alto nível de atividade física.

**PALAVRAS-CHAVE:** Monitoramento da Frequência Cardíaca; Intensidade da Atividade Física; Educação Física Escolar; IPAQ; Promoção de Estilo de Vida Ativo.

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