

RELATION BETWEEN BODY MASS INDEX AND PARTICIPATION IN PHYSICAL EDUCATION CLASSES: A COMPARISON BETWEEN PUBLIC AND PRIVATE SCHOOL

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Abstract

Aim: This study aimed to investigate the relation between participation in Physical Education classes and body mass index (BMI) in students of public and private school. **Materials and Methods:** The sample consisted of students from the sixth grade of elementary school, 16 of public and 26 of private schools. **Results:** The prevalence of overweight and obesity in students of public and private school are respectively: 43,7%;0,0% e 34%;11,5%. We found significant differences between BMI of active students compared to sedentary one ($23.9 \pm 3.8 \text{ kg / m}^2$ and $20.6 \pm 3.1 \text{ kg / m}^2$ respectively, $p=0.02$). **Conclusion:** It was possible to conclude that individuals more active in class had lower BMI.

Keywords: BMI, obesity, overweight, Physical Education

Introduction

According to the World Health Organization (WHO), obesity is an epidemiological problem of global proportion. Physical inactivity associated with poor diet and genetic factors appear as the main factors associated to the excessive fat gain during growth in children and adolescents. Additionally, behaviors such as use of electronic equipment and time spent watching television are related to weight gain (Amaral; PALMA, 2001, Mascarenhas et al., 2005).

Childhood obesity is very worrying, given that obese children and adolescents have a higher risk of becoming obese adults. Joint, cardiovascular and psychosocial complications are associated with excess body weight, as well as an increased mortality rate (BALABAN, Silva, 2001; MELLO; LUFT, Meyer 2004; KNOW, Santos, Ribeiro, 2004).

Studies conducted with schoolchildren in Brazil have a great

variability of results. In the city of Salvador, the prevalence of obesity was 30.0% in private schools and 8.0% in public schools (Lion et al. 2003), in Feira de Santana, it was observed that there is a prevalence of overweight of 20.4% in private schools and 9.2% in public schools (OLIVEIRA; CERQUEIRA, Oliveira 2003).

The school environment has important role in dietary habits and physical activity (COSTA; CINTRA; FISBERG, 2006). Physical Education programs shall, according to Guedes and Guedes (1997), serve two main goals: a) promote motor experiences that can pass satisfactorily toward a better state of health, seeking to move away as much as possible the chance for the appearance of risk factors contributing to the emergence of disruptive organic disorders and b) take the students to take positive attitudes towards physical activity to become physically active not only in childhood and adolescence, but also in adulthood.

Most of the programs include Physical Education learning and improvement of technical sports gestures such as Indoor Football, Handball, Basketball and Volleyball which can result in a departure from some skilled individuals. According to Guedes (1999), to admit that one of the main goals of Physical Education is to promote an active lifestyle, by improving the quality of life of our population, the inadequate use of the sports in programs is likely to act in an inverse way, which can, as a consequence, lead to excessive weight gain.

This study aimed to investigate the relation between participation in physical education classes and Body Mass Index (BMI) in school networks of private and public schools.

Methodology

This study is characterized for being the observational, cross-sectional kind. The study was conducted in two schools in the city of Pelotas, belonging to a public network that primarily serves a population of low socioeconomic status, the second part of the private network and serves on a preferential population of higher socioeconomic level.

Makers signed a consent form allowing the student's participation, and the research project was approved by the Ethics in Research with human beings, ESEF / UFPel under protocol number 052.

Sample

The selection of a convenience sample was composed of two classes of 6th grade of elementary school. The group in the public school was comprised of 16 students, 10 males and 6 females. The group corresponding to the private school had 26 students, 12 males and 14 females.

Those individuals who had a failure of more than 75% in Physical Education classes during the semester were excluded from the study.

Weight, height and BMI

Body weight was measured with the aid of a Filizola scale with an accuracy of 0.1 kg at the time of measurement, the subjects were barefoot and wearing only shorts and t-shirt. In determining the height we used a flexible measure tape placed on a flat wall. At the time of measurement, the subjects were barefoot.

Body Mass Index (BMI) was calculated from the equation of body mass in kilograms divided by height, in meters, squared. Overweight and obesity were defined with a BMI equal to or above the 85th and 95th percentiles for age and sex (Cole et al ., 2000).

Participation in Physical Education classes

Participation in physical education classes was established by two criteria: the perception of the teacher in relation to the practical involvement of students in classes and the frequency of at least 75% of the total tuition for the semester. To be considered active in class, the student should fit the criteria described above.

Statistical analysis

For the analysis we used the program STATA 10.0. We used the Wilcoxon test for unpaired comparison of averages of the groups studied. To verify the relation between participation in Physical Education classes and BMI, we used ANOVA.

Results

The average age of the sample was 12 ± 1.4 years old, and the public school students had an average age of 12.4 ± 0.7 years old, and private school ones of 11.7 ± 1.0 years old. With respect to body weight and height, the averages were respectively 52.2 ± 25.5 kg and 156.5 ± 14.1 cm. When analyzed separately, the public and private schools showed the following, respectively: 57.6 ± 19.7 kg and 164.1 ± 13.8 cm, 49 ± 24 kg and 151.8 ± 12.7 cm.

The average BMI of the sample was 21.2 ± 9.8 kg/m² and 21.2 ± 2.7 kg/m² for public school students and 21.2 ± 3.9 kg / m² for the private ones ($p > 0.05$). Boys had statistically higher BMI than girls (21.6 ± 2.3 kg/m vs 20.9 ± 4.7 kg/m², $p < 0.05$).

When classified with respect to age, there was no difference between BMI and level of participation in physical education classes ($p > 0.05$). The students who appear to be inactive in physical education classes had an average BMI of 23.9 ± 3.8 kg/m versus 20.6 ± 3.1 kg/m² of students considered active ($p = 0.02$).

Data on BMI classification in terms of age, are presented in Table 1.

Table 1. Prevalence in the categories related to body mass index of students in public and private schools of the city of Pelotas/RS

School	Eutrophic	Overweight	Obesity
Public	56.2% (n = 9)	43.7% (n = 7)	0.0% (n = 0)
Private	54.5% (n = 14)	34.0% (n = 9)	11.5% (n = 3)
Total	55.0% (n = 23)	38.0% (n = 16)	7.0% (n = 3)

With respect to participation in physical education classes, 19.0% of the sample proved to be inactive. When separated, public school from private school, the latter presented the following values, respectively, 18.75% and 19.23% ($p = 0.65$) (Table 2).

School	Active	Inactive
Public	81.2% (n = 13)	18.7% (n = 3)
Private	80.8% (n = 21)	19.2% (n = 5)

Discussion

When the BMI values were corrected and classified by age, 43.7% and 34.0% of students in public and private schools, respectively, were overweight and only in private schools were found individuals who had obesity (11.5%). When studying public schools and private schools children in Feira de Santana, Oliveira, Cerqueira and Oliveira (2003) found that, respectively, 6.5% and 13.4% of students were overweight. Leon et al. (2006) found a prevalence of obesity was 30% in private school and 8.2% in public schools of the city of Salvador.

Our findings show that students who proved to be more active in Physical Education classes had significantly higher BMI average than inactive students. Aquino Jr., Barreto and Okada (2008) found no difference in the participation of children with overweight and normal weight in Physical Education classes. The authors state that one possible explanation is the practice of reduced physical activity outside school and a diet high in fatty foods.

The increased consumption of fatty foods, with high energetic density and the decrease in physical exercise are the two main behavioral factors that might contribute to the increased prevalence of obesity (HILL, TROWBRIDGE, 1998). Celestrino and Costa (2006) state that the dietary re-education and physical activity encouraged in schools are vitally important because they can contribute to the prevention of obesity in children and adolescents, preventing complications in psycho-physiologic functions caused by this disease to interfere in the quality of life of individuals, reducing the chances of becoming obese adults.

Guedes and Guedes (1997) emphasize the importance of making Physical Education classes more attractive in order to achieve greater compliance by the students and make them active adults. They also describe the use of four traditional sports (Indoor Football, Handball, Basketball and Volleyball) that may have a negative influence on the practice of an active lifestyle outside of school, since many are not as easy as the field of specific skills that requires practice, leading to a lack of interest in this type of activity.

Over the years, young people are showing dissatisfaction with the provision of sports activities, with the level of competition and fun that exists in physical education classes. This effect seems to occur

progressively starting at the 4th grade. This demonstrates the importance that the pleasure and fun have in Physical Education in the future habits of physical activity among adolescents (GODIN, SHEPHARD, 1986; SALLIS et al. 1999).

When compared in relation to gender, boys had statistically higher BMI than girls ($21.6 \pm 2.3 \text{ kg/m}^2$ vs $20.9 \pm 4.7 \text{ kg/m}^2$, $p < 0.05$). Boys and girls differ in body composition regardless of the stage of sexual maturation in which they are. In girls, we observe a gradual increase in body fat stores during adolescence, while for boys, there is a stronger gain of muscle mass, in the maximum growth speed phase (COLLI, 1991).

Some study limitations should be mentioned. This paper presents cross-sectional design, which can lead to reverse causality bias. Another limitation is the fact they were not data collected on the level of sexual maturation and physical activities outside school. Moreover, the sample size hampers the possibility of finding some associations to cause lack of statistical power (SIERVOGEL et al., 2003; SEABRA et al., 2008).

The creation of suitable environments to the practice of physical activities as well as planning attractive lessons and that meet the aspirations of the students are key to maintaining and developing healthy living habits. Thus, the school environment is of fundamental importance in relation to both physical exercise and healthy eating.

It is concluded that there were no differences with respect to participation in Physical Education classes with students of the public and private educational systems and that individuals who have proven to be more active in class had a lower BMI than inactive ones. The studies involving a larger sample size of individuals of both genders with an evaluation of the level of sexual maturation and physical activities in leisure time should be considered in further studies on the subject.

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