

Rural-Urban differences in perception of effort and physical activity of adolescents in physical education

Diferencias rural-urbanas en el esfuerzo percibido y actividad física de adolescentes en educación física

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Abstract

The article compared the perception of effort and physical activity of adolescents in secondary physical education classes. Greater moderate to vigorous physical activity was identified in rural than urban secondary schools, the perception of effort was similar in both locations, the average moderate to vigorous activity did not reach 50% of the class time. It is important for the teacher to identify the urban or rural space and context where he works, to apply strategies for student participation in physical activity.

key words: physical education, perception of effort, physical activity

Resumen

El artículo comparó la percepción de esfuerzo y actividad física de adolescentes en clases de educación física de secundaria. Se identificó mayor actividad física moderada a vigorosa en secundarias rurales que urbanas, la percepción de esfuerzo resultó similar en ambas localidades, la actividad moderada a vigorosa promedio no alcanzó 50% del tiempo de la clase. Es importante para el profesor, identificar el espacio y contexto urbano o rural donde labora, para aplicar estrategias de participación del estudiantado en actividad física.

Palabras clave: educación física, percepción de esfuerzo, actividad física

1. Introduction

The concept of perception of effort is established as a person's sensation that lets it identify how exhausting a physical task is according to intensity (Borg, et al.,(1987); perception of effort is related to physical activity and refers to muscular work, which involves the cardiovascular and musculoskeletal systems, as well as motivational and emotional aspects (Borg, 1982). The WHO establishes as physical activity with moderate to vigorous intensity as that which requires an effort between 3 to 6 MET (metabolic equivalents of task), which significantly increases heart rate, and causes rapid breathing. The concept of intensity of physical activity is defined as the magnitude of physical effort required to perform an energy expenditure through the musculoskeletal system (McKenzie & Van der Mars, 2015). The World Health Organization (WHO) recommends a minimum of 60 minutes a day of physical activity of moderate to vigorous intensity in children and adolescents between the ages of 5 to 17.

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A systematic review and a meta-analysis identify that adolescents with a sedentary behavior are at greater risk of presenting pathologies associated with chronic non-communicable diseases, such as obesity (Marker et al. 2018). The determinants of this pathology are multifactorial, but the socio-spatial trend of a higher presence in urban areas and greater practice of physical activity in rural areas can be found (Rodríguez Guajardo, et al.,(2013). This is reflected in representative surveys in Mexico, the results of the National Health and Nutrition Survey (ENSANUT by its name in Spanish: Encuesta Nacional de Salud y Nutrición) reports, in terms of physical activity, that 18.9% of the population between the ages of 10 to 14, who live in rural areas are categorized as active according to the criteria recommended by the World Health Organization, while 16.6% of those who live in urban areas are categorized as active (Medina, et al. 2017). In relation to the combined prevalence of overweight and obesity that is reported in adolescents from the ages of 12 to 19, overweight and obesity accounts to 37.9% in urban areas and 34.6% in rural areas.

There are multiple social differences in educational institutions located in urban or rural areas where students live (Larson et al. 2019). According to the National Institute of Statistics and Geography (INEGI by its name in Spanish: Instituto Nacional de Estadística y Geografía), in Mexico, 77.8% of the population lives in an urban area. In terms of Physical Education in rural schools, few studies that analyze the improvement of the health and well-being of a society considered with fewer resources, as well as hardly being any references on educational issues within this context (Ferrando et al.,(2019). Research in international contexts refer a similar pattern with less physical activity of adolescents with urban residence (Flor-Garrido, et al.,(2016; Euler et al. (2017); when comparing the conditional physical capacities, these are valued with greater optimization in rural adolescents Walhain et al. (2016); Zongo et al. (2017). In this sense, as part of the guideline for policy makers in charge of physical education, the United Nations Educational, Scientific and Cultural Organization (UNESCO) establishes physical literacy as a structured provision, which is achieved when students find a wide range of appropriate opportunities at each stage and age. McLennan & Thompson, (2015); Frizzo & Silva Souza, (2019).

Based on a socio-ecological model, there are multiple environmental factors that can determine the intensity of physical activity of students in physical education class. Cross-sectional and longitudinal methodology studies establish that within these factors are the educational model and content management, the facilities, and hours that teachers have to give the class, and teacher training (Hollis et al. 2014). However, according to our knowledge, when analyzing the state of the art research in the context of physical education, the study of the perception of effort and physical activity in students from urban and rural locations has not yet been studied in depth. Therefore, the present study compares the perception of effort and moderate to vigorous physical activity of adolescents in physical education classes in secondary education.

2. Methodology

2.1. Participating subjects

This research was registered in the Coordination of Graduate Studies and Research of the Autonomous University of Baja California (UABC for its acronym in Spanish), with the code number 149/2/C/5/21, and approved in the Sports School (UABC), under a transversal method, with non-probability sampling, requesting consent of participation to the principals and teachers of public secondary schools located in urban and rural areas of the city of Mexicali, Baja California Mexico. It follows the ethical principles of research involving human subjects of the declaration of Helsinki, programming evaluation schedules of 53 physical education classes in the first, second, and third cycle of secondary school; 28 physical education classes taught in secondary schools located in urban areas and 25 physical education classes taught in secondary schools in rural areas.

2.2. Participating subjects

The perception of effort was evaluated by the Pictorial Children's Effort Rating Table (PCERT), which was validated (Yelling, et al., (2002), based on the Borg CR-10 Scale (Borg, 1982). The instrument was translated to Spanish (Hernandez-Alvarez et al. 2010). Being adjusted to the cognitive development of children, it is composed of figures, making it more appropriate to choose an option of a representative value for the ages of children, with scores from 1 to 10 with an average value of 5. The usage of the scale to assess the perception of effort was performed at the end of the physical education class at the educational facility.

Physical activity was evaluated according to the procedures of the System for Observing Fitness Instruction Time (SOFIT) (Mckenzie et al. 1992); the instrument to evaluate teachers is valued qualitatively and quantitatively by randomly selecting two male and two female students of a class. Each student is observed in a rotating sequence of twelve intervals for twenty seconds, repeating the observations throughout the class, the follow up of the evaluation was made by following an audio that establishes the SOFIT protocol to record the activity with an audio player, for 50 minutes of the duration of the class as established by the regulations. According to the SOFIT method the codes: 1.- lying down, 2.- sitting, 3.- standing, 4.- walking, and 5.-very active which corresponds to running or an activity with a higher energy expenditure were used. The index of moderate to vigorous physical activity performed in class adding percentage codes 4.- Walking and 5.- Very active of the total time of the physical education class.

2.3. Statistical analysis

For analysis, the Statistical Package for the Social Sciences (SPSS) version 23.0 was utilized; in which, the descriptive values of the variables were calculated, and the homogeneity of variance of the data, and the normality of the groups was verified with the Shapiro–Wilk test, establishing a degree of significance of P-Value ≥ 0.05 ; as well as calculating the percentage difference ($\Delta\%$). The equality of variances was determined by the Student's t-test for independent samples, establishing a level of $\alpha \leq 0.05$.

3. Results

The research evaluated 64 physical education classes of fourth, fifth, and sixth grade of primary school, with an average duration in minutes of 41.7 ± 8.3 (range from 28 to 51 minutes). The descriptive statistics according to the rural or urban educational unit is presented in Table 1. The average and standard deviation of the codes: 1.- lying down, 2.- sitting, 3.- standing, 4.- walking, and 5.- very active reviewed through SOFIT, as well as the results of the homogeneity of the variances of the data, and the normality of the groups with the Shapiro–Wilk test.

Table 1
Descriptive statistics and homogeneity of variance in the 53 physical education classes performed in urban and rural secondary schools

Variables	Physical Education Classes			
	Urban Secondary Schools n=28		Rural Secondary Schools n=25	
	M \pm SD	Shapiro-Wilk test	M \pm SD	Shapiro-Wilk test
1.- Lying down (%)	3.5 \pm 3	.291	3.3 \pm 3	.268
2.- Sitting (%)	18.2 \pm 4.1	.329	12.8 \pm 2.5	.341
3.- Standing (%)	40.3 \pm 6.7	.712	35.7 \pm 6.2	.601
4.- Walking (%)	26.3 \pm 3.7	.364	32.3 \pm 4.8	.412
5.- Very active (%)	11.7 \pm 2.3	.364	15.9 \pm 2.3	.277

Based on the utilized method, an alternative and null hypothesis were established:

The Alternative Hypothesis: There is a significant difference between the median perception of effort and moderate to vigorous physical activity in rural or urban secondary schools in students of the first, second and third grade when participating in physical education classes.

Null Hypothesis: There is no significant difference between the median perception of effort and moderate to vigorous physical activity in rural or urban secondary schools in students of the first, second and third grade when participating in physical education classes.

For its validation, the statistical analysis with the Student's t test reported no significant differences in the perception of effort in physical education classes according to location. The classes taught by physical education teachers in urban secondary schools were of 4.6, and in rural secondary schools it was of 4.7, finding no significant differences between groups (P-value=.176). The values are presented in figure 1. Moderate to vigorous physical activity in physical education was higher in physical education classes from rural secondary schools with 48.4, compared to urban secondary schools with 38.6, which can be seen in figure 2.

Figure 1
Perception of effort in physical education classes in rural and urban educational facilities (n = 53)

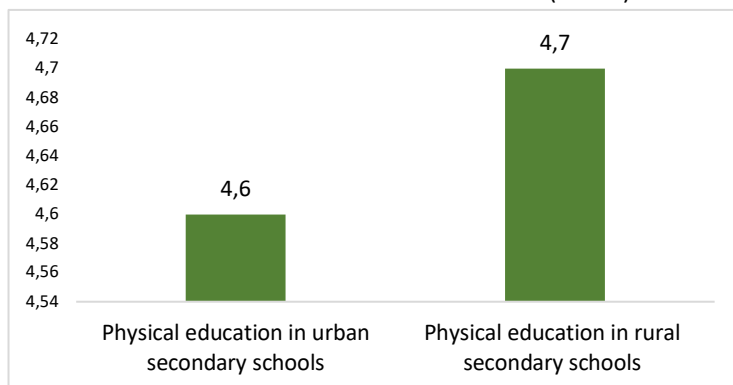
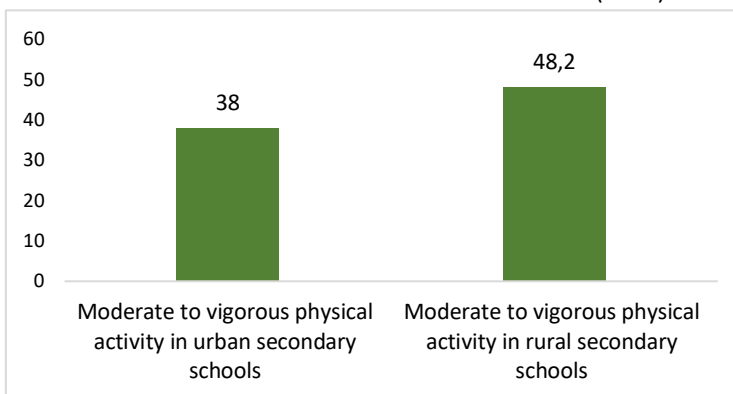


Figure 2
Moderate to vigorous physical activity in physical education classes in rural and urban educational facilities (n=53)



3.1. Discussion

The main result of this study was that when comparing by urban or rural secondary schools, the perception of effort variable in physical education classes did not show significant differences by region, with a difference

percentage of 2.2 $\Delta\%$. While moderate to vigorous physical activity was higher in urban secondary school students with a difference percentage of 21.2 $\Delta\%$.

The perception of effort in the average physical education class in both areas resulted in a mean value of less than five points of the scale, taking into account that values equal to or greater than 5 represent a heart rate above 150 beats per minute, which is considered insufficient to produce the adaptations necessary for a better organic performance derived from physical activity Cowden & Plowman, (1999); Kang et al. (2003), the values in our research are similar to the results in other studies with a similar methodological design (Hernandez et al. 2008, Hernandez-Alvarez et al., 2010) . Hypothetically, it is deduced that the values of perception of effort were not significant due to the fact that lower physical condition in adolescents from secondary education in urban areas is reported, which is relevant in the perception of this variable (Walhain et al. 2016; Zongo et al. 2017),.

Overall, moderate to vigorous physical activity in physical education classes of secondary school by urban or rural location was of 43.5%, which according to the standards established by the National Association for Sport and Physical Education (NASPE), did not achieve moderate to vigorous intensity for at least 50% of class time (Baghurst et al. 2015; Webster et al., 2015). Values similar to those found in research with similar educational contexts in physical education in urban areas (Hall-López et al. 2017; Hall-López et al. 2018). A pattern similar to our results of a greater practice in students of rural residence can be observed in international contexts (Flor-Garrido, et al., (2016; Euler et al. (2019).

The availability of space and infrastructure factor is associated with a greater practice of physical activity in educational centers (Nichol et al. 2009; Huberty et al. 2010); Research mentions that the physical education teacher uses the natural environment as a didactic strategy that favors movement intensity (Coto Vega, (2008); Santos Pastor & Martínez Muñoz, (2011). In terms of physical activity, studies have reported that students in rural educational facilities have a greater possibility of moving despite infrastructure and having the same educational program as in urban regions (Gracia, 2002).

Teacher training has been considered an important element in rural education (Larson et al. 2019). Regarding physical activity, there is importance in the administration, organization of urban and rural schools (Sygit et al. 2019), and the physical education teacher, due to the diversity of the rural environment, has to promote learning through in a self-taught manner (García Salado, 2019). With didactic strategies and teaching styles in line with the rural area (Herranz Martín, 2015). Therefore, starting from the training stages of teachers in physical education, it is recommended that universities address content in line with the different social contexts for integration (Chaparro Aguado & Santos Pastor, 2018), whether these are rural or urban, and take into account the environment for the design of motor tasks in physical education as well (Molina et al. 2020).

4. Conclusions

Within the Mexican context, where this research was performed, it is important for teachers to bear in mind that less physical activity has been identified in urban educational centers, to take into account didactic strategies to conduct physical education classes, intentionally generating opportunities to participate in movement activities. The above taking into account the provisions of the Secretariat of Public Education in Mexico, which within their graduation profiles establishes care for the body and health, and within its curricular components lays physical education as an area of personal and social development (SEP, 2017), for which it is important to take pedagogical aspects so that students understand the perception of effort and intensity of physical activity they perform in physical education, taking WHO standards as parameters.

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