

Secondary physical education, participation by sex in moderate to vigorous physical activity Educación física en secundaria, participación por sexo en actividad física moderada a vigorosa

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Abstract. Objective: To compare by sex the participation in moderate to vigorous physical activity in secondary school physical education classes. Method: The research design was comparative descriptive, with convenience sampling, 188 adolescents with an average age of 12.5 ± 0.7 enrolled in public secondary schools in the city of Mexicali, Baja California participated. Mexico. The system for observing fitness and instruction time (SOFIT) was used to determine the moderate to vigorous physical activity of 47 physical education classes. Results: The equality of the variance was calculated by the Student t test for independent samples less than $\alpha > 0.05$; finding significant differences of participation in vigorous moderate physical activity lower in women than in men during physical education class (P-Value = .002) with a difference percentage of 32.5 ($\Delta\%$) between men and women. Conclusion: In a constructive way, it is recommended to take pedagogical actions with cooperative and simultaneous participation of students in moderate to vigorous physical activity for at least 50% of class time, and guide educational content to involve students in the movement both genders, as established by UNESCO to provide quality physical education.

Keywords: Physical Education, Secondary Education, Sex, Physical Activity.

Resumen. Objetivo: Comparar por sexo la participación en actividad física moderada a vigorosa en clases de educación física de secundaria. Método: El diseño de la investigación fue descriptivo comparativo, con muestreo por conveniencia, participaron 188 adolescentes de una edad promedio de 12.5 ± 0.7 matriculados en secundarias públicas de la ciudad de Mexicali, Baja California. México. Se utilizó como instrumento de evaluación el Sistema para observar el tiempo de instrucción de actividad física (SOFIT), para determinar la actividad física moderada a vigorosa de 47 clases de educación física. Resultados: La igualdad de la varianza se calculó mediante la prueba t-Student para muestras independientes resultando por sexo menor a $\alpha > 0.05$; encontrando diferencias significativas de participación en actividad física moderada vigorosa menores en mujeres que en hombre durante la clase de educación física (P-Valor=.002) con un porcentaje de diferencia de 32.5 ($\Delta\%$) entre hombres y mujeres. Conclusión: De manera constructiva, se recomienda tomar acciones pedagógicas con participación cooperativa y simultánea de los estudiantes en actividad física moderada a vigorosa por lo menos el 50% del tiempo de la clase, y guiar contenidos educativos para involucrar en el movimiento a los estudiantes de ambos géneros, como lo establece la UNESCO para brindar una educación física de calidad.

Palabras clave: Educación Física, Educación Secundaria, Sexo, Actividad Física.

Introduction

The United Nations Educational Scientific and Cultural Organization (UNESCO) establishes in its guide aimed at policy makers working on physical education, that school is a key element in providing girls with the information, skills and confidence necessary to practice physical activity and sport throughout their lives (McLennan, & Thompson, 2015), likewise, within the sustainable development objectives proposed by the United Nations (UN) to reduce extreme poverty in various dimensions, gender equality is found encompassing the educational field (Pérez Betancourt, & Betancourt Rodríguez, 2019), which have established applicability in physical education (Frizzo, and Silva Souza, 2019).

Meta-analysis and systematic reviews identify that sedentary adolescents are at greater risk of presenting pathologies associated with obesity (Brooke et al., 2014; Sims, Scarborough, & Foster, 2015). Within the Mexican context, in terms of physical culture, imbalances between men and women (Flores Fernandez, 2019) and with regards to physical activity have been identified. The results of the Halfway National Health and Nutrition Survey ENSANUT MC (by its Spanish acronym) 2016, found that female adolescents

engage in less physical activity (12.7%) compared to male adolescents (17.2%).

There are different tools to assess physical activity within the school environment, using valid and reliable questionnaires, observational instruments, or equipment (McKenzie and van der Mars, 2015). Among which is the System for Observing Fitness Instruction Time SOFIT (McKenzie, 2002; McKenzie et al., 1992). In Mexico, research that evaluates physical activity using this system has been performed during a school day in primary education, displaying in the quantity of moderate to vigorous physical activity: a greater participation in boys than in girls (Hall-López et al., 2017, Hall-López et al., et al., 2019).

While reviewing the state of affairs, various individual and social multifactorial factors linked to physical-sports practice from the gender perspective were identified (Torre Ramos, 2002, Vicente-Pedraz, & Paz Brozas-Polo, 2017). Research performed in the school environment identifies less physical activity in adolescent women (Beltrán Carrillo et al., 2019) as well as a lower intention by women to actively participate in physical education class (Zueck Enríquez et al., 2019). It has been identified that the role of teachers in promoting effort in physical education class may be insufficient to promote moderate to vigorous physical activity (Retamal-Valderrama, Delgado Floody, Espinoza-Silva, & Jerez Mayorga, 2019).

Internationally, participation standards in moderate and vigorous physical activity have been recommended by the

United States' National Association for Sport and Physical Education (NASPE), establishing that in physical education classes, teachers must design actions for students to participate in activities that have at least a moderate to vigorous intensity above 50% of the class time, that is, being active with an energy expenditure similar to walking or running (Banville, 2006). Thus, promoting an improvement in cardiorespiratory fitness levels (Guijarro-Romero, Mayorga-Vega, Casado-Robles, & Viciana, 2019); and in this way, contributing to the recommendations of the World Health Organization (WHO) which establishes a minimum dedication of 60 minutes a day in physical activity with moderate to vigorous intensity in children and adolescents between ages of 5 to 17 (WHO, 2014).

According to our knowledge, identifying specific studies that evaluate the participation in moderate to vigorous physical activity in physical education according to gender in secondary school has been complicated; therefore, the present study aims to perform a comparative analysis by sex of moderate to vigorous physical activity in secondary school students.

Method

Participants

The present research was approved in the Coordination of Graduate Studies and Research of the Autonomous University of Baja California protocol 149/2/C/5/21, performed between August and December 2019, under a comparative cross-sectional methodological design with a non-probability convenience sample (Thomas, Nelson, & Silverman, 2015), with the consent of the directors and teachers of public educational institutions, programming evaluation schedules and following the ethical principles of research involving human subjects of the Declaration of Helsinki (Puri, Suresh, Gogtay, & Thatte, 2009).

Instruments

The moderate to vigorous physical activity of 47 first grade physical education classes of secondary school in students with an average age of 12.5 ± 0.7 years was evaluated using the System for Observing Fitness and Instruction Time (SOFIT), (McKenzie, Sallis y Nader, 1992).

Procedures

The system for system for observing fitness and instruction time (SOFIT), as means of methodology, was utilized by randomly choosing 4 students from each physical education class (2 males and 2 females) according to the official class list, who were observed in a rotating sequence of 12 intervals for 20 seconds each, repeating the observations throughout the entirety of the class, following an audio that indicated the recording times of the activity. To determine participation in physical activity, codes were used to classify activity levels, which allowed to estimate the energy expenditure associated with physical activity. This procedure was classified into five 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. From the quantification of these codes, the moderate to vigorous physical activity index (IAFMV by its Spanish acronym) of one hundred and eighty-eight students was obtained, adding percentage codes 4) walking and 5) very active of the total time of the physical education class.

Statistical analysis

A statistical analysis with the Statistical Package for the Social Sciences (SPSS) version 23.0 for Windows was performed (IBM Corporation, New York, USA); calculating the descriptive values of the variables; and the percentage difference ($\bar{A}\%$) $\left(\frac{\text{Mean}-2 - \text{Mean}-1}{\text{Mean}-1} \times 100\right)$ (Vincent, 2012). According to the used methodology, an alternate and null hypothesis test was established to verify the normality of the groups and homogeneity of the variance of the data, the Kolmogorov-Smirnov statistical test was utilized with a significance level of P- Value ≤ 0.05 ; as a cross-sectional study when comparing as fixed variables of two groups 1) men or 2) women and moderate to vigorous physical activity in physical education class in men and women, having as a random variable the moderate to vigorous physical activity index. The Student's t-test for independent samples calculating the equality of the variance was utilized, establishing a level of $\alpha = 0.05$.

Results

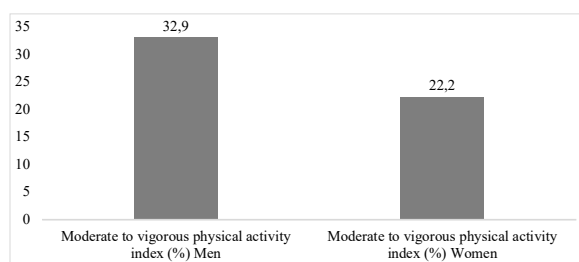
The research evaluated 47 physical education classes in secondary school, with an average duration in minutes of 42.07 ± 5.2 (range from 26 to 51 minutes). The mean descriptive statistics (M) and the standard deviation (\pm SD) of the five codes: 1) lying down, 2) sitting, 3) standing, 4) walking, and 5) very active evaluated by the system for observing fitness and instruction time can be found in Table 1, as well as the results related to normality of the groups and homogeneity of the variance of the data.

Table 1.
Descriptive statistics and homogeneity of variance in the study variables by gender in physical education classes in secondary school.

Variables	Physical Education Classes in Secondary School			
	Men		Women	
	M \pm SD	Kolmogorov-Smirnov Test	M \pm SD	Kolmogorov-Smirnov Test
1) lying down(%)	3.7 \pm 0.7	0.357	4.9 \pm 0.7	0.152
2) sitting (%)	15.1 \pm 6.2	0.746	23.7 \pm 9.7	0.219
3) standing (%)	38.3 \pm 11.2	0.672	49.2 \pm 10.1	0.512
4) walking (%)	19.6 \pm 6.1	0.320	13.3 \pm 4.3	0.186
5) very active (%)	13.3 \pm 3.8	0.589	8.9 \pm 10.2	0.617

Note: Gender comparative table of the mean, standard deviation (\pm) normality and homogeneity of the variance between groups using the Kolmogorov-Smirnov statistical test, * $p = 0.05$. Variables: Percentage distribution of the intensity of physical education classes evaluated by SOFIT; Classifying the codes as 1) lying down, 2) sitting, 3) standing, 4) walking, and 5) very active that corresponds to running or an activity with a higher energy expenditure. Evaluated with the system for observing fitness and instruction time SOFIT; (McKenzie et al., 1992).

The calculation of the equality of variance of the moderate to vigorous physical activity index (IAFMV) of the classes of physical education in secondary school according to sex can be observed in figure 1. The student's t-test reported significant differences in moderate to vigorous physical activity in physical education, with higher averages in male adolescents compared to female adolescents (0.002), and a percentage difference of 32.5 ($\bar{A}\%$) between men and women.



Note: Average percentage of moderate to vigorous physical activity index IAFMV = the percentage sum of the codes 4) walking and 5) very active that corresponds to running or an activity with a higher energy expenditure of the total time of physical education classes in high school evaluated, with the system for observing fitness and instruction time SOFIT; (Mckenzie et al., 1992). The student's t-test reported significant differences in moderate to vigorous physical activity in physical education, with higher averages in male adolescents compared to female adolescents (0.002).

Figure 1. Moderate to vigorous physical activity index (IAFMV) in % of men and women in physical education class in secondary school.

Discussion

The main result of this research was that male students present a significantly higher participation in moderate to vigorous physical activity than women during physical education classes in secondary school (32.5 Å%). The data is consistent with studies performed in the Mexican primary school educational context. Using the same methodological procedure, significant differences are reported in moderate to vigorous physical activity in physical education with 25.7% participation in girls and 32.1% in boys (Pérez-Bonilla, 2009). Another study also found less moderate to vigorous physical activity in girls (36.8%) compared to boys (42.2%) (Jennings-Aburto et al., 2009). The average moderate to vigorous physical activity index of physical education classes taught by teachers evaluated in secondary school was of 27.5%, which when compared with the standards established internationally by the United States' National Association for Sport and Physical Education (NASPE) physical education classes did not achieve moderate to vigorous intensity for at least 50% of class time (Banville, 2006), these values are consistent with research conducted in primary and secondary education in similar geographical contexts (Hall-López et al., 2017, Hall-López et al., 2018).

In Mexico, the physical education program establishes in the graduation profiles collaboration and teamwork as well as attention to the body and health (SEP, 2017), reason for which these elements could be taken into account to intentionally lead physical education classes to generate opportunities to participate in motor skill activities regardless of gender. Teaching strategies have been recommended to minimize inequality in this subject (López Pastor, 2012); hence, the importance of teachers in directing the content of educational programs, avoiding gender-related stereotypes and giving importance to equal participation of students in physical education class (Alvariñas-Villaverde, & Pazos - González, 2018).

Physical education classes with a low effort promotion as well as intensity of physical activity with less than 50% of the class time have been evaluated by teachers (Retamal-Valderrama, et al., 2019), and when analyzing it with our findings; moderate to vigorous physical activity involving students is of 32%. Other research establishes as a factor of intensity in physical education class the task-focused motivational climate in which students remain more in

moderate to vigorous physical activity as opposed to teachers who focus on performance-oriented climate (Wadsworth, Robinson, Rudisill and Gell, 2013), these results are important when adjusting teaching and implementing strategies, content, and the use of materials to guarantee quality in the movement in physical education (Jovanoviæ and Miniæ, 2018). In the above, Kwon, Welch, and Mason (2020), establish the importance of teachers to associate motor skill content in promoting physical activity in physical education class regardless of the students' sex.

Conclusions

As a conclusion, a lower participation in vigorous moderate physical activity in women compared to men can be identified in physical education classes of secondary school. Speaking constructively, it is recommended to take pedagogical actions with cooperative and simultaneous participation of students in moderate to vigorous physical activity by at least 50% of the class time regardless of gender, and in this way contributing in the school environment with the recommendations for children and adolescents established by the World Health Organization (WHO) for the achievement of at least 60 minutes a day in moderate to vigorous physical activity, as well as, in the physical education class, guiding educational content to involve students of both genders in the movement, as established by UNESCO to provide quality physical education.

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