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Moderate-to-vigorous physical activity during recess and physical education among mexican elementary school students

Actividad física moderada a vigorosa durante el recreo y clase de educación física en niños mexicanos de escuela primaria

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Abstract. Objective: To compare the moderate-to-vigorous physical activity of physical education classes taught by teachers and their students during recess. Method: In order to determine the physical activity intensity the system for observing fitness instruction time (SOFIT) was used, a descriptive cross-sectional comparative methodological design was used, 63 physical education classes were evaluated selecting randomly four students from each class (2 men and 2 women), the same procedure was followed to evaluate the same 4 students during the 30 minutes of recess. Results: The equality of variance was calculated using the Student t test for independent samples resulting a P-value=.001 ád» less than 0.05, with a percentage time of moderate-to-vigorous physical activity in physical education classes taught by teachers of 41%±17.7 and performed by students during recess of 50%±10.3, the percentage of difference (Ä%) was of 18% between the variables. Conclusion: The intensity of physical activity during recess was higher without teacher instruction in relation to physical education classes evaluated, due is important a feedback for the teachers in strategies for involving the students in moderate to vigorous physical activity as established by the World Health Organization.
Keywords: physical education, recess, elementary education, physical activity, teachers.

Resumen. Objetivo: Comparar la actividad física moderada a vigorosa de clases de educación física impartidas por profesores y la intensidad de la actividad física de sus estudiantes durante el recreo. Método: Se utilizó como instrumento de evaluación el sistema para observar el tiempo de instrucción de actividad física (SOFIT), el diseño metodológico fue transversal descriptivo comparativo, evaluando 63 clases de educación física seleccionado al azar cuatro estudiantes de cada clase (2 hombres y 2 mujeres), el mismo procedimiento se siguió, evaluando a los mismos 4 estudiantes durante los 30 minutos del recreo. Resultados: La igualdad de la varianza se calculó mediante la prueba t Student para muestras independientes resultando una P-Valor=.001 menor a ád» 0.05, el porcentaje de tiempo de actividad física moderada a vigorosa en las clases de educación física impartidas por profesores fue de 41%±17.7 y la realizada por los estudiantes durante el recreo resulto en 50%±10.3 y un porcentaje de diferencia (Ä%) de 18%. Conclusión: La intensidad de actividad física durante el recreo fue mayor sin instrucción docente en relación a las clases de educación física evaluadas, por lo anterior es importante retroalimentar de manera constructiva la manera de impartir la clase de los profesores mediante capacitación con estrategias didácticas para involucrar al alumno en actividad física moderada a vigorosa como lo establece la Organización Mundial de la Salud.
Palabras clave: educación física, recreo, educación primaria, actividad física, profesores.

Introduction

There is scientific evidence pointing than sedentary lifestyle in children is associated with several chronic diseases including metabolic syndrome (Shilton, 2008, Broyles et al., 2010). Research studies suggest that time engaged in regular moderate-to-vigorous physical activity during childhood is a contributing factor to become a physically active as adult (Kim, 2012, Ali et al., 2014). In schools, physical education lesson has been highlighted as the place to reach most young people to promote a healthy active lifestyle (Lonsdale et al., 2013, Rivera-Sosa & Arras-Vota, 2015, Langford et al., 2015).

According with the Mexican National Survey of Health and Nutrition 2012, 58.6% children among 10 to 14 year old are not physically active after school in a formal program, whereas the combined prevalence of overweight and obesity in school children was 34.4% (ENSANUT, 2012). The world wide of health (WHO) recommend for children achieving at least 60 minutes or more of daily moderate-to-vigorous physical activity in order to improve a healthy growth and development (WHO, 2016).

In Mexico, the Secretariat of Public Education (SEP for its abbreviation in Spanish) establish than elementary school curriculum offers physical education whose primary goals include developing motor skills and teaching about the importance of leading an active lifestyle and the difference with others subjects as sciences, mathematics, civics, is than is the only formal program where children can experience moderate-to-vigorous physical activity (SEP, 2008, SEP, 2008). In addition, in the elementary Mexican schools the recess is a mandatory 30-minute period in which students have the opportunity to eat and be physically active (SEP, 2014). Unfortunately, a recent research conducted in Mexico identified than more than 90% of the recess period was spent at light or sedentary physical activity (Medina et al., 2015), moreover direct observation assessing physical activity using the system for observing fitness instruction time showed in two samples of Mexican elementary school physical education classes only accrued an average of 38.2% and 29.2% of moderate-to-vigorous physical activity in class time (Jennings-Aburto et al., 2009, Pérez Bonilla, 2009), these results partial contradict other findings than showed 54% of moderate-to-vigorous physical activity in class time (Gharib et al., 2015).

During school time the intensity of physical activity can be influenced by the context as, teacher credentials, class size, equipment, facilities, scheduled lesson length and the number of lessons provided per week (Smith, Lounsbery, & McKenzie, 2014, Salazar et al., 2015, Sutherland et al., 2016, Honório et al., 2016), In this context, In Mexico, there is a lack of studies describing the physical activity among school children's; Therefore, this study was designed to compare the moderate and vigorous physical activity during recess and physical education among 4th, 5th and 6th grade Mexican elementary school students.

Methods

Participants and setting

The present study follows a cross-sectional methodological design, with a non-probabilistic convenience sample, in total the study sample was based on 23 public elementary schools located in the urban area of Mexicali Baja California in Mexico, classified as low socioeconomic status, morning sessions, the schools were required to possess a minimum of facilities to conduct the physical education lessons, population above 500 students at least two groups of fourth, fifth and sixth grade students.

The study followed the ethical principles regarding human experimentation proposed by the Helsinki declaration (Puri, Suresh, Gogtay, & Thatte, 2009); and was approved by the research program of the Faculty of Sports of the Autonomous University of Baja California.

Measures and procedures

In order to quantify the physical activity during the physical education classes and recess, the System for Observing Fitness

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Instruction Time (SOFIT) was used, SOFIT is an objective tool for assessing the quality of physical education instruction that provides a measure of student activity levels and has been calibrated using heart rate monitors and validated using accelerometers (Mckenzie, Sallis, & Nader, 1992, McKenzie, 2002). For the current study, tow data collectors were trained following the standard of SOFIT protocol, memorizing operational definitions of codes and learning the tactical procedures and reliability measures were taken in 100% of the observations (Kappa statistics .091).

Sixty-Three physical education classes were evaluated, attended by fourth, fifth and sixth grade students of elementary school (Mean age=10,6±0,2 years), four students were randomly select (2 girls and 2 boys) based on the order in which they arrived at the class, using the procedures outline in the SOFIT manual, in summary observers record intensity of physical activity using a time-sampling system of 10-seconsd observe and 10-seconds records intervals while being paced by audio prompts from a mp3 player. The coded intensity of physical activity was scored as 1=lying down; 2=sitting; 3=standing; 4=walking; 5=very active. To identify moderate-to-vigorous physical activity the codes 4=walking and 5=very active were combined as the proportion of time than students are engaged in these codes.

The lesson context in physical education classes were identify as M=management; K=general knowledge; P=physical fitness knowledge; F=fitness activity; S=skill drills; G=game play; O=Other (e.g., free play).

The four same physical education students were observed during the 30 minutes recess period, the observers move around the school facilities in order to code the intensity of physical activity in order to assess the moderate-to-vigorous physical activity quantified as the proportion of time than students engaged in walking and very active physical activity during recess period.

Analysis

Statistical analyses were performed using statistical software SPSS for Windows version 21 (IBM Corporation, New York, USA). Descriptive statistical procedures are presented as mean ± standard deviation and range; t Student test for independent samples was computed to determine significant mean differences between the moderate to vigorous physical activity index of physical education and recess groups. Statistical significance test was set a priori at $p < 0.05$. Also percentage of difference (Δ%) was calculated for moderate to vigorous physical activity index of physical education classes taught by teachers and their students during recess (Thomas et al., 2001).

Results

There were 63 physical education classes conducted by teachers, 50 male (38.6±9.3 year old) and 13 female (34.2±6.3 year old), the mean of years of experience as permanent physical education specialist were 13.8±9.1 in male and 8.9±5.5 in female. Within the schools the physical education classes observed representing 1,765 children (51% girls and 49% boys) enrolled in 4th grade (n=19, 30.1%) 5th grade (n=23, 36.5%) and 6th grade (n=21, 33.4%), both activities were held outdoors with an average duration of 39,0±6,7 minutes for physical education classes and 29,9±1,2 for the recess period, descriptive characteristics are presented in table 1.

Table 1.
Descriptive statistics for the sample (n = 63).

	Physical Education Classes				Recess Period			
Variables	M ± SD	% Time	Range	M ± SD	%Time	Range
1) Lying Down (min)	0.3 ± 0.7	0.8	0-3	1 ± 1.2	3.2	0-5
2) Sitting (min)	3.8 ± 5.1	10	0-29.4	8 ± 3.4	26.6	0-17
3) Standing (min)	18.7 ± 7.8	19.7	6.4-37	5.9 ± 2.5	19.7	1-12.6
4) Walking (min)	11.5 ± 6.5	28.8	1-29.3	9.6 ± 2.4	31.9	3-15
5) Very Active (min)	4.8 ± 3.1	12	0-13	13 ± 2	18.2	1.2-12

The greatest proportion of lesson context in physical education classes was game play (mean =34%), followed by management (23%) and fitness activity (21%), skill drills and other (e.g., free play) were spent by 9% and 7% respectively, meanwhile little proportion lesson time was allocated to general knowledge (3%) and physical fitness knowledge (2%). Due during recess there was not fitness instruction, the context was 100% other (e.g., free play).

The percentage of difference (Δ%) of moderate-to-vigorous physical activity (combined codes 4=walking and 5=very), was of 18% more in recess than physical education classes. Figure 1. Provides the data of the t-test for independent samples resulting a P-value=.001<0.05, significance differences were observed with more percentage time of moderate-to-vigorous physical activity than students remained in recess (mean percentage time 50±10.3) than in physical education classes (mean percentage time=41±17.7).

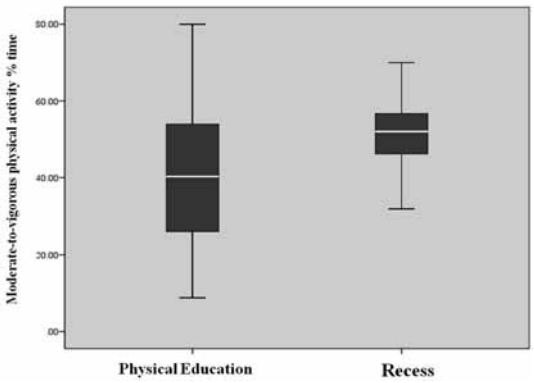

Figure 1. Mean of percentage timeof moderate-to-vigorous physical activity (n = 63). Physical education classes (mean percentage time=41±17.7) recess (mean percentage time 50±10.3); P-value=.001<0.05.

Discussion

The main findings reveal important data related to differences in physical activity during school time, the time engaged of moderate-to-vigorous physical activity during recess was higher than physical education classes among a sample of children enrolled in Mexican public elementary schools. According with the National Association for Sport and Physical Education (NASPE) as strategies to improve the quality of physical education recommends that students engage in moderate-to-vigorous physical activity for at least 50% of the time of the class in order to provides numerous physiological and psychosocial benefits of physical activity (NASPE, 2009, Banville, 2006), the results of our data do not reach this international recommendations for physical education, these findings are corroborated with research of Mexican elementary schools where reported an average of moderate-to-vigorous physical activity in class time of 38.2% and 29.2% (Jennings-Aburto et al., 2009, Pérez Bonilla, 2009), this suggest than teachers behavior and lesson context of the Mexican physical education curriculum do not promote to achieve international recommendations. Regarding the assessment of lesson context with the System for Observing Fitness Instruction Time (SOFIT), this study was consistent with other made in Mexico (Gharib et al., 2015).

The physical activity during the recess time was not organized, without teaching instructions and students participate (50.1%) in more moderate-to-vigorous physical activity than in physical education class (40.8%) it was consistent with other cross-sectional study than report 39.6% of moderate-to-vigorous physical activity during the recess period and 29.2% during the physical education class (Jennings-Aburto et al., 2009). Previous studies than evaluate the moderate-to-vigorous physical activity during the recess period in schools reports 66.4% (Medina et al., 2015) and 33.7% (Springer, Tanguturi, Ranjit, Skala, & Kelder, 2013), there are many factors that determine the intensity of physical activity during school time including teacher credentials, class size, equipment, facilities, scheduled lesson length and the number of lessons provided per week (Hernández-Álvarez et al., 2010, Skala, Springer, Sharma, Hoelscher, & Kelder, 2012, Mckenzie et al., 2015, Navas & Soriano, 2016). Systematic review and meta-analysis suggests that children and adolescents than engage in regular physical activity are

associated with lower risk of chronic diseases as obesity (Brooke et al., 2014; Sims et al., 2015); The World Health Organization (WHO) recommends that children aged 5-17 years should accumulate at least 60 minutes of moderate- to vigorous-intensity physical activity daily (WHO, 2016). In schools, physical education lesson has been highlighted as the place to reach most young people to promote a healthy active lifestyle (Kim, 2012, López-Alonzo et al., 2015, Langford et al., 2015; Lonsdale et al., 2013). The present study is limited by the sample size of Physical Education teachers who conduct a curriculum in a pedagogical model of competencies and delimited to Mexican school context, in addition this cross-sectional study prevents us from inferring causality. Despite of these limitations, the results presented here allow us to better understand potential limitations when the physical education classes did not reach the international standards of have a moderate-to-vigorous intensity above 50% of class time, also the measure instruments used in the research is valid, easy to apply in large samples, it have a low cost and offer a non-invasive means to measure the intensity of physical activity in physical education or recess period as well as providing educational support for teachers within the context and teachers might find it useful to design proposals aimed at increasing the physical activity among children also contributes to the physical education knowledge regarding the physical activity recommendations as established by the World Health Organization. The topic seems relevant since inappropriate dietary habits and lack of physical activity are common in Mexican children. In summary, the intensity of physical activity during recess was higher without teacher instruction in relation to physical education classes evaluated, however, it will be appropriate in the future more studies to better clarify the strategies to enhance physical activity during the school period.

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