

Duration, intensity and context of Physical Education classes taught by teachers and undergraduate students

Duración, intensidad y contexto de clases de Educación Física impartidas por profesores y estudiantes de licenciatura

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Abstract

The knowledge of the intensity of physical activity as educational support provide support for Physical Education teachers within the context to design proposals aimed at increasing the physical activity among children as recommend the World Health Organization. The aim of this study was to evaluate the duration, intensity and context, of Physical Education classes taught by Physical Education teachers and graduate students in physical activity and sport in public middle schools from Mexicali, Baja California, Mexico. In order to evaluate the duration, intensity and context the system for observing fitness instruction time (SOFIT) was used, the methodological design used was descriptive cross-sectional comparative, evaluating 19 Physical Education classes taught by Physical Education teachers of public middle schools and 19 Physical Education classes taught by graduate students in physical activity and sport of the Autonomous University of Baja California. Descriptive statistic was use to assess the variables of duration, intensity and context, it was calculated the percentage change ($\Delta\%$) of Physical Education time class and the moderate to vigorous index resulted in 17% and 91.2% more in the undergraduates than in middle schools teachers. The equality of variance was calculated using the Student t test for independent samples resulting moderate-to-vigorous physical activity (P-value=.000), and Physical Education classes duration (P-value=.033), $\alpha \leq$ more than 0.05. According to assessments in the subjects who participated should provide constructive elements to increase the time of the Physical Education class, and middle schools teachers need a feedback by training on how to impart to the class using teaching strategies involving students with motor actions of moderate to vigorous intensity at least 50% of the Physical Education class.

Keywords

Evaluation; SOFIT; Physical Education; middle school.

Resumen

El estudio de la intensidad de la actividad física como apoyo educativo proporciona al profesorado de Educación Física conocimiento del contexto para diseñar y aplicar propuestas educativas, que coayuden a que niños y niñas logren las recomendaciones de actividad física establecidas por la Organización Mundial de la Salud (OMS). El objetivo de la investigación fue evaluar la duración, intensidad y contexto de las clases de Educación Física impartidas por profesores de Educación Física y estudiantes de licenciatura en actividad física y deporte en secundarias públicas del municipio de Mexicali, Baja California, México. Se utilizó como instrumento de evaluación el sistema para observar el tiempo de instrucción de actividad física (SOFIT), el diseño metodológico utilizado fue transversal descriptivo comparativo evaluando 19 clases de Educación Física impartidas por profesorado de secundarias públicas y 19 clases de Educación Física impartidas por estudiantes del séptimo semestre de la licenciatura en actividad física y deporte de la Universidad Autónoma de Baja California. Se realizó estadística descriptiva para evaluar las variables de duración, intensidad y contexto, se calcularon los porcentajes de cambio ($\Delta\%$) del tiempo de impartir la clase y el índice de actividad física moderada a vigorosa resultado en 17% y 91.2% más en los estudiantes de licenciatura en actividad física y deporte que en el profesorado de Secundaria. La igualdad de la varianza se calculó mediante la prueba t Student para muestras independientes resultando el índice de actividad física (P-Valor=.000) y la duración de la clase de educación física (P-Valor=.033), mayores a $\alpha \leq 0.05$. A partir de los resultados poder inferir de acuerdo a las evaluaciones que en los sujetos que participaron se deben aportar elementos constructivos para incrementar el tiempo de la clase de Educación Física, y en los profesores de Secundaria retroalimentar la manera de impartir la clase mediante capacitación con estrategias didácticas involucrando al alumno de secundaria en acciones motrices de intensidad moderada a vigorosa por lo menos el 50% de la clase de física.

Palabras clave

Evaluación; SOFIT; Educación Física; secundaria.

Introducción

Physical activity and adiposity in children and adolescents have been associated as cardiovascular and metabolic risk factors (Ebbeling, Pawlak, & Ludwig, 2002, Barnett et al., 2013, Rentería et al., 2015), In order to minimize and prevent this health problem, recommendations have been made worldwide, encouraging the reduction of sedentarism and increasing the time of practice of physical exercise, as well as promoting adequate food, concluding that the family environment and the school environment are those of Greater influence in the social environment of adolescents for the solution (Kong et al., 2012, Gómez-Miranda et al., 2013), because they reinforce and develop the norms that govern the behavior and are the ideal spaces to inculcate an adequate physical culture and healthy habits through the education (Seabra, Mendonca, Thomis, Anjos, & Maia, 2008).

According to the 2006 National Health and Nutrition Survey ENSANUT 2006, 40% of Mexican adolescents were sedentary (Morales-Ruan Mdel, Hernandez-Prado, Gomez-Acosta, Shamah-Levy, & Cuevas-Nasu, 2009), the latest national health and nutrition survey ENSANUT 2012, reports that more than half of children and adolescents between 10 and 14 years of age did not engage in any formal activity (such as team sports, organized with trainers), in The last 12 months prior to the survey and only 33% of children and adolescents surveyed spend less than two hours (the maximum recommended time) in front of screens; And in adolescents aged 15 to 18 years, reflect that more than 50% comply with the recommendations of physical activity, according to the criteria established by WHO and only 36.1% of adolescents surveyed spend less than two hours in front of screens; the ENSANUT 2012, shows that from 2006 to 2012 the combined prevalence of overweight and obesity increased from 33.2% to 35.8% among Mexican adolescents between 12 and 19 years of age.

Studies indicate that sedentary activities increase as the age advances, so in adolescence it is important to build lasting habits throughout the life cycle in order to contribute to the prevention and control of diseases chronic diseases associated with obesity, recommending the school scope for its wide coverage to contribute to the reduction of overweight and obesity (Kong et al., 2012).

In Mexico, the Secretariat of Public Education (SEP for its abbreviation in Spanish) (SEP, 2009), establish the physical education program with a competency approach then promotes a pedagogical intervention, which extends as a social and humanistic practice that stimulates the students' experiences, their Actions and motor behaviors expressed through intentional forms of movement; Favoring the children's motor experiences, their tastes, motivations, hobbies and movement needs, channeled both in the courtyards and areas defined in each school of the country as in all the activities of their daily life, linking activities such as the enjoyment of free time, Promotion and health care, school sports activities and educational demonstrations of physical education, even though in Mexico the direct costs of care for people with diseases related to the sedentary lifestyle and derived from obesity are increasing (Rodríguez Bolanos Rde, Reynales Shigematsu, Jimenez Ruiz, Juarez Marquezy, & Hernandez Avila, 2010).

In the school environment, physical education classes are the ideal space to encourage the practice of physical activity (Story, Nanney, & Schwartz, 2009), This is important because of the components of energy expenditure, physical activity is the only one that can be modified voluntarily (Honas et al., 2008), The physical education classes to be applied by the teachers must establish pedagogical actions that adhere to the student in fun, pleasant activities that induce the practice of extracurricular physical activity (Erwin & Castelli, 2008); In accordance with internationally established standards by the United States' National Association for Sport and Physical Education (NASPE, 2015) the physical education classes to be taught by the teachers must be designed so that the student participates in activities that at least have a moderate to vigorous intensity above 50% of the class time, that is to say they are active with an Energy expenditure similar to walking or running (Banville, 2006),

Research conducted in Mexican elementary schools assessing duration, intensity, and context of Physical Education lessons using the System for observing fitness and instruction time (SOFIT) as an instrument (McKenzie et al., 1992), the results showed that the duration of the Physical Education class was of 37.3 minutes (Pérez Bonilla, 2009) and 39.8 minutes (Jennings-Aburto et al., 2009), out of the 50 minutes that the SEP has established in Mexico for Physical Education lesson; Regarding moderate-to-vigorous physical activity over 50%, results showed 38.2% and 29.2% they argued it was related to the lack of material so that the

students could have the opportunity to participate more, students spent long periods of time standing while the teacher organized the rest of the group and very long transition times between the activities. (Jennings-Aburto et al., 2009; Pérez Bonilla, 2009). The results can be due to the fact that teaching strategies implemented by the teachers took the most significant amount of time in managing and organizing the activities related to giving instructions such as making or switching teams, or changing activities within the class (Pérez Bonilla, 2009). In contrast when assessing children during recess period time they carried out 40% moderate to vigorous activity without following any instructions from the teachers (Jennings-Aburto et al., 2009). Also a research has been carried out in Mexico to evaluate the intensity and context of physical education sessions conducted by undergraduate students in physical activity and sport, before and after a system training to observe physical activity instruction time (SOFIT), Using this methodology to evaluate them, resulting in a moderate to vigorous percentage of physical activity distribution of 37.3% before and 70.4% after the training and when measuring the heart rate intensity by heart rate was increased on average from 111 to 127 Beats per minute before and after the training, concluding that the evaluation promotes information and constructive elements to feedback the way to impart the physical education class with didactic strategies involving the student in motor actions of moderate to vigorous intensity at least 50% of the class (Hall et al., 2012).

Another study carried out in students evaluating the intensity, context and caloric expenditure of the physical education class before and after a learning-oriented training to impart physical education classes to undergraduate students in physical activity and sport resulted in an increase, After the training of the moderate to vigorous physical activity index (MIFV) from 41.5% in pre-training, to 62% in post-training, with a percentage change ($\Delta\%$) of 48.8%, modifying the context by applying The sessions, and in the subjects that participated in the training provided elements to give active physical education classes (Hall, 2012).

The importance of the professional competences of teachers in education to address this problem represents a challenge for educational institutions that train human resources in the area of physical culture in Mexico (AMISCF, 2013), for that reason the professional profile must determine knowledge and aptitudes for a practice in which it is considered a

responsibility and function to be applied in the educative context aiming to solve the problems to improve our society (Salazar et al., 2015, López-Alonzo et al., 2015, Salazar et al., 2016), which contribute to the World Health Organization's recommendation on the duration, quantity and intensity of physical activity for children and young people (OMS, 2015, Rivera-Sosa, & Arras-Vota, 2015, Yanci, Vinuesa, & Yanci, 2016).

Therefore, our purpose of investigation was to evaluate the duration, intensity and context of physical education classes taught by physical education teachers and undergraduate students in physical activity and sport in public junior high schools in the municipality of Mexicali Baja California Mexico.

Methods

Design

The present was conducted on cross-sectional baseline data collected with a non-probabilistic convenience sample (Thomas, Nelson, Silverman & Silverman, 2001), participating 19 teachers of physical education of secondary public of the municipality of Mexicali Baja California Mexico and 19 students of bachelor in physical activity and sport of the School of Sports Campus Mexicali of the Autonomous University of Baja California, that studied the subject of evaluation of the physical education ; The 38 study subjects agreed to participate in the study by signing a letter of consent meeting the requirements of the ethical research principles in humans of the Helsinki Declaration (Puri, Suresh, Gogtay, & Thatte, 2009), Written consent was requested to the deans of the participating public junior high schools, the research was proposed and approved by the ethics committee of the research and outreach program of the Faculty of Sports of the Autonomous University of Baja California.

Procedures

The methodological design consisted in evaluating the duration, intensity and context of the physical education class taught by 19 physical education teachers in a period of two weeks they were asked to teach, to evaluate the duration, intensity and context of the class of physical education, to the same group, in the same schedule by a student of degree in physical activity and sport of the School of Sports of the Autonomous University of Baja California,

completing the 38 classes, using the following instrument of evaluation:

In order to quantify the physical activity during physical education lessons, the System for Observing Fitness 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 et al., 1992). Onset of the physical education lessons, trained observers randomly select 4 students (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-seconds 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. Four data collectors were trained following the standard of SOFIT protocol, memorizing operational definitions of codes and learning the tactical procedures, reliability measures were taken in 100% of the classroom observations. 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).

Statistical analysis

Statistical analysis was performed using the Statistical Package for Social Sciences (SPSS) version 21.0 for Windows (IBM Corporation, New York, USA), by calculating the descriptive values of the variables. In order to verify the normality of the groups and the data variables, we used the Shapiro-Wilk test (degree of significance P-value ≥ 0.05). As a cross-sectional study to compare fixed variables of two groups, parametric statistics were used: the t Student test for independent samples in order to calculate the equal variance, determining a level of $\alpha \leq 0.05$, i.e. 5% as a percentage of error of the statistical test.

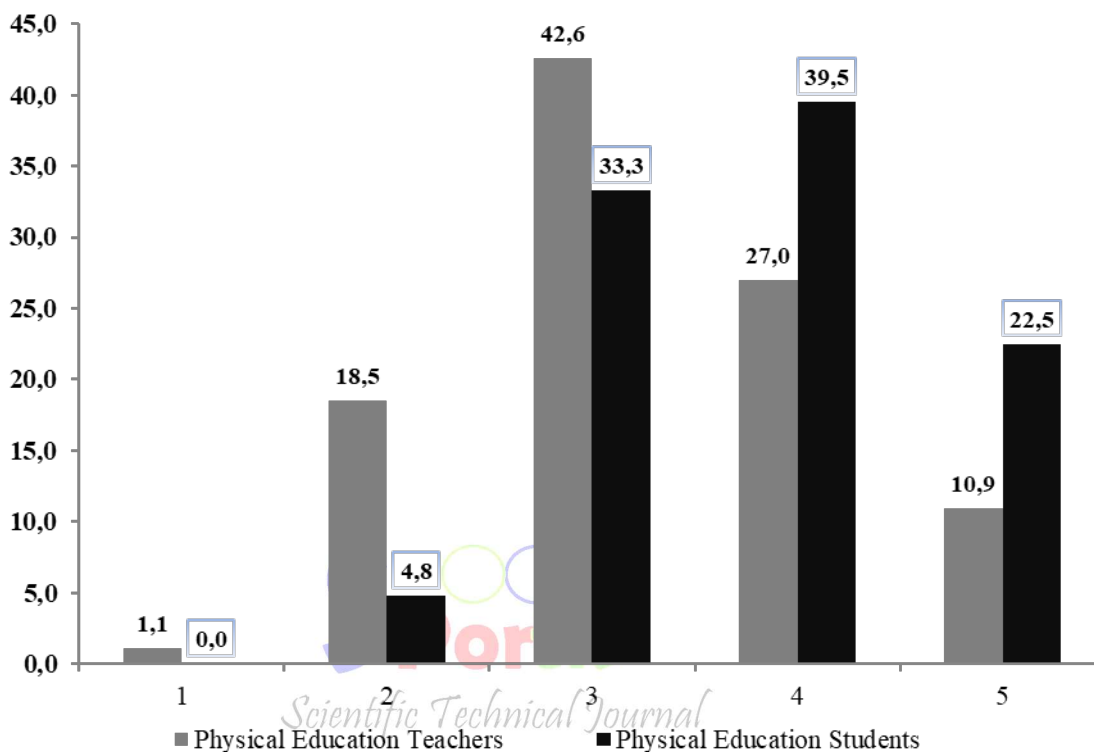
Results

Table 1. Duration in minutes of physical education classes and percentage of intensity and context used when imparting physical education classes of physical education teachers and undergraduate students in physical activity and sport.

Variables	Duration in minutes and% of SOFIT evaluation			
	Teachers (n=19)		Teachers (n=19)	
	Time	% Time	Time	% Time
1) Lying Down (min)	0.5	1.1	0	0
2) Sitting (min)	5.7	18.5	1.9	4.8
3) Standing (min)	14.4	42.6	12.8	33.3
4) Walking (min)	9.0	27.0	15.1	39.5
5) Very Active (min)	3.5	10.9	8.8	22.5
M) management (min)	4.9	15.2	9.5	25.0
P) Knowledge (min)	2.3	6.3	1.1	2.3
K) Physical (min)	0.6	1.9	0.3	0.5
F) Fitness (min)	4.3	12.5	6.8	17.3
S) Skills (min)	3	9.4	4.2	10.7
G) Game (min)	13	39.1	16.3	42.2
O) Other (min)	4.8	15.5	0.7	1.9

Note: Comparative table of the average and percentage of minutes of the intensity and context of 19 physical education teachers and undergraduate students in physical activity and sport, by imparting physical education classes to the same secondary group, using as an evaluation tool: System for observing physical activity instruction time SOFIT; (McKenzie, et al., 1992).

Figure 1. Percentage distribution of the intensity of the physical education classes taught by teachers and undergraduate students in physical activity and sport.

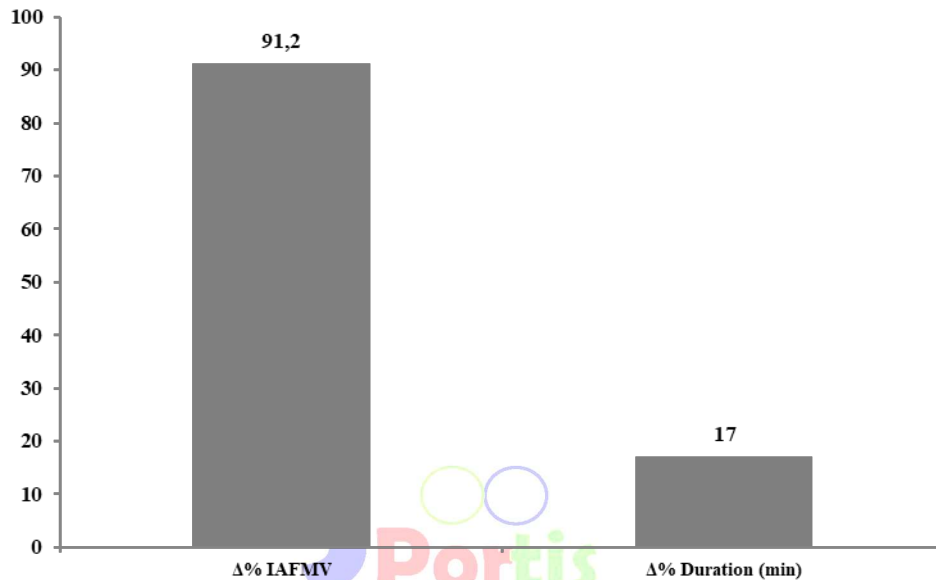


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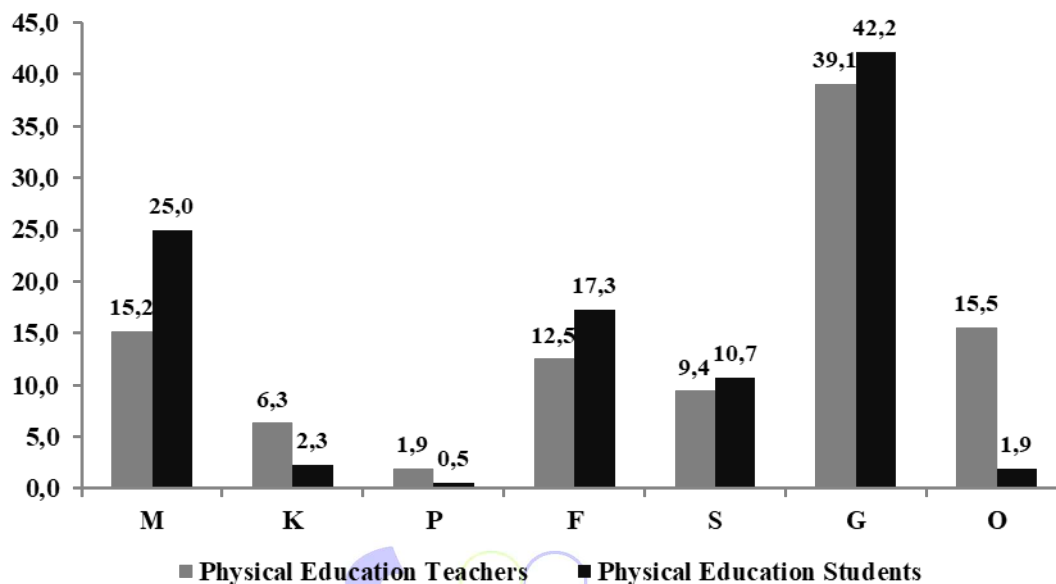
Note: 38 physical education physical education sessions taught by teachers (19) and undergraduate students in physical activity and sport (19), to the same group, using as an evaluation tool: the system for observing physical activity instruction time SOFIT; (McKenzie, et al., 1992).

Figure 2. Percentage distribution of moderate to vigorous physical activity index IAFMV of physical education classes taught by teachers and undergraduate students in physical activity and sport.



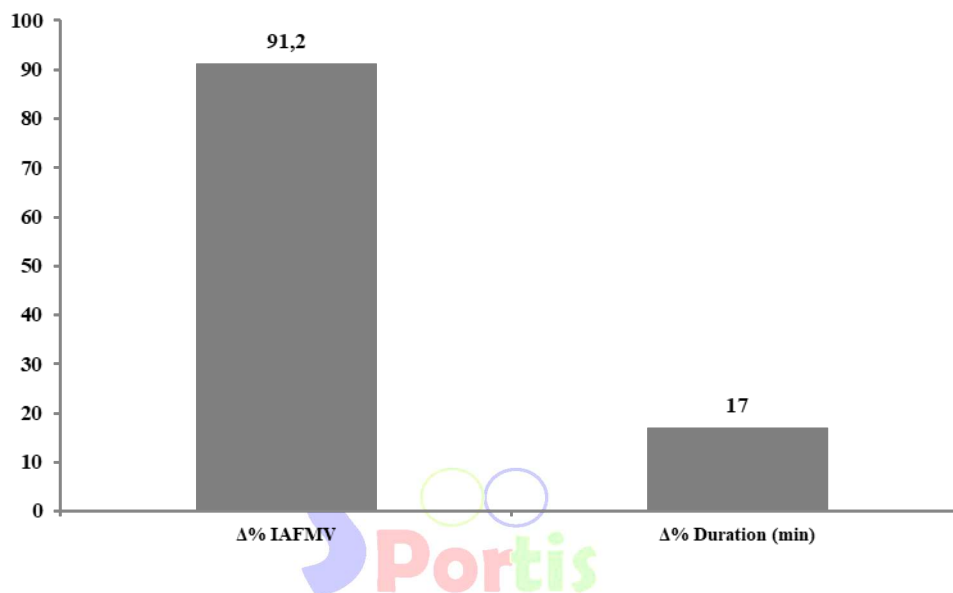
Note: IAFMV = The sum of codes 4) walking and 5) very active of the total of the time of the class evaluated by means of the system to observe the time of instruction of physical activity SOFIT; (McKenzie, et al., 1992) IAFMV greater than 50% is the standard recommended by the United States' National Association for Sport and Physical Education (NASPE, 2015) of the 38 physical education sessions taught by Secondary (19) and undergraduate students in physical activity and sport (19), to the same group.

Figure 3. Percentage distribution of the context of the physical education classes of teachers and undergraduate students in physical activity and sport.



Note: Context of 38 physical education sessions of teachers (19) and undergraduate students in physical activity and sport (19), to the same group, M) General content, P) Specific knowledge, K) General knowledge, F) Physical conditioning, S) Skills development, G) Game, O) Others. Using as an evaluation tool: the system to observe the physical activity instruction time SOFIT; (McKenzie, et al., 1992).

Figure 4. Percentages of change ($\Delta\%$) of the variables of moderate to vigorous physical activity index, average duration of minutes of the physical education class taught by teachers and undergraduate students in physical activity and sport.



Note: The percentages of change ($\Delta\%$) were calculated of the IAFMV for each study group [(Media post – Media pre)/Media pre] x 100; According to what was established by Vincent, (1999). The duration in minutes of the physical education class comparing the changes found in the evaluation of teachers and undergraduate students in activity and sport.

IAFMV = A percentage of the codes 4) walking and 5) very active of the total time of the physical education class established by the secretary of public education of 50 minutes, evaluated through the system to observe the time of activity instruction Physics SOFIT.

According to the methodology used the present investigation established an alternative hypothesis test and another one null as follows:

The alternate hypothesis H1: There is a significant difference between the means of duration, moderate to vigorous physical activity index and duration in physical education classes taught by teachers and students.

Null hypothesis, H0: No There is a significant difference between the means of duration, index of moderate to vigorous physical activity and duration in physical education classes taught by teachers and students.

In the analysis of the statistical test of Shapiro Wilk the value resulted with a P-Value ≥ 0.05 indicating normality of the groups and the homogeneity of the variance of the data, resulting

in the fixed variables of the duration (.963) and activity index Moderate to vigorous physique (.984). The mean and standard deviation (\pm) of the variables studied in the physical education classes taught by the teachers and students were calculated using Student's t-test for independent samples, resulting in a significance level of P-Value greater than $\alpha \leq 0.05$ in index of physical activity (.000) and duration (.033).

Discussion and Conclusions

According to the national standards established by the Mexican Secretary of Public Education, the time for physical education classes is 50 minutes, the teachers the average duration of the physical education class was 33 minutes corresponding to 66% of the total of the class in undergraduate students was of 38.6 minutes executing corresponding to 77.% of the duration of the class, when comparing the percentages of change ($\Delta\%$) the students to the same group of students 17% more time corresponding to 5.6 more minutes of physical education class than teachers. Investigations carried out in Mexico measured the average time that the teacher imparts the physical education class resulting in 37.3 minutes (Pérez Bonilla, 2009) and 39.8 minutes (Jennings-Aburto et al., 2009) in primary schools of the city of Chihuahua and the city of Mexico respectively; According to international standards such as the United States' National Association for Sport and Physical Education (NASPE, 2015) one of the important parameters for imparting active physical education classes is that teachers should design the sessions for the student to participate in activities that have a moderate to vigorous intensity above 50%, with an energy expenditure similar to walking or running (Banville, 2006).

In Mexico, we have the antecedent when evaluating physical education classes with the system to observe the physical activity instruction time (SOFIT) of primary level physical education teachers, having as average moderate and vigorous physical activity indexes of 29.2% (Jennings -Aburto et al., 2009) and 38.2% (Pérez Bonilla, 2009), which were similar percentages to those found in physical education classes taught by physical education teachers.

The results of the context of the 19 sessions of physical education, taught by physical

education teachers and undergraduate students in physical activity and sport, were similar M) General content (15.2% -25%), F) Physical conditioning (12.5% -17.3%) G) Game (39.1% - 42.2%) despite using similar didactic strategies, moderate to vigorous physical activity index was 91.2% higher in students. Teachers dedicated time and established their didactic strategies in the context of M) General content, which includes activities such as transition, administration and rest of the class, where adolescents spent most of the time in intensities such as 1) Lying down, 2) Sitting, 3) Standing, which does not contribute to the energy expenditure of physical activity, the opposite of students performing activities in M) General content, where adolescents spent most of the time in intensity of 4) Walking, incorporating didactic strategies in the sessions where the context spent for M) General content, was more efficient managing the time and organizing activities related to instructions such as team building, equipment change or change of activities within the class and take advantage of them to prepare the beginning of activities of F) Conditioning, S) Skills development and G) Game.

The importance of imparting a class with moderate to vigorous physical activity index is that of the components of metabolic expenditure, physical activity is the only one that can be modified voluntarily (Honas et al., 2008), in this sense the instruction of the teacher during the class has an influence that can contribute to the physical health of the student during physical education classes (Story et al., 2009). According to the criteria established by WHO to have health benefits through physical activity should be performed 30 minutes of moderate to vigorous physical activity five times a week, to have a physical health, physical education is not the solution with two times a week, but would be an essential pedagogical element if the two classes per week are taught with moderate to vigorous physical activity indexes above 50% of the total of the class according to the standard recommended by the United (NASPE, 2015), complementing it with out-of-school physical activities, and by bringing them together generate an energy expenditure that produces biological adaptations in adolescents for the improvement of their health by having adequate physical fitness.

Research has been carried out on undergraduate students who will be the human resource that will teach physical education classes, using as an instrument the evaluation of the system to observe the physical activity instruction time SOFIT (Hall et al., 2012, Hall,

2012) ; Which have been useful in providing information to provide a constructive feedback on the pedagogical intervention of the physical education teacher; Which helped to maximize the use of physical education class time and implement didactic strategies to keep students in moderate to vigorous intensities at least 50% of the class using classroom management contexts in which they involve the movement of student; In our data of moderate to vigorous physical activity were similar to those studies carried out in Mexico using the exact measurement protocol found in Mexican context, 29.2 (Jennings-Aburto et al., 2009) and 38.2% (Pérez Bonilla, 2009). Regarding the assessment of physical SOFIT can be a tool to support teachers in development training also coordinators and inspectors of physical education to recommends teachers modifying the context, in the educational programs of Mexico, to a better understanding the elements that will allow them to implement strategies that contribute through their roles in the school environment, and to apply healthy lifestyle oriented promotion programs to indirectly contributes to the solution of health problems such as the current prevalence of combined overweight and obesity then is 33.2% to 35.8% in Mexicans adolescents. However, there is still the need of carrying out further research that takes into account the age of the Physical Education teacher, with a greater control of the variables such as stratifying evaluations by gender, number of students per class, physical workspaces, public and private education; also to increase the amount of assessment time, and to use probabilistic sampling in order to obtain extrapolable results.

In summary, results from this didactic experience add a much-needed contribution to our understanding of the intensity of physical activity in physical education lessons of junior high school providing theoretical revision and methodological information on the duration, intensity and context to implement didactic and pedagogical strategies in the students that help to achieve the World Health Organization (WHO) recommendation on the quantity and intensity of physical activity for children and young people.

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