

## Educational training program to increase the moderate to vigorous physical activity index in physical education teachers

### Programa de formación educativa para aumentar el índice de actividad física moderada a vigorosa en profesores de educación física

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**Abstract.** Objective: To design and evaluate a training program to increase the moderate to vigorous physical activity index in physical education teachers. Method: the volunteer subjects participated in the educational training program whose goal was to obtain competences on how to create a pedagogical climate in physical education class oriented to the participation of students in moderate to vigorous physical activity at least 50% of the class evaluated quantitatively using the system for observing fitness instruction time (SOFIT), during their university studies and when they have graduated as physical education teachers. Results: The physical activity index increased from 36.6% to 61.2%. Conclusions: The application of the program showed effectiveness with didactic strategies to involve the student in moderate to vigorous physical activity as established by the World Health Organization.

**Keywords:** Physical Education, Education, University, Teachers, Physical activity.

**Resumen.** Objetivo: Diseñar y evaluar un programa de formación educativa para aumentar el índice de actividad física moderada a vigorosa en profesores de educación física. Método: los sujetos voluntarios participaron en el programa de formación que tuvo como meta obtener competencias sobre cómo crear un clima pedagógico en la clase de educación física orientado a la participación de los estudiantes en actividad física moderada a vigorosa por lo menos el 50% de la clase evaluado de manera cuantitativa mediante el sistema para observar el tiempo de instrucción de actividad física (SOFIT), durante sus estudios universitarios y al ser egresados como profesores de educación física. Resultados: el índice de actividad física se incrementó de 36.6% a 61.2%. Conclusiones: La aplicación del programa mostro efectividad 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, Educación, Universidad, Profesorado, Actividad Física.

#### Introduction

On a global scale, basic education has been identified as an area of opportunity to promote an active and healthy lifestyle from an early age (Kim, 2012; Marques et al., 2016). Due to its broad coverage, it comes as an ideal medium for the promotion and development of positive attitudes and healthy habits, which serve as a basis for children and adolescents to adopt an active lifestyle as adults and to prevent future sedentary diseases related to lifestyle (Lonsdale, et al., 2013; Langford, et al., 2015), reducing high costs in the treatment of chronic non-communicable diseases and improving their quality of life (Kim, 2012). Given that, of the energy expenditure components, physical activity is the only one that can be voluntarily modified (Honas, et al., 2008), physical education sessions within school settings are the ideal space to encourage the practice of physical activity (Kanters et al., 2015). Due to the fact that the pedagogical approach in physical education involves movement with effort and intensity that sometimes corresponds to moderate to vigorous physical activity, which is identified as one that requires an energy expenditure between 3 to 6 MET (metabolic equivalents). The intensity of physical activity is defined as the speed or magnitude of the effort required to perform an energy expenditure through the musculoskeletal system, it is determined in relation to the energy expenditure and physical effort against any resistance, making work on the body difficult for a determined period of time (Honas, et al., 2008). Physical education sessions, when applied by

teachers, must establish pedagogical and physical effort actions that involve students in fun, and enjoyable activities that induce the practice of extracurricular physical activity (Shilton, 2008; Lonsdale, et al., 2013). Although the intensity, energy expenditure, and physical exertion of physical activity are not the only factors to assess the teaching of physical education according to internationally established standards by the National Association for Sport and Physical Education (NASPE), physical education sessions taught by teachers must be designed in a way in which students participate in activities that have at least a moderate to vigorous intensity above the 50% of the session time, that is, that they are active with an energy expenditure similar to walking or running (Banville, 2006; NASPE, 2009).

Studies that have evaluated the perception exertion in physical education classes in elementary and secondary school concluded that the curricular guidelines concerning the time allocated regarding real time is not enough to reach the minimum time of thirty minutes necessary to achieve health benefits (Hall-López, 2020a; Ochoa-Martinez, et al., 2020). There are different tools to assess physical activity within the school environment through the use of questionnaires, equipment, or instruments of observation, (McKenzie, & van der Mars, 2015). In Mexico, the research has been performed in public and private primary schools to evaluate the duration, intensity and context of physical education sessions using the system for observing fitness instruction time SOFIT (McKenzie, Sallis, & Nader, 1992). When reviewing the state of the art research performed on elementary school students in Mexico, it is mentioned that the intensity of moderate to vigorous physical activity during the time dedicated to physical education classes was 38.2% in a sample of 1,007 students enrolled in the third and fourth

grades of primary school in the city of Chihuahua, whose age ranged from 8 to 10 years, being higher in boys (42.2%) than in girls (36.8%) (Pérez Bonilla, 2009), another research performed with a sample of 12 schools in Mexico City, with fourth and fifth grade elementary students reported 29.2% of moderate to vigorous intensity during physical education class (32.1% in boys vs. 25.7% in girls). Similarly, within these results, it was found that when evaluating through the system for observing fitness instruction time, children in recess autonomously, without any teacher instructions, carried out physical activity with a moderate and vigorous intensity of 40% (43% in boys vs. 36% in girls) (Jennings-Aburto, et al., 2009), which was higher than in the physical education classes implemented by physical education teachers by 29.2% (Jennings-Aburto, et al. 2009). In both studies, according to gender, moderate to vigorous physical activity results were higher in boys than in girls.

Regarding the context of the physical education session, a lack of opportunities of implementing teaching material, a large amount of time in which the students remained standing still while the teacher organized the group to participate in, long lines to have the opportunity to participate, and the transition times between activities, which were very long, were perceived (Pérez Bonilla, 2009, Jennings-Aburto, et al., 2009). According to the evaluation by the system for observing fitness instruction time, these results are attributed to the fact that didactic strategies implemented by teachers significantly took the greatest amount of time, being spent in administering and organizing the activities related to instructions, such as team building, changing teams, or changing activities within class, and not maximizing the time in activities in motion (Pérez Bonilla, 2009). On the other hand, within the Mexican context, the duration of physical education sessions is established at 50 minutes, but when evaluated in the aforementioned research, the average duration was of 37.3 minutes (Pérez Bonilla, 2009) and 39.8 minutes (Jennings-Aburto, et al., 2009).

Based on a socio-ecological model, there are multiple environmental factors that can determine the intensity of students' physical activity during a school day. Cross-sectional and longitudinal research suggest that these factors are: teacher training, group size, students' age, schedule, material, instruments and facilities of the school center, duration of classes (Skala, et al., 2012; Brooke, et al., 2014; Hollis, et al., 2016) educational model and particular school context in the educational process of each country (McKenzie & van der Mars, 2015) and the active lifestyle that the student leads in his family environment being very important (McKenzie, et al., 2008; Retamal-Valderrama et al., 2018; Gois et al., 2020).

The educational training program to increase the moderate to vigorous physical activity index in physical education teachers. (PFEIAFEF by its Spanish acronym: Programa de formación educativa para aumentar el índice de actividad física moderada a vigorosa en profesores de educación física), was based on previously described programs regarding the training of physical education teachers with the aim of designing their classes so that students participate in activities that have at least a moderate to vigorous intensity above 50% of session time (McKenzie, et al., 2001). The

training program was designated as CATCH Coordinated Approach to Child Health, conducted by a research team from four universities (University of California at San Diego, University of Minnesota, Tulane University and University of Texas Health Science Center at Houston) CATCH has been extensively evaluated in more than 80 scientific publications, a longitudinal research that covered 96 schools (56 of intervention and 40 of control) in four states of the United States (California, Louisiana, Minnesota and Texas) and included around 5,100 3rd to 5th grade students from various ethnic and cultural groups. When applied in schools, CATCH had many components for health promotion, which were coordinated throughout years, designing a program to decrease fats, saturated fats and sodium in children's diets, increase physical activity and prevent smoking, involving in four components of the curriculum: food services, physical education and family and community environment (Perry, et al., 1990), the CATCH program had positive results in at least producing changes in diet and behavior related to physical activity, the students who participated in CATCH consumed less fats and participated in more physical activities outside of school; 3 years after the intervention, sustainability was shown when observing that the low consumption of fats and high levels of physical activity were greater in the participating students in relation to the control group (Osganian, Parcel, & Stone, 2003), enabling its implementation as a public health policy in the school environment in some states of the United States (Heath, & Coleman, 2003).

Regarding the physical education component of the CATCH program, modifications were included in the physical activity environment, which were focused on physical education being provided 5 times a week and, as previously mentioned, physical education teachers were trained so that students could participate in moderate to vigorous physical activity for at least 50% of class time (Kelder, et al., 2003), the duration of the training program was of 2.5 years, training teachers in an experimental group and assigning teachers without training in a control group. 2096 physical education classes were evaluated by the system for observing fitness instruction time SOFIT, with the result that the teachers of the experimental group promoted more in students a moderate to vigorous physical activity than the schools in the control group ( $P=.002$ ). On the other hand, at the beginning of the training, the moderate to vigorous physical activity intervention in schools increased from 37.4% at the beginning to 51.9% at the end of the program. (McKenzie, et al., 2001). Similarly, during this intervention, the participating students improved their aerobic capacity in the 9-minute running test ( $P=.21$ ), they ran 18.6 yards more than the children in the control group, in the same way, the children in the intervention group reported 12 min. more vigorous daily physical activity ( $P=.003$ ). However, no significant effects on the body mass index and body fat were seen. (Perry, et al., 1990).

Therefore, the importance of the professional competencies of teachers in physical education to address this problem represents a challenge for educational institutions that develop human resources in the area of physical culture in Mexico, consequently, the professional profile must determine knowledge and skills for a practice in which to be applied in the educational context is considered

a responsibility and a function, aiming to solve problems to improve the health of our society and prevent sedentariness, as is recommended by the Mexican Association of Higher Institutions of Physical Culture (AMISCF, by its Spanish acronym). Similarly, the physical education program with a competency-based approach of the Secretariat of Public Education (SEP) in Mexico, promotes a pedagogical intervention, which extends as a social and humanistic practice, which stimulates the experiences, actions and motor behavior of students expressed through intentional forms of movement; favoring the motor experiences of children, their preferences, motivations, hobbies and movement needs, channeled of students in the school courtyards and designated areas of each school in the country and in all the activities of their daily life, linking activities such as the enjoyment of free time, promotion of health care, school sports activities and pedagogical demonstrations of physical education.

Physical educators are positioned to be the strongest advocates for a healthy and active lifestyle, effectively promote physical activity in schools, and encourage it in communities beyond school installations (McKenzie, et al., 2007). Physical educators will need to develop skills that are not usually acquired in undergraduate programs, reason for which in-service staff development and training programs are important, so they can continually be trained and play an important role in promoting physical activity for health. (Kanters, et al., 2015).

## **Methodology**

### ***Participants***

The present research was performed under a quantitative longitudinal methodological design with a non-probability sampling for convenience; additionally, in the last phase, this last phase of the research was qualitatively evaluated cross-sectionally (Thomas, Nelson, & Silverman, 2015). The study was approved and founded by the Autonomous University of Baja California, protocol number 149/2/C/5/21.

Under the auspices of the results of the CATCH programs and under the same premise, the following proposal was made; designing the Educational Training Program Aimed at Increasing Intensity in Physical Education, which we established with the acronym PFEIAFEF. In order to verify that students learn through assistance, it will be evaluated during the process in a diagnostic, formative and summative manner (Bordas, & Cabrera, 2001) through the system for observing fitness instruction time (SOFIT) which will be detailed later in the instruments section. The participants of the program were students from the 5th semester of the disciplinary stage of the Bachelor's degree in Physical Activity and Sport educational program of the Faculty of Sports at the Autonomous University of Baja California who took part in the Evaluation of Physical Activity and Sport learning unit, subsequently, in the terminal stage of the degree, students interested in continuing to develop their competencies associated with this profile and continuing in the PFEIAFEF, joined the basic educational sector to perform their unpaid internship or social service, and during this stage, they were evaluated using SOFIT to determine the medium-

term maintenance effect of the program. After receiving their bachelor's degree in physical activity and sport, the students who have graduated participating in the PFEIAFEF who work in the field of public basic education who obtained a work position through the concurso de oposición ordinario para el ingreso a la educación básica (public entrance examination for the entry to basic education) by the sistema nacional de registro del servicio profesional docente (national registration system for the professional teaching service) of the Secretariat of Public Education in Mexico, in the City of Mexicali, Baja California were asked to consent to be evaluated in real-life situations as physical education teachers and to know the long-term maintenance effects of the program, they were also asked through an interactive verbal meeting as an interview of sorts their perspectives related to their participation in the PFEIAFEF with regards to their training in the disciplinary stage, received training, observation through SOFIT, and observation of videos.

### ***Procedures***

Taking into account the above, the procedures of the PFEIAFEF are presented below with their approach phases that involve 4 stages:

- 1.-Disciplinary training as students of the degree.
- 2.-Maintenance of the program's effects in the short term as a degree student linked to the basic education system.
- 3.-Maintenance of the program's effects in the short term as a student who has graduated and as a physical education teacher in the basic education system.
- 4.-To know by way of interview the perspectives as a student who has graduated and as physical education teacher in the basic education system having participated in the PFEIAFEF.

#### ***1.-Disciplinary training as a degree student***

This initial phase began when students were in the disciplinary stage of the educational program of a bachelor's degree in physical activity and sport of the Faculty of Sports at the Autonomous University of Baja California, studying in the 5th semester the compulsory learning unit of 6 credits Assessment of Physical Activity and Sport, where the goal is for the student to obtain the following skills in unit 2.

- 1.-Analyze the Evaluation in Physical Education theories, based on the principles of movement to determine the criteria of methodological intervention in the different age types, with a critical, objective and responsible attitude;
- 2.-Apply the technical evaluation procedures of PE through the use of the System for Observing Fitness Instruction Time SOFIT, to improve the way in which physical education classes is taught by the teacher at different stages of basic education, with an objective, responsible and respectful attitude.

The PFEIAFEF program covered unit 2 of the learning unit consisting of 10 sessions of 2 hours, using different strategies and sports teaching material to teach physical education classes; computer, projector, stopwatch, mp3 player, speakers, articles, bibliography referring to the topic and a video camera to record physical education classes and use it in the assessment process. On the other hand, in order to meet part of the UABC educational model, practices with

content linked in the educational sector with real learning scenarios where students performed an evaluation to a physical education teacher in service, and subsequently taught a class of physical education with students in a real environment in an educational center.

The strategies and content addressed during this phase are explained as follows:

§ Diagnostic evaluation corresponding to session 1 and 2.

-Corresponds to the first two sessions of the training program. A diagnostic evaluation where the student was required to plan and design a physical education class for the fourth grade of basic education, to be later taught by classmates was performed.

Description: The place where the class was held was in the sport installations of the Autonomous University of Baja California, the physical education class was recorded with a Sony camera, having it as a repository in an MPG File (MPG) quality was sought through the use of shots and visually attractive angles that favor identifying critical aspects of the planning and execution of intentional physical education by identifying the series of didactic strategies and tasks that promote movement, the video format was downloadable for its reproduction and used as a didactic strategy and to be observed in training sessions and to also be able to determine the rate of moderate to vigorous physical activity in the diagnostic evaluation and physical education classes taught by students and compare it with previous studies performed in Mexico and the recommended by international standards.

§ Content and learning strategies PFEIAFEF corresponding to session 3 and 4.

-Introduction of the system for observing fitness instruction time (SOFIT).

Description: By way of introduction, the background of the instrument, its validity, reliability, as well as the results and benefits of its previous application in the field of physical education were described. Other training strategies were also performed, such as reading and commenting on specific bibliography. (Banville, 2006; Pérez Bonilla, 2009; Jennings-Aburto, et al., 2009; NASPE, 2009).

-Methodological procedures for the evaluation of intensity in physical education through (SOFIT)

Description: Conceptualize the decision phases when evaluating intensity, describing the five codes to classify activity levels, which would allow to calculate the energy expenditure associated with physical activity.

-Analysis and calculation of results and determination of the index of vigorous moderate physical activity

Description: Describe the quantification of moderate to vigorous physical activity based on the quantification of these codes, adding percentage codes, according to the duration in minutes of the physical education case, and compare it with previous studies performed in Mexico.

-Determine the index of moderate to vigorous physical activity in the diagnostic evaluation.

Description: utilizing the personalized diagnostic video as a didactic strategy and for feedback, identifying the duration of the physical education class and comparing it with the national standards of the Secretariat of Public Education of Mexico. Identify if physical education classes

involve students in moderate to vigorous physical activity at least 50% of the class, with many opportunities to practice their skills, promoting fun and adherence, emphasizing cooperation and teamwork, following the didactic recommendations established by international standards such as the National Association for Sport and Physical Education (NASPE).

§ PFEIAFEF content and learning strategies corresponding to session 3 and 5.

Methodological procedures for the evaluation of context and the behavior of the physical education teacher through SOFIT. It was sought to conceptualize the decision phases when evaluating the context, describing the seven codes to identify the contents and the six codes to identify the behavior of the teacher who directs the physical education class. Analysis and calculation of the results and determination of the temporal percentage from the quantification of these context codes and the teacher's behavior.

Description: Giving continuity to the visualization of the diagnostic evaluation, a self-reflection and search for own solutions were performed by the physical education teacher, under the supervision of the teacher in the learning unit evaluation of physical activity to establish a pedagogical intervention that addressed effective planning to manage the tasks in class with clear and simple instructions, active supervision, having material, avoiding long lines, avoiding elimination and limiting competition, using short games, avoiding focusing on the most outstanding, having as a conclusion making recommendations and teaching strategies for teaching physical education classes with moderate to vigorous intensity for at least 50% of class time.

§ Formative Assessment corresponding to session 6 and 7.

The same procedures were used as in the diagnostic evaluation section, but for the formative evaluation, it was sought to know if the competencies are being achieved.

Description: As reinforcement for worked on content, and using the formative video as a didactic strategy, they were analyzed in a personalized manner with video feedback, identifying whether the duration of physical education classes and whether students conduct classes with pedagogical elements of teaching support recommended in the CATCH program for this second evaluation to teach physical education classes with international standards such as the National Association for Sport and Physical Education (NASPE) determining the moderate to vigorous physical activity index to compare it with the diagnostic evaluation by SOFIT, therefore, physical education class was again given, determining the moderate to vigorous physical activity index.

§ Practice in a real evaluation environment to a physical education teacher in service, corresponding to session 8 and 9.

-Formally, inter-institutional collaboration was requested between the UABC Faculty of Sports and a basic education institution of the Secretariat of Public Education.

Description: Through the school principal, the students of the Degree in Physical Activity and Sport were authorized to perform practices of the Evaluation of Physical Education

subject by teacher, in a SEP Primary School, this as part of the evaluation actions of said subject when linking with previous educational sectors to apply the contents of unit two and related to the PFEIAFEF, which consisted of performing an evaluation through SOFIT to a physical education teacher. Subsequently, the students quantified the moderate to vigorous physical activity index and constructively identified which teaching strategies of that class favored it in terms of intensity, context and teacher behavior.

§ Formative Assessment corresponding to session 8 and 9.

-The same procedures utilized in the diagnostic and formative evaluation section were utilized again, where students taught, and videotaped a physical education class, but in order to certify that the competences were achieved in a real environment, again with inter-institutional collaboration between the Faculty of Sports of UABC and an institution of basic education of the Secretariat of Public Education, so that students can teach physical education class.

Description: As reinforcement of the worked on content, and using the formative video as a didactic strategy, they were analyzed in a personalized manner with video feedback, identifying whether the duration of the physical education class and whether students conduct classes with pedagogical elements of teaching support recommended in the CATCH program to teach physical education classes with international standards such as the National Association for Sport and Physical Education (NASPE) determining the moderate to vigorous physical activity index to compare it with the diagnostic evaluation by SOFIT.

§ Seminar of learning experiences in real environments corresponding to session 10.

-In order to learn the experiences of a real environment situation, the goal is to know the perceptions of the students.

Description: For this activity, according to their professional criteria, they were asked two questions: Educationally speaking, how do you consider the evaluated physical education class? Constructively, if you were the teacher, how would you have taught the class? For the above, they will be asked to write the answers and then explain them, for which they will be videotaped and will also need to possess qualitative elements of the experiences of the students participating in PFEIAFEF.

*2.-Maintenance of the effects of the short-term program as a degree student linked to the basic educational system*

-Once the Evaluation of Physical Activity and Sport learning unit is completed by the students of the degree in physical activity and sport of the Faculty of Sports School at the Autonomous University of Baja California. It was sought in a second phase of the process to give continuity to the PFEIAFEF by inviting those who intend to dedicate and specialize themselves in physical education in the long term, to apply this knowledge by linking to basic education through their unpaid internship, which will be performed on a compulsory basis with 10 credits in the terminal stage of their studies, for this, the inclusion criteria was that the participant have had a qualification of excellence in the Evaluation of Physical Activity and Sport learning unit.

Description: For this, the corresponding rules established by the coordination of vocational training of the UABC Faculty of Sports were followed to assign and teach physical education classes for a duration of 150 hours, during which the participant agreed to be recorded in three phases (initial, intermediate and final), and evaluated using SOFIT. Following the same methodology previously mentioned, to determine the moderate to vigorous physical activity index to compare it with the diagnostic, formative and summative evaluation, identifying the duration of the physical education class and whether for this second evaluation the students teach the classes with pedagogical elements of teaching support recommended in the CATCH program to teach physical education classes with international standards such as the National Association for Sport and Physical Education (NASPE) to learn about the short-term maintenance of the effects of PFEIAFEF.

*3.-Maintenance of the effects of the program as a student who has graduated and teacher of physical education in the basic education system*

-Long-term maintenance of the effects of PFEIAFEF, was evaluated with SOFIT.

Description: when participants obtain their bachelor's degree in physical activity and sport, for this we will have as inclusion criteria in which participants work as physical education teachers in the field of private compulsory education or have obtained a work position in the concurso de oposición ordinario para el ingreso a la educación básica by the sistema nacional de registro del servicio profesional docente of the Secretariat of Public Education in Mexico, in which they will be asked for formal inter-institutional consent to be video recorded and evaluated through SOFIT and to know the maintenance effects of long term, comparing them with the values in previous phases.

*4.-Know by way of interview the perspectives as a student who has graduated and teacher of physical education in the basic education system by having participated in the PFEIAFEF*

-In addition to the fact that the evaluations through SOFIT allow us in a quantitative manner to know in different phases of the PFEIAFEF, it is intended to qualitatively know and in greater depth the effectiveness of the program when working as a physical education teacher in basic education.

Description: An interview designed and constructed in a structured manner was applied through a verbal meeting where the perspectives related to their participation in the PFEIAFEF can be collected, their usefulness as students who have graduated and during their training in the disciplinary and terminal stage, the observation of the received training is through SOFIT. The interview was video recorded for verbatim transcription, coding, and analysis procedures.

#### ***Instruments***

To assess the moderate to vigorous physical activity index, the System for Observing Fitness and Instruction Time (SOFIT) instrument will be used (Mckenzie, et al., 1992). According to the methodology, this was performed by

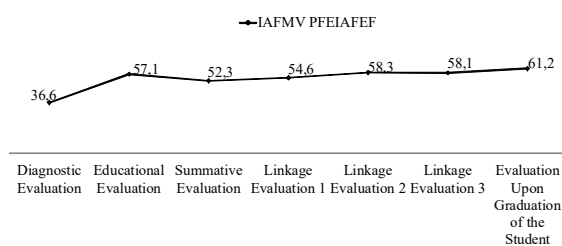
randomly choosing 4 students from each physical education class (2 men and 2 women) who were observed in a rotating sequence of 12 intervals for 20 seconds each, repeating the observations throughout the class, following an audio that will indicate the recording times of the activity. To determine the intensity of the physical education class, codes were utilized to classify the activity levels, which allows us 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 adding percentage codes 4) walking and 5) very active of the total time of the physical education class.

During the investigation 7 evaluations were performed with SOFIT, 1 in the diagnostic evaluation, 1 in the formative evaluation and 1 corresponding to the summative evaluation, 3 evaluations to evaluate the maintenance in the training phase during linkage and 1 last as a teacher of physical education upon graduation.

Statistical analysis was performed using Excel software, determining with percentage descriptive statistics the index of vigorous moderate physical activity during the 4 phases of the program and processing it as a figure.

## Results

The research evaluated the index of moderate to vigorous physical activity in physical education classes of students in training for the physical activity and sport bachelor's degree who met the training inclusion criteria of this training research. The participants were 2 males with an average age of 21 years and currently with a year in the education system. Data for the moderate to vigorous physical activity index during the PFEIAFEF phases is shown below in Figure 1.



**Figure 1.** Percentage distribution of the moderate to vigorous physical activity index IAFMV (by its Spanish acronym) of the physical education classes taught by the participants.

**Note:** IAFMV by its Spanish acronym=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 taught by the participants evaluated through the system for observing fitness instruction time SOFIT; (McKenzie, et al., 1992).

## Discussion and Conclusion

In the Mexican education system, compared to other international contexts, the intensity of physical activity is not a determining factor to assess the educational process and health of children at school (Banville, 2006, NASPE, 2009), even though the 2017 physical education study program assumes among its objectives the placement of health as an important element, in the same way, with the

intention of guaranteeing a healthy approach to physical education, UNESCO recommends addressing elements age-appropriate for children that promote adaptations that help decrease sedentary lifestyle. (UNESCO, 2015), in this sense, the results of the present study reflect a physical activity proportional to the training provided to teachers from their training stages of the degree, on the other hand, it is understood that there are multiple environmental factors that can determine the intensity of physical activity and energy expenditure of students in physical education (Skala, et al., 2012; Hollis, et al., 2016). However, when analyzing results of studies with similar methodological procedures using SOFIT as an evaluation instrument performed in Mexico, the results found in this research evaluating teachers' way of teaching physical education class in a traditional way, as an example, we can find what was evaluated for third and fourth grade students of primary school in Chihuahua, where more moderate to vigorous physical activity is reported in boys (42.2%) than in girls (36.8%) (Pérez Bonilla, 2009). Another research performed in Mexico City in fourth and fifth grade students of primary school reported a moderate to vigorous intensity during physical education class of 32.1% in boys and 25.7% in girls (Jennings-Aburto, et al., 2009). Another reference of third and fifth grade students from primary school in Mexico City showed a moderate to vigorous physical activity index of 44% in boys and 38% in girls (Gharib, et al., 2015), thus, it is confirmed that although physical education classes are designed and planned based on the guidance of an education program, there are factors that promote greater movement in male students. On the other hand, it stands out that, when analyzing the percentages of moderate to vigorous physical activity during physical education class, international standards established by NASPE were not met, with students participating in moderate to vigorous intensity for at least 50% of class time in physical education (Banville, 2006), the results in our study corroborate the research of the CATCH program where teachers were trained so that students participate in moderate to vigorous physical activity at least 50% of class time (Kelder, et al., 2003), the duration of the Training program was 2.5 years increasing from 37.4% at the beginning to 51.9% at the end of the program. (McKenzie, et al., 2001).

The relevance of energy expenditure in physical activity as a factor associated with health recommended by the WHO and dietary and physical activity guidelines in the context of overweight and obesity in the Mexican population does not differentiate gender, that is, it recommends that both boys and girls equally accumulate 60 minutes of daily moderate to vigorous physical activity (Hall-López et al., 2017; Hall-López, et al., 2018; Hall-López, 2020b). As a conclusion, continuous and permanent training provides teachers with didactic strategies and content that involve students of both genders in movement, thus promoting quality physical education established by UNESCO (Piña Díaz et al., 2020).

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