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Analysis of step frequency as an indicator of physical activity in Ecuadorian schoolchildren

Análisis de la frecuencia de pasos como indicador de actividad física en escolares ecuatorianos

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Abstract

The pedometer is considered an effective tool for the control and measurement of physical activity, becoming a motivating tool to increase the number of steps in children and adolescents. The objective of this study is to analyze the differences in the physical activity of Ecuadorian schoolchildren, through the measurement and control of the frequency of steps taken during the course of a day; considering gender, age, presence or absence of Physical Education class and the current recommendations of steps/day. The sample consisted of 50 schoolchildren (27 males and 23 females, mean ± standard deviation: 1.46 (+0.5), first year high school students of the "Don Bosco La Tola" Educational Center in Quito-Ecuador. An Omron HJ-152-E pedometer was used; analyzing the young people in terms of compliance with the established recommendations (11,000 steps/day). Descriptive analysis was performed, as well as frequency analysis, to see if there were significant differences, the T-student test was performed for the variables of gender, age and paired data. The results show that adolescents comply with the minimum recommendations when they take Physical Education classes (Day+PE1= 11.067 s/d and Day+ PE 2= 11.413 s/d); evidencing the need to propose strategies to promote physical activity on days when Physical Education classes are not taken.

Key words

Physical education; physical activity; number of steps; schoolchildren; health promotion.

Resumen

El podómetro es considerado una herramienta eficaz, para el control y medición de la actividad física, transformándose en una herramienta motivadora para el incremento del número de pasos en niños y adolescentes. El objetivo de este estudio es analizar las diferencias en la actividad física de los escolares ecuatorianos, a través de la medición y control de la frecuencia de pasos realizados en el transcurso de un día; considerando para ello género, edad, presencia o ausencia de la clase de Educación Física y las recomendaciones actuales de pasos/día. La muestra estuvo compuesta por 50 escolares (27 hombres y 23 mujeres, media ± desviación estándar: 1,46 (±0,5), alumnos de primero de bachillerato del Centro Educativo “Don Bosco La Tola” de Quito-Ecuador. Se utilizó un podómetro Omron HJ-152-E; analizando a los jóvenes en función del cumplimiento de las recomendaciones establecidas (11.000 pasos/día). Se realizaron análisis descriptivos, así como análisis de frecuencias, para ver si existían diferencias significativas, se realizó la prueba T-student para las variables de género, edad y datos emparejados. Los resultados muestran que los adolescentes cumplen con las recomendaciones mínimas cuando realizan las clases de Educación Física (Día+EF1= 11.067 p/d y Día+EF2= 11.413 p/d); evidenciándose la necesidad de plantear estrategias para promover la actividad física en los días que no se realiza la clase de Educación Física.

Palabras clave

Educación Física; actividad física; número de pasos; escolares, promoción de la salud.

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Introduction

Sedentary lifestyles have reached 60% of the world's population, occupying an important place among public health problems due to the increase in non-communicable diseases (WHO, 2010). In this sense, the current theoretical framework establishes the relationship between physical activity and quality of life. It demonstrates that the regular and systematic physical practice is beneficial for the prevention of diseases, in addition to the development and rehabilitation of health. Physical activity becomes a way to build character, discipline, decision-making capacity and compliance with rules; favouring the development of people in all areas of life (Valenzuela, Salazar, Ruíz, Lomeli & Perkins, 2018).

The World Health Organization (WHO) recommends that children and adolescents should engage in at least 60 minutes of physical activity per day, including activities such as: walking, recreational activities, Physical Education (PE) lessons, among others (WHO, 2010; Victo et al., 2021); these activities should be included in the family context, school and community activities, with the aim of reducing non-communicable diseases and improving cardiorespiratory and muscular functions, bone health and psychosocial aspects (Tanaka, Hikihara, Inoue & Tanaka, 2019).

To clarify the above, the documentary analysis mentions that, in school physical activity, boys participate more in competitive activities, while girls are more inclined to cooperative activities, generating therefore a greater energy expenditure on the part of boys (Rodríguez-Fernández, Rico-Díaz, Neira-Martín & Navarro-Patón, 2020). Educational centres have been identified as the place where students spend most of their time; however, a large proportion of this time is spent sitting down, which generates high levels of sedentary lifestyles.

Among the main alternatives available to these education centres for engaging in physical activities are Physical Education classes, school breaks and extracurricular activities, so a correct organisation and planning of the spaces and times for these activities could help to achieve compliance with the daily physical activity recommendations (Calahorro-Cañada et al., 2014;

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Muñoz, 2016). On the other hand, technological development has favoured an increase in sedentary lifestyles, which has led to a change in lifestyles, especially among adolescents (Tonosaki, Rech, Mazo, Antunes & Benedetti, 2018). However, these technological advances have also brought about positive changes, especially in relation to the development of instruments for measuring and monitoring physical activity and health (Bortolozo, Santos, Pilatti & Canteri, 2017). In this sense, the development of the pedometer has contributed to objectively determine physical activity levels by monitoring the number of steps (Edwardson, Davies, Khunti, Yates & Rowlands, 2018; Sánchez-Baño, Visiedo & de Baranda, 2018).

Current studies indicate that the recommended number of steps for children and adolescents varies between 11,000 and 16,500 per day (s/d), with higher indicators for males than for females (Beets, Bornstein, Beighle, Cardinal & Morgan, 2010; Fukushima et al., 2016; Grao-Cruces, Moral-García & Martínez-López, 2014; Victo et al., 2021). In relation to the above, we should mention that, although this instrument utility focused more on a clinical and public health studies, it is also being used by educational institutions, mainly due to its low cost and ease of data interpretation (Tudor-Locke et al., 2011; Peters, Wong & Sanchez, 2020).

In education, the pedometer has been used as an effective tool for monitoring and measuring physical activity, becoming a motivational instrument for increasing the number of steps in children and adolescents (Grao-Cruces, Ruiz-López, Moral-García, Ruiz-Ariza & Martínez-López, 2016; Scott, 2020). Evidence shows increases of between 2071 and 4141 s/d, among those who have been monitored (Grao-Cruces et al., 2014; Tudor-Locke et al. 2011). The research carried out by Sánchez-Baño et al. (2018), in Murcia-Spain, aimed to measure the amount of physical activity performed in Physical Education sessions, which resulted in an average of 3318 s/d (3467.3 s/d in boys and 3107.2 s/d in girls), in a 55-minute class time. Of the total sample, only 20.1% and 28.85% respectively, met the quantity recommendations (11000 to 16500 s/d), concluding that the time of a Physical Education class is not enough to generate beneficial activity and vitality in the student's health. In the same vein, Lubans, Morgan & Tudor-

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Locke (2009b) concluded that the use of pedometers for four weeks with students in educational institutions was beneficial for increasing physical activity, mainly among the least active.

On the other hand, the educational programme to prevent excess of body weight in adolescents (ADOS) achieved a substantial increase in the number of steps taken during the day by using the pedometer as motivation and control to prevent sedentary lifestyles (Edwardson et al., 2018). Finally, the study developed by Lubans, Morgan, Callister & Collins (2009a), determined an increase of 1000 steps per day, after implementing a ten-week programme, with the use of pedometers. This study included information on the need for physical activity, in addition to some nutritional recommendations that were included in this intervention.

In the Ecuadorian educational context, one of the main drawbacks for the use of this instrument is the lack of knowledge about its field of application and limitations; considering irrelevant the use of the pedometer as a tool for measuring and promoting physical activity (Coffman, Reeve, Butler, Keeling & Talbot, 2016; Grao-Cruces et al., 2016). Moreover, most of the evidence has been derived mainly from self-report instruments (Chandia-Poblete, Cortinez-O'Ryan, Ulloa-Lopez & Aguilar-Farias, 2019). For this reason, the aim of this study is to establish and analyse the existing differences in the physical activity of Ecuadorian schoolchildren, through the measurement and control of the frequency of steps taken during the course of a day; considering gender, age, presence or absence of Physical Education class and the current frequency recommendations (s/d).

Methodology

Participants

For this descriptive study, a within-subjects or repeated measures experimental design was implemented. We analysed the differences, according to gender and age, in the number of steps that the participating schoolchildren from the city of Quito took on a normal day and on days when Physical Education class was included, controlling for compliance with the s/d frequency recommendations.

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The sample consisted of 50 students between 15 and 16 years (mean + standard deviation 15.2+0.4) belonging to the first year of *bachillerato* of "Don Bosco" educational centre located in the city of Quito-Ecuador. Of the total number of participants, 27 were male and 23 were female. The socio-demographic characteristics are presented in table 1. A convenience sample was carried out and the participants were selected on the basis of the following inclusion criteria: students of 1st year of *bachillerato* and determined age range. With regard to the exclusion criteria, those students without authorisation to participate were withdrawn from the study. Personal data were coded in order to safeguard the identity of the participants, and were treated confidentially and only for scientific purposes, respecting the ethical considerations for human studies set out in the Declaration of Helsinki (2008).

Table 1. Descriptive values of the sample

	n (%)	Mean ± Standard deviation (SD)
Sample	**50 (100)**	
Gender		
men	27 (54)	------
women	23 (46)	
Age (years old)		
15	40 (80)	15,2±0,4
16	10 (20)	

Materiales e Instrumentos

Sex and age were used as independent variables. Likewise, the quantification of s/d, with/without inclusion of the PE classes was used as dependent variable. The instrument used for the step count assessment was the Omron HJ-152-E pedometer (Omron, Hoofddorp, Holland), a digital device that shows and records the oscillation originated by each step; it is also manipulable, light, lightweight and allows to store in its memory the values collected during one week. The validity and reliability of this tool is justified by a correlation of r = 0.90 ($p<0.01$)

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(Coffman et al., 2016; Grao-Cruces et al., 2014); verified with similar pedometers and contrasted with more advanced, accurate and expensive technological instruments (Edwardson et al., 2018; Fukushima et al., 2016; Husted & Llewellyn, 2017).

Procedimiento

Prior to the start of the study, authorisation and consent was requested from those in charge of the educational institution. Since the participants were minors, written permission was required from their representatives or guardians - in order to inform them of the actions and objectives - and they signed to authorise their participation in the research. All procedures were in accordance with the Declaration of Helsinki. The researchers carried out the following actions prior to the start of the study: they explained the objectives of the research to each of the participants, carried out a familiarisation stage (two days), explaining in detail and demonstrating the technique for using the instrument, verifying its correct execution, meaning the autonomous and error-free use of the different options allowed by the pedometer. The data collection lasted for three days in order to record the s/d values on days with and without the Physical Education sessions. The students had to attach the pedometer to their waist with a woollen cord throughout the day, except for sleep and personal hygiene time; due to the device's internal clock, it was reset to 'zero' after midnight. The recording of the number of steps during PE lessons included the lessons of "Volleyball and Strategy Games" units (Appendix 1 and 2). The recording of the number of steps included one day without PE lessons (normal day) and two days when, according to the academic timetable, they had PE lessons (day + PE). The recording of the number of steps was carried out before the start of the session and after the end of the session, and was subsequently organised as follows:

- Initial part: the students, with the pedometers placed autonomously, performed joint mobility and several dynamics of the class topic with a duration of 10 minutes.
- Main part: in this part of the session the objective of the programmed class "Volleyball and Strategy Games" was carried out, lasting 35 minutes (Appendix 1 and 2).

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- Final part: in this last part, flexibility and stretching exercises were carried out with a duration of 5 minutes.

For monitoring with the pedometer (Omron HJ-152-E), each participant was provided with a note sheet to record the number of steps recorded by the device. The physical activity determined by the pedometer was considered valid if the participant wore the device for at least 10 hours each of the days of the investigation. The steps were summarised as total steps in the Physical Education sessions and total steps per day, and then a sum of both. For the setting and recording of the number of steps, the time, weight and stride length were set to avoid counting steps that were not part of a walk, and the unit did not show the step count for the first four seconds of the walk. If you continued walking for more than four seconds, the device counted the steps of the first four seconds and then continued counting.

Statistical analysis

For the coding and respective statistical analysis of the data, it was used the IBM SPSS v.24.0. Statistics (IBM Corporation, USA) for Windows. First, a descriptive analysis was carried out using the mean, standard deviation, minimum, maximum, as well as frequency analysis. Subsequently, and with the aim of being able to compare the mean values between the different variables under study, the normality of the data was checked, for which the T-student test was used for independent samples (sex and age variables) and for paired data, of the number of steps at a general level. The level of statistical significance was set at $p<0.05$.

Results

According to sex, the average number of daily steps on the days analysed was 10,830+3,814 and the average number of steps in the Physical Education sessions was 2,302+563. Table 2 shows that on the three days analysed, males performed an average of (11,896+3,583) s/d and females (9,473+3,531) s/d, and there were statistically significant differences between them:

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1) Normal day (p=0) 2) Day + PE1 class (p=0.024)

On the other hand, in the Physical Education sessions, boys took more steps (2,502+596) than girls (2,069+422). Also, in both sessions, there were statistically significant differences according to sex.

1) PE1 (p=0.006) 2) PE2= (0.005)

Finally, there were no significant differences according to age, with the highest number of steps performed by 15-year-old students relative to 16-year-old students on Day+PE2 (11,443+3,581 s/d and 11,291+3,801 s/d respectively).

Table 2. Means, standard deviations and comparative s/d and number of steps in the PE sessions according to sex and age.

Day	Male	Female	Total	Minimum	Maximum	p(M-F)
Normal day	11.872±3.327	7.827±2.814	10.011±3.685	4.335	17.839	0
Day + PE1	12.284±3.997	9.638±3.989	11.067±4.171	2.262	21.028	0,024
Day + PE2	11.802±3.426	10.956±3.791	11.413±3.586	4.104	21.556	0,411
Media	11.896±3.583	9.473±3.531	10.830±3.814	3.567	20.141	
Sesión						
PE 1	2.089 ±404	1.793±314	1.952±391	1112	3128	0,006
PE 2	2.915±788	2.345±531	2.653±734	1522	3946	0,005
Media	2.502±596	2.069±422	2.302±563	1.317	3.537	
Day	**15 years old**	**16 years old**				
Normal day	9.870±3.877	10.575±2.887	10.011±3.685	4.335	17.839	0,593
Day + PE1	11.175±4.250	10.634±4.021	11.067±4.171	2.262	21.028	0,718
Day + PE2	11.443±3.581	11.291±3.801	11.413±3.586	4.104	21.556	0,906
Media	10.829±5.903	10.834±3.570	10.830±3.814	3.567	20.141	---

Table 3 shows statistically significant differences (p=0.025) between Normal Day (10,011+3,685) and Day + PE2 (11,413+3,586), in the other groups analysed there were no significant differences.

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Table 3. Student's t-test of paired data of the number of steps at the general level.

Comparison according to number of steps/day	Media	p (a-c)	p (a-b)	p (b-c)
a) Normal day	10.011±3.685	---	0,152	---
b) Day + PE1	11.067±4.171	---	---	0,582
c) Day + PE2	11.413±3.586	0,025	---	---

Discussion

This study analysed the differences found in the frequency of steps/day, between males and females, age range and between Physical Education sessions, in students at a school in Ecuador. The programme had a high level of adherence, with no harmful health outcomes or injuries attributable to the programme intervention.

After statistical analysis, on days with/without PE sessions, the results showed an average of 10,830 s/d per class session, showing that the average number of steps does not reach the minimum recommended level per day for children and young people (11,000 to 16,500 s/d) (Beets et al., 2010). Our results are supported by Miguel-Berges, Reilly, Aznar & Jiménez-Pavón (2018), in which they state that the data obtained for the number of steps were not representative, due to the fact that their study population, apart from performing activities linked to walking, performed static physical activities, since the programme unit corresponded to a sport of low mobility and high reaction speed, enhancing the muscular work of the upper and lower limbs, through jumping and hitting the ball, so the limitation of the pedometer was evident, which did not allow discriminating between the use of limbs, occupational categories of sitting, standing or the level of effort and load.

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Although our participants did not reach the daily recommendations, they did exceed 10,000 s/d, thus favouring a lower prevalence of the metabolic syndrome; an effect studied by Sisson et al. (2010), who found that people who reach that average number of steps have a lower risk of developing metabolic syndrome, reducing by 72% the probability of suffering from it, in addition, it decreases by 5.8% the risk of suffering from obesity, unlike driving for an hour a day which increases this risk by 6% (Peters et al., 2020). With regard to the minimum and maximum number of steps, we found that the mean of the subjects performed a minimum of 3,567 and a maximum of 20,141 s/d. This minimum number of steps is of concern, because it represents approximately 32% of the recommended number of steps that should be performed in a day (Sánchez-Baño et al., 2018). In other words, if a person's level of physical activity is low, they will have obesity problems due to the association between a lower number of steps and obesity (Miguel-Berges et al., 2018; Scott, 2020). This statistical gap could indicate differences in the sporting practice of schoolchildren in extra-curricular hours; development of motorised sporting activities, which is unlikely, since the analysis of the socio-economic situation of the school's pupils and their age range does not allow it. On the other hand, the analysis of the somatotype composition of the sample indicates that the levels of obesity are high, which is a clear indicator that the differences in the step count could be due to a low level of physical activity among the pupils.

Regarding gender differences, the mean number of s/d in males (11,896) was higher than in females (9,473). Similarly, this difference was observed in all the parameters analysed, gender, normal day and day+PE; significant differences were observed in the normal day (p=0) and Day + PE1 (p=0.024). On the other hand, males exceeded the established recommendations for frequency of s/d, while females did not. These results show a similarity with related studies (Tudor-Locke & Lutes, 2009; Beets, et al., 2010), where it is stated that men are more physically active than women, since as they grow older, they become more autonomous, leaving competitive sports aside and moving on to more passive activities or games, in which they do not need to compete with other people (Rodríguez-Fernández et al., 2020; Fukushima et al., 2016).

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On the other hand, Tudor-Locke et al. (2011) refer to the importance of assessing the levels of physical activity that can be achieved in Physical Education classes. In this sense, the data obtained allow us to go deeper into this aspect, by comparing and interpreting the results and their frequency. This frequency analysis, during the physical education classes, showed differences in the average number of s/d, men (2,502 steps) and women (2,069 steps), which was also observed in the analysis per session (PE1= 0.006 and PE2= 0.005). These differences are similar to Chase, Hall & Brusseau, (2018), who analysed the number of steps that US and non-US students could take during school hours and found that females took fewer steps (2,500 steps) than their male counterparts (3,500 steps).

With the data obtained, the average in Physical Education sessions was calculated (2,302 steps), which represents 21% of the total recommended s/d, which is why PE teachers have the task of implementing physical activities in their class schedules; motivating, encouraging and promoting the practice and benefits of physical activity, since currently schools have become the only place where students have the opportunity to perform physical exercise (Lubans et al., 2009a; Sánchez-Baño et al., 2018). In this sense, Hernández & Velázquez (2007) highlight the importance of the Physical Education session, as it is the only time in which most students perform some type of physical activity, which is why Physical Education sessions should provide a high degree of satisfaction in students, with the aim of increasing adherence to physical activity, adopting an active and healthy lifestyle (Tanaka et al., 2019).

In relation to age, the results did not show significant differences, with a higher frequency of steps being observed on the days when Physical Education class was included (Day + PE2 = 11,413 steps), reaching the established recommendations. It is evident that as adolescents increase in age, their levels of physical activity decrease (Rodríguez-Torres et al., 2017), which would explain the differences in the frequency of steps recorded by 15-year-old students (Vera-Estrada, Sánchez-Rivas & Sánchez-Rodríguez, 2018). All of the above provides the necessary foundations to highlight the work of the physical education teacher as a factor in promoting physical activity, health and quality of life; highlighting the relevance of Physical Education and

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school breaks as spaces that favour the practice of physical activity in schoolchildren (Grao-Cruces et al., 2014; Muñoz, 2016).

In this context, the experience developed underlines the contribution of the subject of Physical Education as an essential axis for the acquisition of healthy habits, mainly through the promotion and increase of students' physical activity. The above is endorsed in the study conducted with students with special educational needs, in which it was considered that increasing physical activity in leisure time will have more value the more it is strengthened and a process of reflection is generated in physical education sessions (Lubans et., 2009b). The above could pose a gap in the teaching action, since the reflective processes - absent from the pedagogical practice studied and excluded from our research - could explain the differences in the frequencies of steps, between days with and without Physical Education.

Due to the above, it is possible to point out that the level of satisfaction and the effectiveness of Physical Education sessions are determining elements in the adherence to physical activity and in the acquisition of a healthy and active lifestyle. In this sense, several countries through their governmental bodies have focused their attention on the area of physical education as one of the main guidelines for the benefit of the school population. For example, the Department of Health and Human Services in the United States has established as a health objective for the nation, to raise the levels of moderate-vigorous intensity physical activity through physical education sessions (Department of Health and Human Services, 2008).

On the other hand, technological advances, specifically in relation to the control and measurement of physical activity, have favoured the development of devices such as the pedometer, which has become one of the main devices for monitoring, tracking and motivating physical activity (Bortolozo et al., 2017; Peters et al., 2020). In addition, this measurement tool has undergone various validation and objectification studies, contrasting it with other measurement methods (Pérez-Ferre, Marcuello & Martín, 2019).

In relation to the duration of the intervention programme, we should point out the relevance it has when observing physical activity in sedentary people, since, for the data to be

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reliable, interventions of up to 120 days' duration should be implemented (Preciado & Bonilla, 2011). Although our intervention had a duration of 3 days, this is within the time parameters implemented by other researches, most of which has used 3 to 14 days to carry out programmes in healthy youth and adults (Hoeger et al., 2008; Tudor-Locke et al., 2011).

Finally, we should point out that it is necessary to implement new studies that allow us to delve deeper into all those intervening factors, in addition to encouraging the theory of programmes based on pedometrics to be coupled and evaluated with judgements of objectivity and reliability on self-monitoring, self-selection of goals and behavioural change, not only with regard to the quantification of steps but also with regard to the consolidation of healthy lifestyle habits (Chandia-Poblete et al., 2019; Husted & Llewellyn, 2017; Tudor-Locke & Lutes, 2009). With regard to studies implemented in Ecuador, the use of pedometric techniques, through the use of pedometers, has not been considered as an intervention strategy, despite being considered an effective practice to counteract the processes of sedentary lifestyles, poor eating habits and other risk elements to which the population is continually exposed (Arias-Moreno, Rodríguez-Torres, Castro, Gómez & Paredes, 2020; Beets et al., 2010).

For this reason, the study did not consider some anthropometric variables and lifestyles of the participants (socioeconomic status, level of family study, level of sedentary activity, among others), which could allow us to determine, in a more precise and reliable way. However, the quantification of steps, which is a methodology supported by the current theoretical framework, has become an effective, objective, safe and reliable method for measuring physical activity and generating positive changes in people's health (Preciado and Bonilla, 2011; Arias-Moreno et al., 2020).

Conclusions

The results obtained allow to point out that the subject of Physical Education has a positive influence on the increase of physical activity, both in men and women, generating the necessary spaces for the development of sports and recreational activities, but lacking in

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reflective processes within the classroom, which promote the strengthening of healthy behaviours, especially those that should equal or increase the physical workload in time outside the educational centre, which undoubtedly becomes a weakness in the system or in the way teachers work.

Similarly, compliance with the recommendations for steps/day by men, especially in the younger age range (15 years), confirms what has been described in the studies carried out to date, demonstrating the transversality of this type of work, thereby emphasising its relevance and contribution, by precisely identifying those factors and behaviours that promote and those that are harmful to increasing physical activity and health.

Recommendations

The analysis of the results allows us to visualise some possibilities for improvement in the promotion of the practice of physical activity at school age, thus promoting healthy lifestyles and an improvement in quality of life. Secondly, the contribution of the Physical Education class and the importance of the teacher as promoters of change, through reflective processes in students and sports practice, have been proven. For this reason, it is believed that it is necessary to strengthen professional training or, failing that, to provide teachers with the necessary tools for a better performance in this field. Similarly, we believe it is relevant to implement a symbiosis between technology and quality of life, developing activities that allow the use of technology, but that at the same time stimulate and pose a physical challenge to the students. This would undoubtedly become a playful, creative and innovative promotional component of the activities. In addition, it is considered essential to incorporate other measurement parameters in studies of this type, since the focus on factors and the use of appropriate technological tools would broaden the range of possibilities for collecting data, giving us a deeper and more complete vision of the reality that we are trying to study. Finally, it is fundamental to incorporate the participation of all the actors in the educational process (students, parents, educational centres, teachers and educational administration) in the activities of reflection and promotion of healthy lifestyle habits and

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physical activity, since based on the data collected and the documentary analysis carried out, physical activity outside the educational centre decreases significantly, resulting in possible harmful alterations to the physical development of the students; This would allow them to distance themselves from a sedentary lifestyle, projecting them towards healthier lifestyles and care for their physical health (Rodríguez-Torres et al. , 2017).

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Appendix 1. Volleyball Lesson Plan

UNIDAD EDUCATIVA "DON BOSCO"

Subject: Physical Education.

Date: January 15, 2020

Grade/Course: 1st BGU

Teacher: Lic. Richard Ortega

Objective:

O.EF.4.5. OG.EF.2.

To associate and transfer knowledge from other disciplinary fields in order to optimize their performance in sports practices, whether at amateur or federative level.

Objective of the class

To develop the K1 system of tackling and defense, through proper positioning and correct technique.

Topic: Volleyball Attack and defense

Skill to develop:

EF.5.4.2. Participate in sports practices understanding the internal logic (principles and tactical actions) of each one and making technical, tactical and strategic adjustments, according to the rules and requirements (motor, emotional, cognitive, social) for their effective and comfortable resolution.

Content	Methodological strategy	Resources	Evaluation indicators
-Games of speed and agility with implements. -Coordination and strength games - K1 System	**Start 5min** General warm-up Burned game with a bal **Main 30min** Coordination gam attack, reception Explanation of the K system Location and position	Cones Ulas Whistle Volleyb alls Net Basket	I.EF.5.4.1. Collectively constructs respectful work spaces that position him/her as a protagonist and/or spectator and that favor the creation of non-stereotyped and non-

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	the players Demonstration of th exercise Mode of change an rotation Repetition of th exercises several times. Correction of errors **Final 5min** Return to calm Clarifications on th exercise		hegemonic manifestations through body language. (J.2., S.1.)

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Appendix 2. Lesson Plan Strategy Games

UNIDAD EDUCATIVA "DON BOSCO"

Subject: Physical Education.
Date: January 17, 2020
Grade/Course: 1st BGU
Teacher: Lic. Richard Ortega

Objective:
OG.EF.3.
Effectively resolve situations present in body practices (sports, dances, games, among others), having clarity about their objectives, logic and implications, according to the levels of participation in which he/she is involved (recreational, federative, high performance, etc.).
Objective of the class
Develop strategies to solve the different situations presented in the different games.

Topic: Strategy games

Skill to develop:
EF.5.1.1. To recognize games as constant manifestations in the history of man and to relate them to their contexts of origin, their specific culture and the senses and meanings that allow their participants to turn them into a possible recreational practice.
Skills
Problem solving, Creativity, Spatial perception, Stamina, speed

Content	Methodological strategy	Resources	Evaluation indicators
Competitive Games Cooperative games Strategy games	**Start** Stretching Warm-up generates Game: frozen **Main** Explanation of the	Ropes Cones Ulas plates Elastic rope	I.EF.5.1.1. It establishes relationships between different games, their contexts of origin, the senses

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	exercises to be performed Formation of teams Games 1: - relays with materials (4 variants) Games 2: strategy, crossing the river (conditions, only 2 can cross at a time). Games 3: cooperative. Crossing over the rope. (rope one meter high) **Return to calm** Discussion of the games	Synthetic field	and meanings given by the participants during their participation and the impact on the construction of body identity and the social, cognitive, motor and affective dimensions of the subjects. (J.1., S.2.)