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DETERMINATION OF PHYSICAL ACTIVITY DURING SCHOOL RECESSES: COMBINING MEASUREMENTS OF PHYSICAL ACTIVITY AND CHILDREN'S PERSPECTIVES

DETERMINACIÓN DE LA ACTIVIDAD FÍSICA EN EL RECREO ESCOLAR: COMBINANDO MEDICIONES DE ACTIVIDAD FÍSICA Y LA PERSPECTIVA ESTUDIANTIL

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Abstract

The aim of this study was to determine physical activity of children during school recesses, taking into account their own perceptions, and observations during school recesses. To achieve this objective, a mixed method was applied, using the SOPLAY instrument for observation of games and recreational activities, as well as focus groups. Students from 3 public schools with extended and alternating schedules were observed

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during school recesses, and focus groups were also held. Descriptive statistics were used, and a factorial analysis of variance test (2x2) was performed to determine if there were differences between levels of moderate to vigorous physical activity between types of schools. Results of the focus groups were organized into categories. Slightly less than half (47.98%) of the children studied during this investigation engaged in sedentary activities during school recesses, while 52.02% were involved in moderate to vigorous physical activity, with girls being more sedentary than boys. Children in schools with alternating schedules were more active than those in schools with extended schedules. Participants perceived that barriers to physical activity had to do with reduced space to play, and with receiving little support from teachers. In conclusion, this study showed that slightly more than 50% of students perform physical activity in school recesses, with boys and girls in schools with alternating schedules being more active than those in schools with extended schedules. Participants perceive that school environments do not favor physical activity, due to environmental barriers. Based on the results of this study, it is recommended that physical activity be promoted during school recesses, taking into account the existing natural, social, physical environmental and organizational barriers.

Keywords: Physical activity, Barriers, Children, School recesses, Perception, Types of schools.

Resumen

El objetivo de este estudio fue determinar los niveles de actividad física de los estudiantes durante el recreo escolar, tomando en cuenta las percepciones de los estudiantes y observaciones del recreo escolar. Se aplicó un método mixto, utilizando el instrumento de observación de juego y actividades recreativas (SOPLAY) y entrevistas. Los participantes fueron estudiantes de tres escuelas públicas de horario ampliado y alterno, que fueron observados en los recreos escolares. Adicionalmente, se realizaron grupos focales. Se utilizó estadística descriptiva, y para determinar si existieron diferencias entre niveles de actividad física moderada-vigorosa entre tipos de escuela, se realizó una prueba de varianza factorial (2x2). Los resultados de los grupos focales se organizaron en categorías. Los estudiantes de este estudio presentaron 47.98 de actividad sedentaria, con un 52.02 de actividad física moderada vigorosa en el recreo escolar, siendo las niñas más sedentarias que los niños. Los escolares de escuelas que alternan son más activos que los de escuelas de horario ampliado. Las personas participantes percibieron que las barreras para la realización de actividad física tienen que ver con espacio reducido para jugar, con poco apoyo de las maestras. En conclusión, este estudio mostró que un poco más de 50% de los estudiantes realizan actividad física en los recreos escolares, siendo los niños y niñas de escuelas de horario alterno más activos que los de horario ampliado. Las personas participantes perciben que los entornos escolares no favorecen la actividad física, debido a las barreras ambientales. Con base en los resultados de este estudio, se recomienda promover la actividad física a través del recreo escolar, considerando las barreras en el entorno natural, social, físico y organizativo.

Palabras clave: Actividad física, Barreras, Niñez, Recreo Escolar, Percepción, tipos de escuela.

Introduction

Costa Rica has not escaped the epidemic of overweight and obesity, having experienced an increase in the incidence and prevalence of childhood overweight and obesity. In the school census of weight and height of the Ministry of Health and the Ministry of Public Education (2016), it was estimated that 34% of Costa Rican school children were overweight and obese. In

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addition, the levels of sedentary lifestyles have become one of the most critical health problems (Pan American Health Organization [PAHO], 2010). Fuster (2014) has indicated that a sedentary lifestyle is related to increases in cardiovascular risk factors associated with obesity and chronic noncommunicable diseases. In Costa Rica, an alarming level of sedentary lifestyles (27.4%) has been reported for children (Instituto de Nutrición de Centroamérica y Panamá [INCAP], 2016).

Increasing levels of sedentary lifestyles, lack of opportunities for physical activity, and increases in the number of overweight and obese children throughout the world (Janssen and Leblanc, 2010) have led to schools being considered as the fundamental spaces for schoolchildren, where they can be active and acquire the necessary skills to confront a sedentary culture (Pawlowski, Tjørnhøj-Thomsen, Shipperijn and Troelsen, 2014).

The WHO (2010) has also identified these institutions as essential in contributing to achieve the one hour of moderate to vigorous physical activity recommended as a strategy to combat overweight and obesity in young children, since it is in these environments where they remain most of the day. Therefore, placing a high priority on regular physical activity in the school can be a tool for preventing childhood obesity, and for promoting an early-stage approach that optimizes the results and impacts on health (Davidson and Lawson, 2006; Biddle and Asare, 2011). Within this context, school recesses are an important space in achieving the goal of having an active school population. It has been recognized that recesses have the potential to contribute up to 40% of the 60 daily recommended minutes of physical activity for students, under the appropriate conditions (Frago, Murillo, García, Aibar and Zaragoza, 2017).

According to previous quantitative studies conducted in other countries, the proportion of time devoted to physical activity of moderate to vigorous intensity during the morning and lunch break in France is 32.1% in boys and 23.7% in girls (Blaes et al., 2013), and 32.9% in boys and 25.3% in girls in England (Ridgers, Stratton and Fairclough, 2005). There is a lack of information about the levels of physical activity of Costa Rican school children in recreational environments, so it is necessary to not only know the degree of physical activity of school children in that environment, but also their own perceptions about these activities, which will make it possible to better understand movement behavior which can be used to implement interventions that are appropriate to the realities of Costa Rican schools. It is also important to emphasize that, according to qualitative studies carried out in different cultures, the influence of environmental factors on physical activity during recess differs according to the cultures and lifestyles of countries (Ishii, Shibata, Sato and Koichiro, 2014; Haug, Torsheim, Sallis and Samdal, 2010), making it necessary to investigate these factors in the Costa Rican environment from the perspective of the students.

In the Costa Rican school environment, especially in school recesses, the behaviors, patterns and perceptions of school children about physical activity are unknown. Having this information is necessary to be able to not only understand the problems faced in terms of physical activity levels of schoolchildren, but also to be able to formulate proposals and policies

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that promote a culture of movement in school recesses. Responding to the public health call to assume an active role in promoting and developing models to promote of school health, especially in the search to combat problems such as sedentary lifestyle, obesity, cardiovascular diseases and type II diabetes (Hayman et al., 2004), this study will provide the initial inputs required to develop a proposal for healthy recreation in the Costa Rican environment which takes into account the daily reality of schools, and the voices of students.

This type of study has been recognized as the perfect combination to deepen understanding and obtain direct information about the environment of school recesses in the promotion of schoolchildren's physical activity. As has been established, it is necessary to get students involved by listening to them to better understand their perceptions, beliefs and attitudes towards human movement and barriers to such movement in the construction of a healthier culture (Pawlowski, Tjørnhøj -Thomsen, Shipperijn and Troelsen, 2014).

Therefore, the objective of this study is to determine the activity levels of children in play spaces in the school environment during recesses, incorporating a qualitative approach to the perceptions of these children about barriers to physical activity.

Methodology

Participants

This study involved the observation of 90 boys and girls in the first and second academic cycles, during school recesses in a public school with extended schedules and two schools with alternating schedules which are receiving priority attention in the Central Canton of Heredia, selected at random. In schools with extended schedules, students attend from 7 a.m. to 1:30 p.m. every day, and in the schools with alternating schedules, students attend from 7 to noon. In these schools, those in one cycle attend school in the morning, while those in the other cycle attend in the afternoon. In the qualitative part of this study, two focus groups were conducted with 12 children from each institution.

Instrument

In the quantitative part of this investigation the System for Observing Play and Leisure Activity in Youth (SOPLAY) was used. This is a validated tool using cardiac monitors (McKenzie, Sallis and Nader, 1991), which has obtained high correlations for sedentary girls (R = .98) and girls who walk (.95), but a lower correlation for very active girls (.76). For boys, the correlations were high for sedentary (.98), walking (.98) and very active behavior (.97). All inter-observer and intraclass correlations met acceptable criteria IOA = 80%, R = .75) for a reliable evaluation.

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SOPLAY provides objective data on the number of participants and their levels of physical activity during play and leisure periods. This protocol consists of observing or scanning the intensity and physical activity of children in each of the play areas of the institution for 15 seconds during institutional recess, observing the areas from left to right and recording the levels of physical activity of the children observed in each of these areas in the school. During a scan, the physical activity of each student in an area is coded as sedentary (sitting or standing), moderate activity (including walking), or vigorous activity. The observations were made twice in each of two days with typical recesses to corroborate the results.

When conducting the focus groups, a questionnaire with open questions was used for students in the participating groups. This questionnaire was constructed based on a bibliographic review on the topic of recreation, the objectives proposed in the research, and the experience of the researchers, following the socio-ecological model (Ward and Saunder, 2007).

Procedure

The study was carried out with the approval of the Ministry of Education and the consent of the director of each educational institution. Recesses were informally observed to determine the play areas of students, measure them, and prepare the necessary conditions for observations. Once the areas were mapped, the 10 and 15 minute breaks were observed at three different times in each of the participating schools. Once each observation was finished, physical activity levels of the schoolchildren observed were calculated following the method specified by McKenzie (1991). When the observation phase and calculations were concluded, focal groups with students from different grades in participating schools were carried out to contribute to a better understanding of these results from the point of view of the students that had been observed.

For the qualitative part of this investigation, the informed consent of parents of the participants was obtained. Each section of the first cycle of primary education selected was divided by the school guidance counselor into four mixed focus groups. Focus group sessions were held in a private location in the institution during class hours, and were conducted by a researcher, assisted by the school's guidance counselor and the teacher of that grade. The teacher and a research assistant recorded and took notes of the sessions to strengthen subsequent analysis of the information gathered, and to carry out necessary triangulation of responses (Patton, 2002). Each of the sessions lasted 30 to 40 minutes, during which time the activity was first explained, after which group interviews took place, with the end of the interviews left open for any anecdote that students might like to share.

A semi-structured interview was used in focus groups, using generating questions that were based on the Socio-Ecological Model, in the following order: 1) children's preferences for activities during recess, 2) factors that motivated children to participate in active play, 3) factors that limited children's active play, and 4) factors that facilitated children's active play.

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Design

A mixed method design was used, with a quantitative sequence of stages using the SOPLAY observation instrument, followed by a qualitative stage with focal groups, which were complemented and triangulated to achieve a better understanding, deepening, or transformation of the phenomena studied (Pereira, 2011).

Data analysis

During the quantitative phase of this study, descriptive statistics were obtained by calculating averages and standard deviations for measurements of physical activity. In the case of intensity of participants' activity in recesses, an ANOVA analysis was carried out between the dependent variable, student gender, and the type of schools they attended (schools with extended schedules and alternating schedules).

In the qualitative section of this study, the data analysis process involved three key aspects: data reduction, disposition and transformation of the data, and, finally, obtaining results and verification of conclusions, as described by Pitney and Parker (2009).

Results

Quantitative phase

Table 1 shows the averages and standard deviations for different levels of physical activity in general and by sex, obtained during school recesses based on the use of SOPLAY in the three participating schools. It can be seen that 47% of the observed students were sedentary, 21% performed moderate activities, and 30% performed vigorous activities. The aforementioned values indicate that almost 50% of schoolchildren showed sedentary behaviors. When separate results were calculated for boys and girls, it was observed that boys (65%) were far more active than girls (38%), based on a comparison of values for students who engaged in either moderate or vigorous physical activities (MVPA).

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Table 1: Averages of physical activity of students observed during recess

Physical activity level	Mean (SD)	Girls (DE)	Boys (DE)
Sedentary	47.98 (3.2)	61.23 (±3.7)	34.48 (±2.4)
Moderate PA	21.58 (1.9)	24.31 (±1.9)	18.81 (±2.0)
Vigorous PA	30.43 (3.4)	14.46 (±1.1)	46.71 (±4.6)
MVPA	52.02 (2.7)	38.77 (±1.6)	65.52 (±3.5)

PA: physical activity, **MVPA** either moderate or vigorous physical activity **(SD):** standard deviation.

Table 2 shows the observed results for physical activities carried out in schools with extended schedules and those with alternating schedules. The frequency of MVPA in schools with alternating schedules was 61.3%, and in schools with extended schedules it was 22.6%. This finding shows possible lines of change in school environments that transform this weakness into a strength in terms of the promotion of movement styles in the during recess.

Table 2: Averages of physical activity of students according to type of school schedule

Physical activity level	Schools with alternating schedules (SD)	Schools with extended schedules (SD)
Sedentary	38.7 (±2.5)	77.4 (±4.3)
Moderate PA	25.6 (±2.2)	9.0 (±0.7)
Vigorous PA	35.8 (±3.9)	13.5 (±1.1)
MVPA	61.3 (±3.2)	22.6 (±0.91)

PA: physical activity, **MVPA** either moderate or vigorous physical activity **(SD):** standard deviation.

After carrying out a 2 X 2 ANOVA test, significant differences were found for the main effects of gender ($p < 0.017$) and the type of school ($p < 0.0001$) on the level of MVPA physical activity in school recesses; however, no significant interaction was found between the variables studied. Both gender and the type of school attended caused a significant difference in the MVPA levels; however, these variables did not interact to produce a stronger effect.

Qualitative phase

Four main categories of analysis were defined in order to understand the results obtained after observing schoolchildren during recess, following an ecological approach (Ward, Saunders and Pate, 2007): the individual factor, the social environment, the physical environment, and the factors of the organization and school policies.

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In general, boys indicated their fondness for soccer, while girls in higher grades mentioned great satisfaction about their sedentary activities, with a great social component with small groups of companions; as Girl 3 said: "What I enjoy the most is talking to my friends". Contrary to older girls in focus groups, 70% of first grade girls were attracted to chasing games, such as "*la anda*". One girl said: "I have to get to the playground first so I don't miss any thing during recess."

Teachers were perceived by 68% of boys as a barrier to physical activity, due to their constant interference in their games. The following expression is an example of this situation: "They don't let us play ball at recess". However, teachers offer young girls a great sense of security, as one girl stated: "Bullies go away when the teacher is here."

The care of children is in the hands of teachers during recesses, which prevents them from being mistreated; however, children do express some perceptions of persecution with respect to not being allowed to play some games. One of the children/boys said: "(Female) teachers don't let us play and they take our tops away."

On the other hand, older boys see younger ones as obstacles that interrupt their soccer games and get in their way: "Generally, we have to stop playing until we get rid of them" a boy in the Second Cycle said.

In the school environment the physical barriers to play at recess most frequently mentioned by students are lack of facilities and lack of space to play. However, policies and places to play are not concerns of the school administration, and sometimes putting the children at ease and allowing them to play depends on a (female) teacher ignoring a provision that prohibits them from playing ball.

Discussion

Findings of this study highlight the great contributions made possible by using mixed methods in this research in the process of understanding schoolchildren's physical activity children and their perceptions of the barriers that prevent them from being active. Recess is not only one of the main opportunities in the school context for promoting active lifestyles, but also one of the main allies in the fight against overweight and obesity in Costa Rican children. School recesses have been shown to be appropriate for practicing physical activity (PA) in a free or directed manner; however, the results of this study show that sedentary behavior prevails among school children, and that they perceive that the school environment during recesses does not favor physical activity.

The results of this research indicate that almost 50% of school children have sedentary lifestyles, a much higher level than that which has been reported in previous studies in other environments (Anthamatten et al., 2011, Blaes et al., 2013, McKenzie, Marshall, Sallis and Conway, 2000, Springer, Tanguturi, Ranjit, Skala and Kelder, 2013).

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Schools are the place where young children spend the most time during the week, and playing in schools offers the greatest potential to help children perform the greatest amount of physical activity, helping them to achieve one hour per day of moderate to vigorous physical activity, as recommended by the World Health Organization (WHO, 2010). However, the results of this study show that participant behavior during recesses is primarily sedentary, nullifying the potential of recesses to promote movement in childhood.

To find explanations for the high levels of sedentary lifestyles found in elementary students, it is necessary to turn back to the perceptions of students about possible barriers to their participation in physical activities during recess. The students in this study considered the lack of social support to be an important barrier to such activity, although social support is important at early ages to ensure involvement in physical activities (Mays, Graber and Daum, 2012). This makes it extremely important to understand that recess is an extension of the academic experience in the classroom, and it is recommendable to provide students with the physical conditions and social support necessary to obtain the maximum benefits from environments that stimulate play and physical activity, as well as the greatest number of possibilities for them to play (Ickes, Ervin and Beighle, 2013).

Although in this study the teachers' activities during recess were perceived by students as a barrier to physical activity, increased supervision by teachers, particularly when they participate in games, provides greater satisfaction and participation on the part of girls, promoting a reduction of conflicts and less domination by boys, as several studies have found (Ozdemir and Yilmaz, 2008, Sallis et al., 2001).

The physical environments of schools in the Central Valley of Costa Rica lack necessary elements to promote movement. As Arias (2014) has shown, the effects of reduced space available for physical activity during recess, together with school policies to restrict movement in students for security reasons, contribute to the large number of children who engage in sedentary behavior.

The availability of sports equipment during breaks has proven to be a motivating factor to increase the level of activity of school children (Verstraete, Cardon, De Clercq and De Bourdeaudhuij, 2006). However, the lack of available space to play mentioned by students in this study, and lack of playground equipment, indicate the need for interventions to create conditions under which the schools' administrations can contribute to providing environments that promote physical activity (Anthamatten et al., 2011).

The results of the quantitative analysis also show that boys (65%) are far more active than girls (38%), based on the data for children who engage in either moderate or vigorous physical activity (MVPA). Elliot, Combs and Boyce (2011) found when comparing the percentages of time that boys and girls spend in physical activity, that boys are more active, regardless of the environment. As opposed to the girls in this study, who stated that recess is a great opportunity to socialize with friends, boys perceive recess as a great opportunity to play. The data contributed

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by students participating in this study is consistent with data from Álvarez (2016) and Haug et al. (2010), who add that this finding is independent of the level or grade of the children observed.

Although girls in this study reported that their preferred activities are social relationships that involve talking and walking in small groups, they also expressed their desire to become involved in physical activities, if better conditions existed. This perception, which limits the activity of girls, is a basic element that must be dealt with to guarantee increased physical activity during school recesses.

It has been suggested that recesses could contribute up to 40% of recommended daily physical activity, however, this study has clearly shown that this does not occur in the schools studied. Especially in the case of girls, physical activity patterns are linked to movement patterns that are determined by gender-differentiated roles (Blaes et al., 2013).

The gender-related difference in levels of moderate to vigorous physical activity found in this study is consistent with the findings of previous studies that used SOPLAY, which indicate that boys participated in vigorous activities and girls participated in activities of a sedentary nature (Willenberg et al., 2010). Although boys were somewhat more active than girls, the differences are not very large. When trying to understand the more sedentary or less active behavior of girl, attention should be paid what they expressed during this study. Girls in higher grades stated that they liked less vigorous or sedentary activities involving the social group of friends, such as talking and walking around the school premises; however, first grade girls were attracted to games involving chasing, such as tag, and said that when the opportunity arises and children in higher grades will let them, they will participate.

Studies in England and Australia (Parrish, Yeatman, Iveson and Russell, 2012; Ridgers and Stratton, 2010) have shown that the perception of safety offered by the school recess environment does not differ between boys and girls; however, the findings of this study show that girls do feel intimidated in environments in which there is no teacher supervision or presence. This finding could perhaps be explained by taking into account that girls stated that they preferred the use of small and well-known spaces that allowed them to socialize.

An important finding of this research is the fact that students in schools with extended schedules showed a greater number of sedentary behaviors than those in schools with alternating schedules, suggesting that aspects of school infrastructure may be a barrier to becoming involved in physical activity. In schools with extended schedules, all students have to share the same play space, while in schools with alternating schedules there are less children using the recess space at any given time. In this respect, it has been mentioned that when there is a greater density of students in a school environment, the possibilities for them to participate in physical activities, especially for the youngest students, will be lower. The students in this study stated that sharing spaces with older children definitely put them at a disadvantage when it comes to finding a space to play, which also puts them at a disadvantage in achieving the cognitive, social, emotional and physical benefits provided by physical activity in the recreational environment

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(American Academy of Pediatrics, 2013). Shen (2014) states that behavioral change is associated with appropriate physical and social environments, so space limitations in schools with extended schedules should be taken into account when trying to understand the results of this study.

The results of this study have shown that the influences of the social and organizational environments are perceived by children as being most important when engaging in physical activity during school recesses, which makes it essential that school programs or interventions for the promotion of physical activity strongly emphasize these factors.

Conclusion

Through the use of the Observation System (SOPLAY) it has been possible to determine that the levels of physical activity carried out by students during recesses do not contribute to achieving the one hour daily of moderate to vigorous activity recommended by international organizations for students in primary education, and that girls are are less likely to achieve this goal than boys. Furthermore, it was found that levels of active behavior are higher in schools with extended schedules than in those in schools with alternating schedules.

To understand the findings of this study, attention should be paid to children's qualitative perceptions of the barriers to physical activity during recess. The children perceived that the following were important barriers to physical activity during recess: lack of facilities and equipment, lack of policies at the school level, clothing, lack of teacher support, and lack of space. This indicates that physical school environments have an impact on behavior, including the tendency of children to participate in physical activity.

This study emphasizes the need to rethink the role of schools in leading the promotion of physical health and prevention of obesity. The students' perception that the factors than most strongly influence physical activity are the social and physical environment indicates that strategies for the promotion of physical health that contribute to the integral health of schoolchildren should include efforts to eliminate those barriers, and to increase children's perceptions of environments that encourage movement.

These results make it clear that there is a great need for recesses to be conceptualized as an essential part of the integral formation of children, not only because of the essential stimulus they provide in physical and social development, but also because of the positive effect playing has on academic performance. It is therefore necessary to develop policies that regard recess as a time for play, in which students are provided with the minimum conditions necessary to enjoy those playful moments, which can contribute to the formation of healthier schoolchildren, supported by teachers who understand the unique value of those moments for their students.

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