A physical activity intervention based on high-intensity interval training improves cardiorespiratory fitness and fat mass in children aged 7 to 10 years

Una intervención de actividad física basada en el entrenamiento en intervalos de alta intensidad mejora la resistencia cardiorrespiratoria y la masa grasa en niños de 7 a 10 años

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Abstract

Introduction: Efforts to curb the obesity crisis should begin at an early age, and promoting physical activity is key to achieving positive long-term outcomes. One option is high-intensity interval training (HIIT), which is based on high-intensity exercises in short or long periods, alternating with recovery periods.
Objective: To determine the effectiveness of incorporating HIIT methodology into physical education classes on fat mass and cardiorespiratory fitness in students aged 7 to 10 years.
Methodology: A quasi-experimental study lasted 12 weeks. The sample was non-probabilistic. The intervention group was composed of 100 schoolchildren and the control group of 40. The intervention was based on the incorporation of HIIT methodology into physical education classes.
Results: After the intervention, the group that incorporated HIIT methodology into their physical education classes showed significant improvements, decreasing fat mass (girls, from 33.9% to 32.1%; boys from 23.5% to 22.5%) and improving cardiorespiratory fitness (VO2max) (girls, from 16.9 to 18.7; boys, from 22.5 to 26.1).
Discussion: A HIIT intervention is more effective than a traditional physical education program in reducing fat mass and improving cardiorespiratory fitness in schoolchildren aged 7 to 10 years.
Conclusions: The results allow us to consider HIIT as a valid option to increase moderate to vigorous physical activity time in physical education classes.

Keywords

CRF; HIIT; Physical Education; school.

Resumen

Introducción: Los esfuerzos para frenar la crisis de obesidad deben comenzar a una edad temprana, y promover la actividad física es clave para lograr resultados positivos a largo plazo. Una opción es el entrenamiento interválico de alta intensidad (HIIT), el que se basa en ejercicios de alta intensidad en períodos cortos o largos, alternados con períodos de recuperación.
Objetivo: determinar la efectividad de la incorporación de la metodología HIIT a las clases de educación física sobre la masa grasa y la capacidad cardiorrespiratoria en estudiantes de 7 a 10 años.
Metodología: estudio cuasiexperimental, que tuvo una duración de 12 semanas de duración. La muestra fue no probabilística. El grupo de intervención estuvo compuesto por 100 escolares y el grupo control por 40. La intervención se basó en la incorporación de la metodología HIIT a las clases de educación física.
Resultados: Tras la intervención, el grupo que incorporó la metodología HIIT a sus clases de educación física mostró mejoras significativas, disminuyendo la masa grasa (niñas, de 33,9% a 32,1%; niños de 23,5% a 22,5%) y mejorando la capacidad cardiorrespiratoria (vo2máx) (niñas, de 16,9 a 18,7; niños, de 22,5 a 26,1).
Discusión: Una intervención HIIT es más eficaz que un programa de educación física tradicional para reducir la masa grasa y mejorar la capacidad cardiorrespiratoria en escolares de 7 a 10 años.
Conclusiones: Los resultados permiten considerar el HIIT como una opción válida para aumentar el tiempo de actividad física de moderada a vigorosa en las clases de educación física.

Palabras clave

Resistencia cardiorrespiratoria; HIIT; escuela; Educación Física.

Introduction

Childhood obesity has increased in recent decades, affecting different nations regardless of the level of their economic development (Jaacks et al., 2019). Among its causes, it is pointed out that it is a consequence of the reduction of energy expenditure and poor nutrition of schoolchildren, with physical activity having the potential to be part of the solution (Wiklund, 2016). Due to the consequences at the level of health of the population and how it affects the economies of countries, it is considered a public health problem worldwide (Kumar & Kelly, 2017; Blüher, 2019), as it tends to persist into adulthood (Reilly et al., 2003). Obesity prevention has been associated with the reduction of some noncommunicable diseases, such as metabolic syndrome, type 2 diabetes, hyperlipidemia, hypertension, and coronary heart disease (OPS, 2023; Misra & Khurana, 2011), as well as being a predictor of premature mortality (Reilly & Kelly, 2011).

In Chile, this situation is alarming, since the population over 15 years of age with overweight and obesity reaches 74.2% (Abarca-Gómez et al., 2017). In the child population, the concern is similar, because approximately 4 out of 10 children are overweight and 2 out of 10 are obese (Junaeb, 2025).

Physical activity from an early age is considered an obesity prevention strategy (Merellano-Navarro & Almonacid-Fierro, 2022; Lobstein et al., 2023). Thus, the World Health Organization established guidelines that indicate that children and adolescents (5 to 17 years old) should perform an average of 60 minutes a day of moderate to vigorous intensity physical activity, along with reducing the time of sedentary behaviors (Bull et al., 2020). However, despite efforts, nearly 70% do not meet these recommendations (Ng et al., 2014; Tremblay et al., 2014), which leads to an increased risk of obesity (Silveira et al., 2022), and increased risk of lipid metabolism disorders, hypertension, hyperinsulinemia, and impaired quality of life (GBD et al., 2017; van der Voorn et al., 2023).

Given the importance of obesity on children's future health, and according to Martínez-Vizcaíno et al. (2020), efforts to stop the obesity crisis must begin at an early age, and promoting physical activity is key to achieving long-term effectiveness. In this context, school has proven to be the most appropriate environment to encourage the practice of physical activity (WHO, 2019), since, as Grao-Cruces et al. (2023) explain, children spend a large part of their time in these places, during essential stages of their lives, which are key to acquiring and consolidating lifestyle habits. However, physical activity levels in physical education classes are below the WHO recommendations (Hollis et al., 2017). A similar situation occurs in Chile, where evidence shows that between 14.3% and 20% of the class is devoted to moderate to vigorous physical activity (Kain et al., 2014; Giakoni et al., 2021), which is worrisome because Chilean children also have low levels of physical activity (Godoy-Cumillaf et al., 2023; Ibarra-Mora et al., 2025).

Considering the above background and considering that it is necessary to apply measures to cause increases in physical activity, it is essential to incorporate adjustments in the methodologies, so that physical education classes are fully used (Nielsen-Rodríguez et al., 2021), facilitating their implementation in other contexts (Neil-Sztramko et al., 2021). One option to use is high-intensity interval training (HIIT), which is based on high-intensity exercise in short or long periods, alternating with recovery periods (Buchheit & Laursen, 2013), which presents as one of its main strengths its duration, since in a shorter period it produces adaptations like traditional training (for example, jogging, cycling, among others) (Logan et al., 2014). Thus, a systematic review that analyzed the effectiveness of this type of training in weight control concluded that it is an effective strategy in terms of time and adherence to its practice (Guo et al., 2023). Regarding the school population, evidence indicates that this type of training can generate greater enjoyment in the children who practice it (Brambilla et al., 2011), which is attributed to the fact that it has characteristics like the games that children develop spontaneously (Dias et al., 2018). An intervention study in children that used HIIT as a working methodology demonstrated increases in cardiorespiratory fitness (CRF) (Van Biljon et al., 2018), a situation that is positive because CRF is considered a powerful marker of health, highlighting that better values are related to less obesity (Barry et al., 2014; Ortega et al., 2008), because increases in this capacity cause greater fat utilization (Meng et al., 2022). HIIT has also been shown to contribute to the decrease in adipose tissue in children because it increases resting metabolic rate, reducing fat mass (Islam et al., 2018).

Because Chilean children have high levels of overweight and obesity, 27.3% and 31% respectively [9], and the practice of physical activity contributes to reducing these high levels, the incorporation of HIIT in physical education classes could be a methodology that contributes to its prevention and reduction.

In addition, if HIIT generates greater enjoyment in children, along with similarities with the games they play, it is reasonable to hypothesize that implementing HIIT in physical education classes could improve cardiorespiratory fitness and reduce fat mass. In this context, few studies currently use HIIT in Chilean children (Pino et al., 2018), and more evidence of its impact is needed. In this study, it is hypothesized that implementing HIIT methodology in physical education classes will lead to improvements in cardiorespiratory fitness and a decrease in fat mass, compared to a control group. This research aims to establish the effectiveness of incorporating HIIT methodology in physical education classes on cardiorespiratory fitness and fat mass in students from 7 to 10 years old.

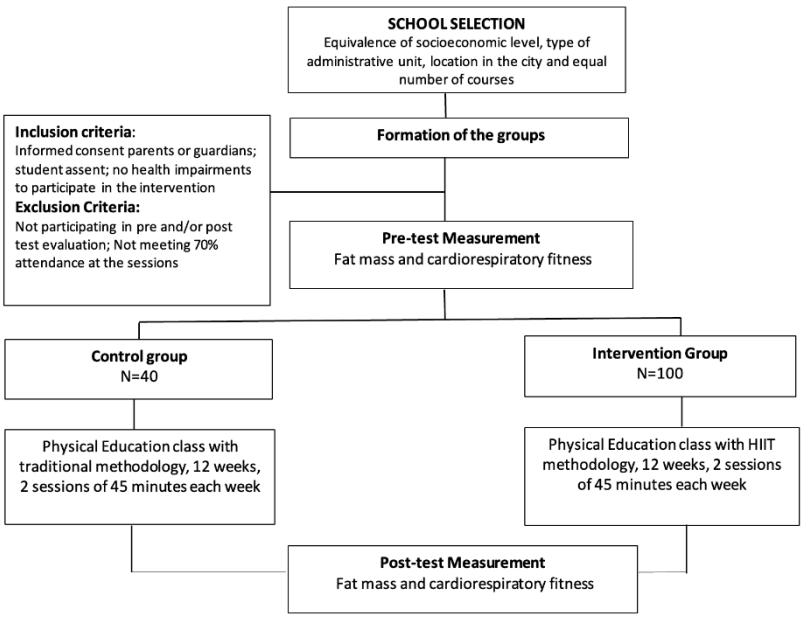
Method

This chapter was written following the recommendations provided by The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE)(vom Elm et al., 2008).

Design

The study was quasi-experimental using a repeated-measures design, with a non-equivalent control group lasting 12 weeks. All the research followed the safeguarding protocols established in the Declaration of Helsinki and was approved by the scientific ethics committee of the Universidad de La Frontera, through act No. 138-23. The flowchart in Figure 1 describes the process of recruiting participants and developing the measurements.

Figure 1. Flow chart of the participant recruitment process and development of measurements.



Participants

Students from two schools in the Temuco commune, aged between 7 and 10 years, participated in the study. The establishments were selected according to the criteria of socioeconomic level, type of administrative unit, location in the city, and the same number of courses per level and average number of students per course. For the conformation of the sample, the conformation of the courses of each establishment was maintained, randomizing the course for the intervention and control group. The inclusion criteria for student participation were a) informed consent of parents or guardians, b) student assent, c) not having health problems to participate in the intervention, and as exclusion criteria a) not participating in pre- and/or post-test evaluations and b) not completing the intervention program, c) Failure to comply with 70% attendance at the sessions.

The sample was non-probabilistic, with a total of 140 schoolchildren. The intervention group consisted of 100 schoolchildren, divided into 50 boys and 50 girls, with boys presenting average values of 35.1 kg for weight and 141.3 cm for height, while girls had an average value for weight of 36 kg and 140.8 cm for height. The control group was composed of 40 schoolchildren, 20 boys and 20 girls, with a weight of 35 kg for boys and 141 cm for height, and girls with average values of 36.2 kg. For weight and 140.5 cm for height. The difference between the number of participants in the control group and the intervention group was because, once the exclusion criteria were applied, it was intended to maintain gender equality in each of them, to reduce confounding variables.

Intervention

During the second semester of 2023, a physical activity intervention was carried out in high-intensity intervals, in the context of Physical Education classes.

The intervention group (IG) ran their physical education classes incorporating HIIT methodology for 12 weeks, 2 times a week. The entire intervention was carried out by the same teacher, who had training and experience in this type of work. Before the start of the intervention, the professor trained those who would participate in the activity in heart rate monitoring and maximum heart rate calculation. For this, in a first part, through an interactive video, the children were explained how the artery should be located at the level of the neck, and then how the pulses should be counted. Subsequently, activities were carried out in the classroom that produced changes in the heart rate and that were detected by the children. Once the pulses were detected, the amount was counted in a certain period (10 seconds). The last part consisted of carrying out different activities where variations in the pulses were produced through games that were carried out in the sports gym, and the children will practice the detection and accounting of the pulses. All these activities were carried out in four classes.

During the execution of the intervention, each participant already knew their maximum heart rate and the value at which they should be when performing each activity. To avoid possible confusion in the heart rate values they had to achieve, the teacher had an information table in front of the participants with the ranges they had to be when performing each of the activities of the HIIT methodology. The formula proposed by Karvonen et al. (1957) was used to calculate the maximum heart rate.

Each session lasted a total of 45 minutes. In the first part of the class, a 10-minute preparatory was performed based on joint mobility and cardiovascular activation. In this part, the exercises were not performed through HIIT and the heart rate had to be between 50% to 60% of the maximum heart rate, which was monitored through heart rate monitors (Polar H10, Finland). The curriculum activities were carried out in the second part of the class using the HIIT methodology. Each activity lasted 30 seconds, at an intensity of 80% of the maximum heart rate (monitored using Polar H10 heart rate monitors, Finland), followed by a 60-second break, in which the students walked through the gym where the class was taking place, the period of work (30s) and rest (60s) was repeated 3 times. Then it gave way to a new activity. In total, 6 different activities were carried out, which were the following: 1. Flexion-extensions of arms, 2. abdominals, 3. to raise and lower a drawer, 4. medicine ball throwing, 5. jumping rope, 6. obstacle courses. This part of the class lasted approximately 25 minutes. The third part of the class lasted 10 minutes, where a cooling down was carried out through stretching exercises, ensuring that the heart rate is between 50% and 60% of the maximum heart rate, which was monitored with heart rate monitors (Polar H10, Finland). The class was conducted throughout the intervention by the physical education teacher of the establishment that regularly taught the subject, who was previously trained in the use of the HIIT methodology. In each session, heart rate was monitored using heart rate monitors (Polar H10, Finland), so that the intensity of the activities was adjusted. Members of this group were advised not to engage in any other type of physical activity for the entire duration of the intervention.

The control group (CG) only carried out the activities of the subject of Physical Education, through the methodologies traditionally carried out by the teacher who taught the subject, which focused on the development of motor skills and physical fitness, which had the following structure, a preparatory part of 10 minutes where low intensity running and stretching were performed. The second part of the class consisted of the development of sports activities such as spins on beams, ball throwing, speed races. The last part of the class consisted of low speed running and stretching.

Both groups showed no statistically significant differences at the beginning of the intervention, demonstrating homogeneity of the groups.

Variables and measurement procedures

Fat Mass

It was measured by electrical bioimpedance with the Inbody 120 multifrequency analyzer instrument (Biospace), which provides fat mass values in percentages. To obtain the information, it is necessary to enter the height of the person to be evaluated, which was measured with a stadiometer (seca 222), where the subject evaluated had to be standing, with the spine aligned, keeping the vertex in the Frankfort plane. Prior to the evaluation, parents were asked that their children attend with light clothing, without metal garments and with the option of taking off their shoes. The entire procedure was carried out under the supervision of a teacher from the center.

Cardiorespiratory fitness

It was evaluated through the 20-meter shuttle run test, where participants must run between two lines separated by 20 meters and reach the lines along with the sound emitted by a pre-recorded tape (Leger et al., 1988). This measure, despite its limitations, is considered the most effective field evaluation to measure cardiorespiratory capacity (VO2max) in children and young people (Tomkinson et al., 2019; Zhang et al., 2020). For this reason, it has been widely used in the field of research, presenting adequate values of reliability, reliability, and validity to determine oxygen consumption in children and adolescents (Tomkinson et al.; Ruiz et al., 2011)

The first minute of the race is run back and forth between the two lines at a speed of 8.5 km/h. The speed increases by 0.5 km/h every minute. The test concludes when the participant is unable to reach the lines in conjunction with the sound stimulus. The minute in which the test was completed is recorded and the oxygen consumption is calculated using the formula proposed by Léger (Leger et al.), which delivers values in milliliters, per kilogram, per minute (ml/kg/min).

On the day the evaluations were carried out, both at the beginning and at the end of the intervention, the evaluation of the body fat variable began at the beginning of the school day, between 8 and 10 in the morning, for which they had to attend on an empty stomach. After feeding the subjects, a cardiorespiratory fitness assessment was performed in the school gymnasium.

The measurement of both variables was carried out by graduates in physical education, with experience with the instruments used, in addition, the research team had previous training, to maintain standardization. Both moments were measured by the same team members.

Statistical analysis

The Kolmogorov Smirnov test was applied to determine the type of distribution of the data and to select the statistical tests for comparison. Once the pretest was performed, the homogeneity of the groups was verified using the Student's T test for independent samples. To contrast the inter-subject results in the pre- and post-test, Student's T was used for related samples. The level of statistical significance was established at $p<0.05$ in all tests. When statistically significant differences are identified, the effect size will be calculated using Cohen's d estimates (<0.2 negligible; ≥0.2 to ≤0.49 small; ≥0.5 to ≤0.79 moderate; and ≥0.8 large) (Cohen, 1998).

For the analysis of the information collected, the statistical software SPSS version 29 was used.

Results

As shown in Table 1, After the contrast analysis between the pre- and post-intervention using the students' t-test for related samples, the fat mass of IG girls was 33.9% ± 2.11 before training and 32.1% ± 2.01 after the intervention. The percentage of fat mass decreased significantly in the IG (p= .037), with a small effect size (d= .21), in contrast to the CG of girls in which the mean increased in the intervention period from 34.2% ± 3.03 to 34.5% ± 3.26, interpreting this value as an increase in the fat mass of the CG group. A similar phenomenon occurs in boys. In the IG group, their fat mass was 23.5% ± 3.31 before the intervention, decreasing to 22.5% ± 3.53 after the intervention, with a small effect size (d= .25). In this group, fat mass decreased significantly (p= .032) in contrast to the CG, which increased in the intervention period from 23.7% ± 2.92 to 23.9% ± 3.15.

Table 1. Results before and after the intervention for fat mass in both groups separated by sex, control group and intervention.

	Control group N=40				Intervention group (HIIT) N=100				
	Pre-test	Post-test	p	d		Pre-test	Post-test	p	d
% Fat mass									
Girls N=20	34.2 (±3.03)	34.5 (±3.26)	0.720	-	Girls N=510	33.9 (±2.11)	32.1 (±2.01)	0.037	0.21
Boys N=20	23.7 (±2.92)	23.9 (±3.15)	0.200	-	Boys N=50	23,5 (±3,31)	22.5 (±3.53)	0.032	0.25

The values in bold indicate a statistical significance for p .05

Table 2 shows that the oxygen consumption (VO2max) of the girls in the IG was 16.9 ± 0.71 before the intervention and 18.7 ± 0.52 after the intervention, significantly improving the VO2 max (p<.001), with a small effect size (d= .19), supporting the hypothesis that, the higher the intensity of physical activity, the greater the oxygen consumption. In the case of boys there was also a positive effect, since at the beginning it was 22.5 ± 3.70 and after the intervention an improvement was observed to 26.1 ± 3.51, with a small effect size (d= .18). In the CG in girls, the mean decreased in a non-significant way in the intervention period, going from 15.4 ± 0.92 to 15.1 ± 0.45. In the CG in boys there was also a decrease, although not significant, where the VO2max was 22.0 ± 2.33 and after the intervention this value was 21.7 ± 2.20.

Table 2. Pre- and post-intervention results separated by sex, in control and intervention groups.

	Control group N=40				Intervention group (HIIT) N=100				
	Pre-test	Post-test	*p*	*d*		Pre-test	Post-test	*p*	*d*
Cardiorespiratory fitness (VO2Máx)									
Girls N=20	15.4 (±0.92)	15.1 (±0.45)	0.470	-	Girls N=50	16.9 (±0.71)	18.7 (±0.52)	<0.001	0.21
Boys N=20	22.0 (±2.33)	21.7 (±2.20)	0.390	-	Boys N=50	22.5 (±3.70)	26.1 (±3.51)	<0.001	0.22

The values in bold indicate a statistical significance for *p* .05

Discussion

The objective of this study was to establish the effectiveness of incorporating HIIT methodology in physical education classes on cardiorespiratory fitness and fat mass in students aged 7 to 10 years. The main results were that the intervention group decreased fat mass and increased cardiorespiratory fitness values.

The results of the study show improvements of 1.8 in girls and 3.6 in boys in cardiorespiratory fitness (VO2Max) through the HIIT intervention, unlike the control group, which decreased their VO2Max by 0.3 in both sexes. These results are like those reported in studies that have implemented HIIT methodology in children (Van Biljon et al.; Starkoff et al., 2014), demonstrating the effectiveness of this type of training. However, the literature also reports studies that did not achieve significant changes when implementing HIIT (Thivel et al., 2019; Racil et al., 2013). Studies that did not improve cardiorespiratory fitness values were conducted in clinical centers working with obese children and not in the school setting (Thivel et al.; Racil et al.). Therefore, the school context can facilitate the implementation of multicomponent interventions, reaching more schoolchildren and being effective and of low economic cost (Unicef, 2021; Llosa et al., 2020).

The reduction of VO2max values in the control group can be explained by the methodology used, which continued with the traditional programming of the physical education class of the Chilean curriculum. Apparently, this methodology does not help to comply with the recommended intensities to bring about beneficial changes for health (Wintle, 2022), increasing the health risk in the school population (van Sluijs et al., 2021). This situation is in line with the evidence that states that between 14.3% and 20% of physical education classes are allocated to moderate to vigorous physical activity (Giakoni et al.; Kain et al.), however, because the intensity of physical activity was not monitored in any of the groups, it is necessary that future research studies it be studied.

Another aspect that could explain the discrepancies between the studies that have applied the HIIT methodology are the differences between the duration of the sessions and the weekly frequency of the sessions. Although most studies have a similar duration of sessions (40 to 45 minutes), the frequency varies

between 1 to 4 times a week, which directly influences the results obtained. In relation to the total duration of the intervention, a systematic review that analyzed the efficacy of physical activity interventions determined that positive results can be obtained from 10 weeks to 5 years (Racil et al.). However, as Catuzzo et al. (2016) explain, the important thing is that the interventions are sustained over time, as the effects are not long-lasting.

Since CRF is a factor that can modify the consequences of obesity in children in the present and future (Barry et al., 2014), in addition to having positive effects on other important variables such as depression, anxiety, mood, self-esteem and even better academic performance (Ortega et al., 2008), it is necessary to implement more research that incorporates HIIT in physical education classes, in order to accurately determine the effect it produces on the CRF variable, as well as others that are related to health.

In relation to fat mass, a meta-analysis that determined the effect of HIIT on body composition in children and adolescents reported significant reductions (Meng et al., 2022), a similar situation occurred in the intervention group of the present study, who decreased fat mass values by 1.8% in girls and 1% in boys. This situation is particularly important since the excessive accumulation of fat mass is strongly associated with the risk of acquiring cardiovascular diseases (Millard et al., 2018). In addition, other research has reported that HIIT causes reductions in body mass index and waist circumference (Racil et al.), which when found at high values in children are linked to health damage (Grawe et al., 2023; GBD et al., 2017; Pietrobelli et al., 1998). As a result of the arguments presented and considering the high rates of childhood obesity worldwide and nationally (Chile), the results, together with those already existing, position HIIT as a tool that could contribute to reducing obesity levels.

A point to highlight is the place where the HIIT methodology is implemented, since most of the research is carried out in clinical centers, which is because people first go to this place to be diagnosed and then to be treated. We believe that this place is not the most suitable to work with children, because the context is different from the one they normally live, by this we do not mean that it does not serve to meet the objective, but that there may be more appropriate contexts. The other place where interventions that work with children and use HIIT are developed is at school, which is justified by the fact that it is where children spend most of their day, in addition to the fact that scientific evidence supports school as an environment that can provide greater support, integrating the people who usually surround children, such as the family and teachers (Waters et al., 2014; Brown et al., 2009). However, the studies carried out in schools are mostly carried out by incorporating HIIT into activities throughout the school day, such as recess or school breaks, or through workshops, in which they work with overweight or obese children and who do not use the HIIT methodology specifically in physical education classes. Therefore, we believe that our study is a contribution to the implementation of the HIIT methodology in physical education classes, since HIIT has similar characteristics to the games played by children, in addition to generating greater enjoyment (Dias et al., 2018; Brambilla et al., 2011).

The results found in this study have health implications of obesity prevention and treatment in children. The results reported by the intervention group highlight the usefulness of HIIT methodology as a strategy to improve CRF and reduce fat mass, which contributes to reducing the risk of obesity (Barry et al., 2014; Ortega et al., 2008). Our results provide scientific evidence to consolidate the benefits that HIIT has on CRF, and to ratify the relationship it has with fat mass. In addition, it helps subjects who are not overweight or obese to increase their CRF values and thus be better prepared, as CRF is classified as a potent marker of health (Barry et al., 2014).

An important point to address and highlight in relation to the participants of the study and the results obtained, is that although there is a variety of outdoor games or sports games in the physical education class that could cause similar changes in cardiorespiratory endurance and fat mass, to those caused in this study by the implementation of the HIIT methodology, in Chile the curriculum is developed through curricular bases that set general learning objectives that are mandatory, but the didactic guidelines on how to implement these objectives are reflected in the subject programs, which are not mandatory, but can be adapted to the reality of the classroom and the school, or replaced by those of their own elaboration by the educational establishment (Mujica-Johnson, 2022; Mujica-Johnson & Concha-López, 2020), so it cannot be said that outdoor games and sports games are a constant in schools. Therefore, the HIIT methodology may be feasible to be used in physical education classes, because its implementation does not affect context factors (equipment, infrastructure, environmental conditions), in addition to having a low or no cost of implementation and that due to its characteristics it would contribute to increase the

real work time allocated to moderate to vigorous intensity physical activity in physical education classes.

The strengths of this study are: a) the incorporation of a work methodology similar to the characteristics of the children's games that they usually practice and that is to the liking of the children, b) its direct execution in the physical education class, which allowed all students to receive the benefits of the HIIT methodology, c) the use of standardized assessment instruments, which contribute to the objectivity of the information collected, d) the work was carried out with Chilean children, a population on which there is little information in relation to the experience with the HIIT methodology and its effect on health variables, e) the use of a methodology that is aligned with the learning objectives proposed in the curricular bases of physical education in Chile, in particular with objective 6, in which the performance of moderate-vigorous intensity physical activity is indicated, and in objective 8, in which students must determine the intensity of the activities by means of the pulse (Mineduc, 2012, pp 44).

The limitations of this study are: a) not being able to generalize the results obtained by not working with a representative sample, so it is recommended to carry out a randomized controlled trial to ratify the effects, b) not having measured the total physical activity, preferably objective, that the children perform throughout the day, to determine how much the intervention carried out influenced, c) not to determine the number of overweight or obese children, since these conditions influence changes in the study variables, d) not to measure factors such as diet and sleep, since they influence the modification of the study variables, e) not to directly measure cardiorespiratory capacity, f) to perform the analyses without division by age of the participants, since the age ranges in childhood imply differences in the variables studied, g) formation of unequal groups in quantity (intervention n=100 and control n= 40).

It is recommended that future studies that incorporate the HIIT methodology in school, do so directly in physical education classes, due to the continuity that this allows throughout the year and the school year, thus allowing all students to be included, regardless of their sex or physical fitness, and therefore be favored with the benefits that the use of the HIIT methodology brings to children.

Conclusions

A HIIT intervention is more effective than the traditional physical education program in decreasing fat mass and increasing cardiorespiratory fitness in schoolchildren aged 7 to 10 years. These results allow HIIT to be considered a valid option in the national curriculum, contributing to increase the time of moderate to vigorous intensity physical activity in Chilean physical education.

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