Sportis
Revista Técnico-Científica del Deporte Escolar, Educación Física y Psicomotricidad
Scientific Technical Journal of School Sport, Physical Education and Psychomotricity

Published by: Campus Educa Sportis. Collaborator: University of A Coruña A Coruña. Spain

E-mail: v.arufe@udc.es Web: www.sportisjournal.com

ISSN-e 2386-8333

Original article. Effects of a school-based physical activity and sports program on children's well-being. Vol. 12, n. º 1; p. 1-20, January 2026. https://doi.org/10.17979/sportis.2026.12.1.12457

Effects of a school-based physical activity and sports program on children's well-being

Efectos de un programa escolar de actividad física y deporte en el bienestar infantil

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Editorial schedule: *Article received 17/07/2025 Accepted: 08/12/2025 Published: 01/01/2026*

https://doi.org/10.17979/sportis.2026.12.1.12457

To cite this article use the following reference:
Cusano, P.; Di Lascio, G.; Kasa, A.; Karçurri, A.; Mazza, F.; De Cesare, G. (2026). Effects of a school-based physical activity and sports program on children's well-being. Sportis Sci J, 12 (1), 1-20 https://doi.org/10.17979/sportis.2026.12.1.12457

Authors' specific contribution: Introduction (P.C., G.D.L.; A.K.) Materials and Methods (A.K., F.M., G.D.C.) Results (P.C., G.D.L., F.M.) Discussion (A.K., A.K., P.C.).

Informed consent study participants: All subjects gave informed consent for participation in the study.

Conflict of interest: the authors report no conflict of interest.

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Abstract
Physical activity plays a crucial role in the overall development of children, influencing various aspects of their daily lives. However, obesity and physical inactivity are among the main public health concerns globally. It becomes essential to promote sports in schools as an effective strategy to combat obesity, encouraging children to develop active lifestyle habits that could last into adulthood. The aim of this study was to measure the impact of regular participation in sports activities on overall well-being in the context of primary school. The participants, consisting of 200 students, underwent a structured physical activity program for six months, with exercise sessions held three times a week. Pre- and post-intervention measurements included assessments of psychological, physical, and social well-being through standardized questionnaires and physical tests. The results showed a significant reduction in anxiety and depression levels, an increase in self-esteem, and improvements in social skills such as cooperation and self-control. From a physical perspective, participants recorded improvements in cardiorespiratory endurance, muscular strength, and a reduction in body mass index (BMI). These findings suggested that integrating physical activity into the school routine could have significant beneficial effects on children's overall well-being, promoting healthy habits and combating childhood obesity.

Keywords: movement; education; school; youth; lifestyle.

Resumen
La actividad física desempeña un papel crucial en el desarrollo general de los niños, ya que influye en diversos aspectos de su vida cotidiana. Sin embargo, la obesidad y la inactividad física se encuentran entre los principales problemas de salud pública a nivel mundial. Resulta esencial promover el deporte en las escuelas como estrategia eficaz para combatir la obesidad, animando a los niños a desarrollar hábitos de vida activos que podrían perdurar en la edad adulta. El objetivo de este estudio era medir el impacto de la participación regular en actividades deportivas sobre el bienestar general en el contexto de la escuela primaria. Los participantes, 200 alumnos, se sometieron a un programa estructurado de actividad física durante seis meses, con sesiones de ejercicio tres veces por semana. Las mediciones previas y posteriores a la intervención incluyeron evaluaciones del bienestar psicológico, físico y social mediante cuestionarios estandarizados y pruebas físicas. Los resultados mostraron una reducción significativa de los niveles de ansiedad y depresión, un aumento de la autoestima y mejoras en habilidades sociales como la cooperación y el autocontrol. Desde una perspectiva física, los participantes registraron mejoras en la resistencia cardiorrespiratoria, la fuerza muscular y una reducción del índice de masa corporal (IMC). Estos resultados sugieren que la integración de la actividad física en la rutina escolar podría tener efectos beneficiosos significativos en el bienestar general de los niños, promoviendo hábitos saludables y combatiendo la obesidad infantil.

Palabras clave: movimiento; educación; escuela; juventud; estilo de vida .

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Introduction

Physical activity plays an important role in the overall development of children, influencing various aspects of their daily lives. In an era where sedentary behavior is increasing due to excessive technology use and reduced opportunities for outdoor play, promoting movement, physical activity and healthy lifestyle in schools has become essential (D'Isanto & D'Elia,2021; D'Elia & D'Isanto, 2021). Physical activity in children can be defined as any bodily movement produced by skeletal muscles that requires energy expenditure (Neil-Sztramko et al., 2021). This may include games, sports, recreational activities, physical education, or structured exercises. The World Health Organization recommends an average of 60 minutes of moderate or vigorous physical activity daily for children and adolescents (Bull et al, 2020). These activities should include exercises that strengthen muscles and bones at least three times a week. Sports not only contribute to physical health but also have a significant impact on the psychological well-being of children (Piñeiro-Cossio et al, 2020).

Different studies have shown that sports and physical activity have significant benefits on the physical, psychological, and social health of children (Piñeiro-Cossio et al., 2021). A study (Tandon et al, 2021) showed that children who regularly participated in sports had lower levels of anxiety and depression compared to their less active peers. Additionally, active children had higher self-esteem and better social skills. Another study (Zuckerman et al,2021) examining the impact of team sports on their psychological and social development. The results indicated that children involved in team sports showed significant improvement in social skills, better teamwork, and a reduction in problematic behaviors. These studies suggest that physical activity not only improves physical health but also contributes to psychological and social well-being (Kemel et al., 2022).

Participation in team sports provides children with the opportunity to develop social skills, work in groups, and build meaningful relationships with peers(Sannicandro & Raiola, 2021). Self-efficacy, defined as the confidence in one's ability to organize and execute actions necessary to achieve specific goals, is a central concept in psychological well-being. Several studies (Pakarinen et al, 2017; Escarti et al, 2010) have shown that physical activity can enhance self-efficacy in children, offering them experiences of

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success and the chance to overcome challenges. This, in turn, can positively influence other aspects of children's lives, such as academic performance (Di Domenico et al, 2024) and social relationships.

From a physical standpoint, regular sports and physical activity offer numerous health benefits for children. These include improved fitness, weight control, reduced risk of chronic diseases such as type 2 diabetes and cardiovascular disease and strengthened immune systems (Raiola, 2025). For example, a study by Strong et al. (2005) found that physically active children had lower blood pressure, lower cholesterol levels, and greater aerobic capacity. Beyond physiological benefits, regular physical activity helps improve body control and promotes self-perception development (Almeida et al., 2021; Giardullo et al, 2024). Childhood obesity has become one of the major public health concerns in many parts of the world, and physical inactivity is one of the primary contributing factors to this problem (D'Isanto et al, 2024). Studies such as Dietz and Gortmaker (2001) have shown that regular physical activity helps children maintain a healthy weight, reducing the risk of obesity and related diseases like type 2 diabetes. Promoting sports in schools can be an effective strategy to combat obesity, encouraging children to develop active lifestyle habits that can last into adulthood (Altavilla et al., 2022; D'Isanto, 2019).

In addition to physical and psychological benefits, sports have a significant impact on children's social well-being (Ceruso et al., 2024). Participating in sports provides children with the opportunity to interact with peers in a collaborative and friendly competitive environment. This can help develop important social skills such as communication, cooperation, respect for others, and conflict management. Team sports can teach children the importance of teamwork, responsibility, and respect for rules (Aliberti et al, 2025). These experiences can contribute to character development and help children develop a sense of belonging and identity. Feeling part of a group can enhance children's emotional and social well-being. A study by Eime et al. (2013) found that children who participate in team sports have a greater sense of belonging and social connection compared to their peers who do not engage in group activities. Furthermore, sports can provide a safe and controlled environment where children can learn to manage stress (Esposito et al, 2020) and negative emotions such as anxiety, frustration, and disappointment. Biddle et al. (2019) showed that children who regularly participated in

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team sports had significantly lower levels of anxiety and depression compared to their sedentary peers. This effect may be due to the release of endorphins during physical activity, which improves mood and overall well-being (Mahindru et al., 2023; Raiola, 2025).

However, it is important to note that most of these studies focus on adolescent or secondary school (Zuckerman et al., 2021; Tandon et al., 2021), and other contributions focus on primary school children (Escartì et al., 2010; D'Isanto et al., 2024). This study is also grounded in the Theory of Planned Behavior (Ajzen, 1991), which think that behavior is shaped by attitudes, subjective norms and percived behavioral control. Although sports interventions have been widely studied, few studies have examined a structured program specifically in primary school children using a mixed-methods approach combining psychological, physical, and social outcomes. Thestudy aims to measure the impact of regular participation in sports activities on the overall well-being , that is not only understood as the absence of disease but as psychological, physical, and social well-being, encompassing all areas of a person's life, of 200 primary school students. The specific objectives of the study include:

• Evaluating psychological well-being by measuring levels of anxiety, depression, self-esteem, and life satisfaction.

• Evaluating physical well-being by measuring changes in fitness, body weight, cardiorespiratory endurance, and muscle strength.

• Evaluating social well-being by measuring changes in social skills, cooperation, and sense of belonging.

To achieve these objectives, the study poses the following research questions:

• How does regular participation in sports activities affect the psychological well-being of primary school children?

• What physical improvements can be observed in children who regularly participate in sports activities?

• What social changes emerge in children who regularly participate in sports activities?

Based on the evidence from existing literature, the study hypotheses are:

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• (H1) Regular participation in sports activities improves children's psychological well-being by reducing levels of anxiety and depression and increasing self-esteem and life satisfaction.

• (H2) Regular participation in sports activities improves children's physical well-being by increasing fitness, reducing excess body weight, and improving cardiorespiratory endurance and muscle strength.

• (H3) Regular participation in sports activities improves children's social well-being by enhancing social skills, cooperation, and sense of belonging.

Materials and Methods

The study adopted a mixed-methods design, combining a quantitative experimental pre–post intervention with a qualitative observational component. Quantitative data included standardized psychological questionnaires and physical fitness tests administered before and after the intervention.. The sample consisted of 200 children aged between 6 and 10 years, recruited from various primary schools located in both urban and rural areas, ensuring socioeconomic and cultural diversity in the sample. The selection of the sample was conducted using stratified random sampling to ensure that each subgroup of interest was adequately represented. The inclusion criteria were age between 6 and 10 years, voluntary participation, and absence of medical conditions that would prevent participation in sports activities. Children with manageable conditions, such as asthma, were included if they were under medical control and had a physician's clearance to participate. Children with severe physical disabilities or medical conditions that could compromise their safety during physical activity were excluded. Informed consent was obtained from the parents prior to the start of the training program, after they were informed about the aims and procedures of the study. The final sample consisted of 52% males and 48% females, with an even distribution across the different school grades. To assess the impact of the sports intervention on the children's well-being, various measurements were taken before and after the intervention using psychological questionnaires, physical assessments, and social observations.

Rosenberg Self-Esteem Scale (RSES), consisted of 10 items, was used to measure the participants' global self-esteem. The items were rated on a 4-point Likert scale ranging

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from "strongly agree" to "strongly disagree." The RSES is one of the most widely used and validated instruments for measuring self-esteem in children and adults (Rosenberg, 1965). Has been used the italian validated version of the test, which shows good internal consistency in validation studies (Cronbach's α ranging from 0.77 to 0.88)

Spence Children's Anxiety Scale (SCAS) questionnaire, including 44 items, was used to measure different aspects of anxiety and depression in children. Items were rated on a 4-point Likert scale. The SCAS has been widely used in previous research and has shown good psychometric properties (De Riso et al, 2013). SCAS demostrated good internal consistency (Cronbach's α =0.85-0.89)

Psychological Well-Being Questionnaire (PWB) was used to measure six dimensions of psychological well-being: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. The questionnaire contained 84 items rated on a 6-point Likert scale (Ryff & Keyes,1995). The Psychological Well-Being Questionnaire (PWB) shows good internal consistency, with Cronbach's α value ranging from 0.70 to 0.89 across the six dimension.

Body Mass Index (BMI) was calculated by dividing body weight (in kilograms) by height (in meters) squared (Hasin-Brumshtein et al., 2009). This index was used to classify children into weight categories (underweight, normal weight, overweight, obese) based on age- and gender-specific growth curves. Cardiorespiratory Endurance was assessed using the 20-meter shuttle run test (Beep Test), a standardized and validated method for measuring cardiorespiratory endurance in children. Muscular strength was assessed using the standing long jump test and the push-up test. These tests were selected for their simplicity and ability to provide a reliable measure of overall muscular strength.

Social Skills and Behavior Scale (SSBS) was used to assess children's social skills in group settings. Teachers completed the scale for each child, providing an evaluation of their cooperation, assertiveness, self-control, and responsibility (Merrell & Gimpel, 1998). The observations focused on active participation, peer interaction, rule-following, and behavior during activities. Before the sports intervention began, the psychological questionnaires were administered to the children, and physical assessments were conducted. Teachers completed the social skills scale for each child. These pre-intervention data provided a baseline for evaluating the effectiveness of the intervention.

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At the end of the intervention, the tests and questionnaires were re-administered, followed by the teachers' completion of the social skills scale.

The sports intervention lasted six months, with physical activity sessions held three times a week for one hour. Activities were conducted in school gym and outdoor sports area avaiable within each participating institution. The sports sessions included a variety of structured sports and games designed to be enjoyable and engaging. Activities were tailored to the children's age and abilities to ensure active participation and success. The sports sessions were led by qualified instructors, that is holding a degree in Sport and Exercise Sciences , with a ratio of one instructor for every 10 children to ensure individual attention and appropriate feedback. The instructors followed a structured program that included warm-up, main activities, and cool-down. The main activities included:

• dribbling, passing, shooting exercises, and games to improve coordination, speed, and endurance (soccer).

• shooting, passing, dribbling exercises, and games to develop muscular strength, coordination, and accuracy (basketball).

• exercises focused on speed, endurance, agility, cardiorespiratory endurance and aerobic capacity (running).

• exercises focused on balance, flexibility, and strength, to the development of muscular strength and coordination (gymnastic).

These sports were selected because they develop fundamental motor skill, providing multiplanar stimuli, promoting complete motor development. Descriptive statistics were used to summarize data. A t-test was used to compare the means of the pre- and post-intervention scores. For the psychological and social data, mean scores were calculated for each dimension of the questionnaires and social skills; for the physical data, changes in BMI, cardiorespiratory endurance, and muscular strength were calculated. Additionally, an analysis of variance (ANOVA) was used to evaluate differences between groups based on gender, age, socioeconomic background, and tests. Direct observations made by the instructors during the sports sessions were analyzed qualitatively to identify emerging themes regarding social interaction, behavior, and the children’s engagement in the activities. The data were analyzed using SPSS v.27.0.

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Results

The results from the Rosenberg Self-Esteem Scale (RSES), used to assess children's self-esteem levels, indicated significant changes ($t = 5.23$, $p < 0.001$), with the average score increasing from 2.8 to 3.5. A detailed description is shown in Figure 1.

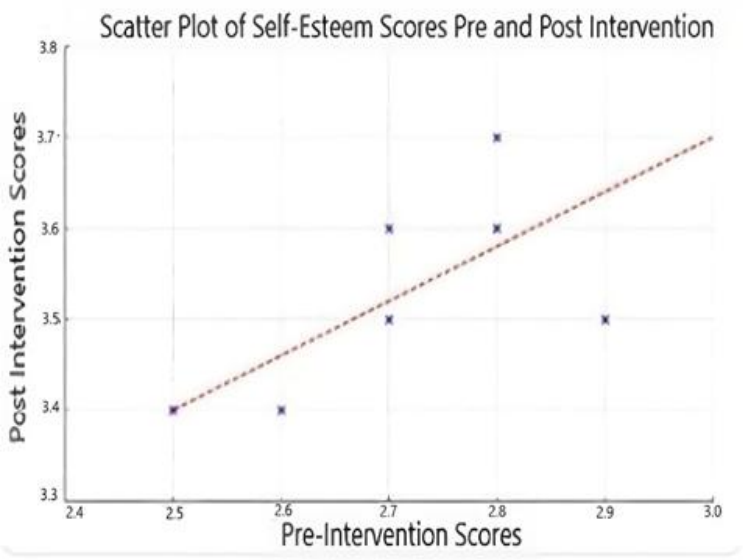

Figure 1. Mean self-esteem scores pre- and post-intervention

The results from the SCAS questionnaire, designed to detect symptoms of anxiety and depression, also showed significant changes (anxiety: $t = -4.12$, $p < 0.001$; depression: $t = -3.89$, $p < 0.001$), with scores decreasing from 2.7 to 2.1. A detailed description is shown in Figure 2.

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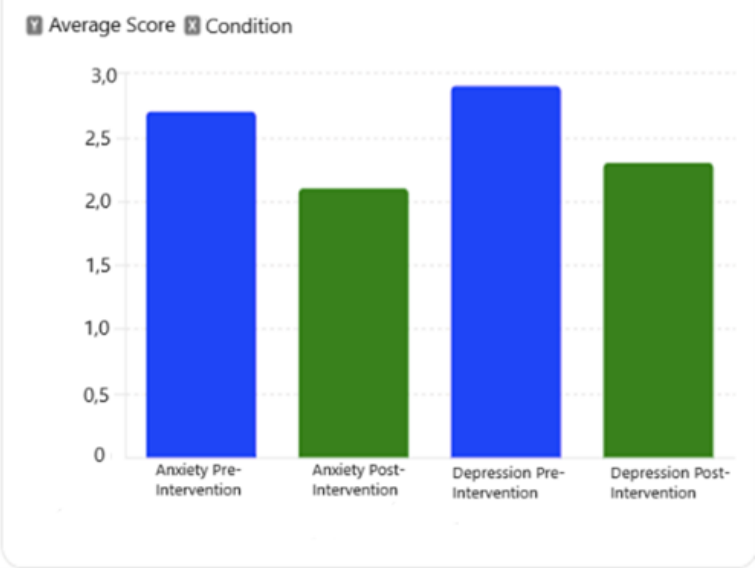

Figure 2. Mean anxiety and depression scores pre- and post-intervention

The Psychological Well-Being (PWB) questionnaire results revealed significant differences across all six dimensions of psychological well-being investigated ($p < 0.05$), including autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. A detailed description is shown in Figure 3.

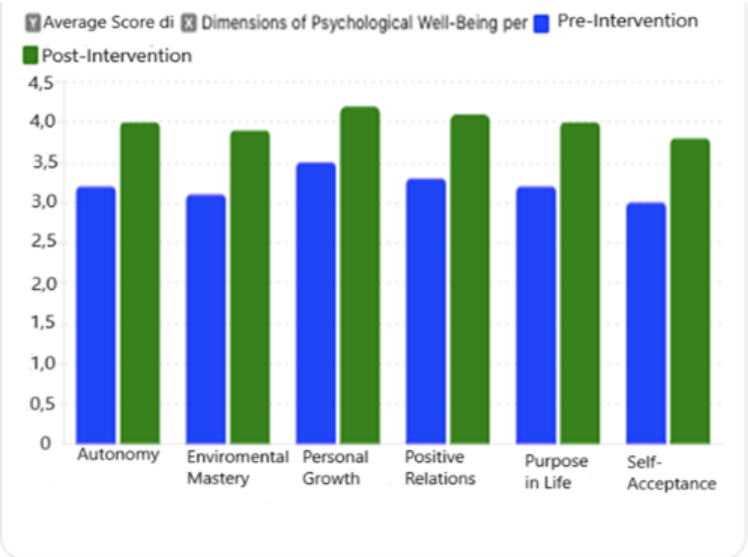

Figure 3. Changes in psychological well-being scores pre- and post-intervention

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ANOVA analysis revealed significant differences between age and gender groups, showing that younger children and females benefited more from the intervention. The children's average Body Mass Index (BMI) significantly decreased ($t = -2.67$, $p < 0.01$), from 19.5 to 18.9, suggesting an improvement in body composition, as shown in Figure 4.

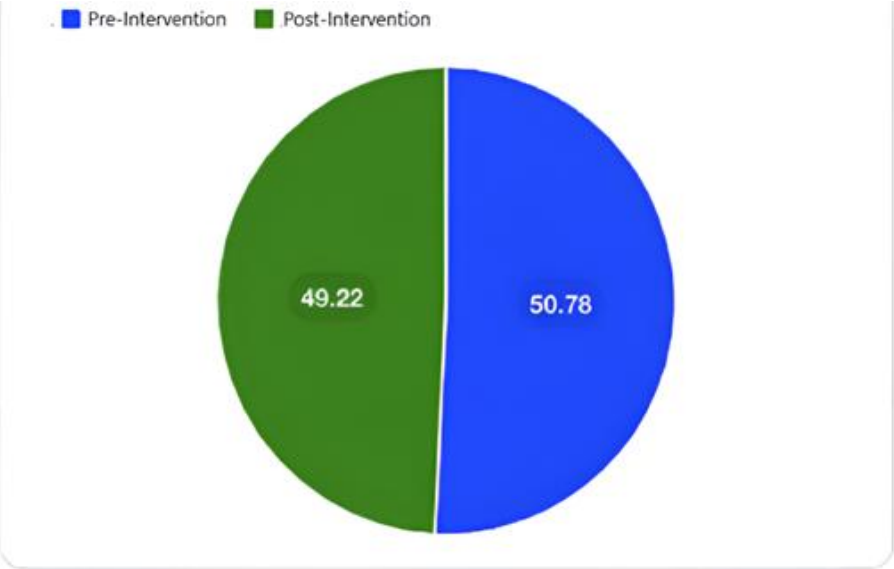

Figure 4. BMI variation pre- and post-intervention

The results from the Beep Test, measuring cardiorespiratory endurance, indicated significant improvements ($t = 6.45$, $p < 0.001$), with the average score increasing from 6.5 to 8.2, as shown in Figure 5.

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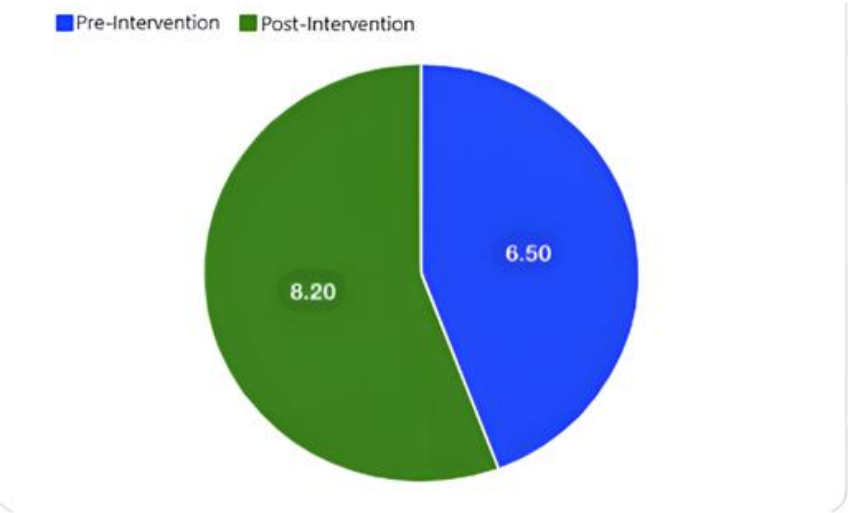

Figure 5. Beep Test results pre- and post-intervention

The results of the standing long jump test showed a significant increase in the average distance, from 1.2 meters to 1.4 meters, and the push-up test results indicated a significant increase in the number of successful trials, from 8 to 12 (push-ups: $t = 5.67$, $p < 0.001$; long jump: $t = 4.23$, $p < 0.001$), as reported in Figure 6.

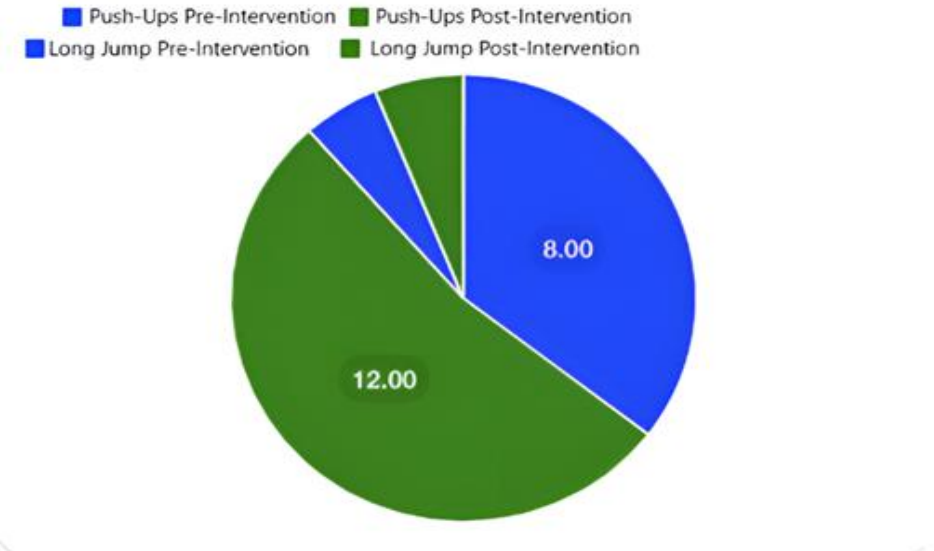

Figure 6. Changes in muscular strength (push-ups and long jump) pre- and post-intervention

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The results from the Social Skills and Behavioral Scale (SSBS) showed a significant increase in the mean scores for cooperation, assertiveness, self-control, and responsibility (cooperation: $t = 4.87$, $p < 0.001$; assertiveness: $t = 4.12$, $p < 0.001$; self-control: $t = 4.56$, $p < 0.001$; responsibility: $t = 4.23$, $p < 0.001$), as shown in Figure 7.

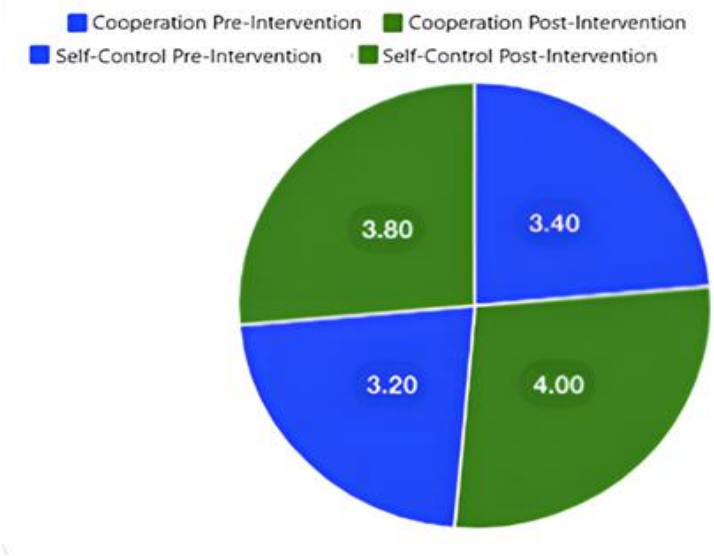

Figure 7. Mean social skills scores pre- and post-intervention

Discussion

The results of this study demonstrated the effectiveness of regular participation in sports activities on children's physical, psychological, and social well-being, reducing anxiety and depression levels while increasing physical fitness, self-esteem, and social skills. Data analysis showed significant improvements in children's psychological well-being following participation in sports intervention. The mean self-esteem scores, as measured by the Rosenberg Self-Esteem Scale, increased significantly, indicating improved self-perception. Similarly, the SCAS scores showed a significant reduction in anxiety and depression symptoms. Specifically, paired-sample t-test results indicated that the sports intervention led to a significant reduction in anxiety and depression scores. The mean self-esteem scores increased from 2.8 (pre-intervention) to 3.5 (post-intervention), representing a significant improvement. Variance analysis revealed significant differences between groups: children aged 6-8 showed greater improvements in self-esteem compared to those aged 9-10. The improvement in self-esteem and reduction in anxiety observed in our participants are consistent with literature, that highlight the

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psychological benefits of regular physical activity in children ((Biddle et al., 2019; Carter et al., 2021). Results suggest that structured activities can enhance children's perceived competence and self-efficacy, in line with findings of of Escartí et al. (2010).

Physical data analysis showed significant improvements in various aspects of physical well-being. The participants' average BMI slightly decreased, indicating an improvement in body composition. The cardiorespiratory endurance tests (Beep Test) showed a significant increase in aerobic capacity, with mean scores rising from 6.5 levels (pre-intervention) to 8.2 levels (post-intervention). Muscular strength also improved, as indicated by the standing long jump and push-up test results. The mean number of completed push-ups increased from 8 (pre-intervention) to 12 (post-intervention), while the mean long jump distance increased from 1.2 meters to 1.4 meters. Improvements in cardiorespiratory endurance were significantly greater in children who participated in running sessions compared to those engaged mainly in team sports. Moreover, children with lower pre-existing physical activity levels showed greater improvements in muscular strength than those with higher activity levels. From a physical standpoint, the increases in cardiorespiratory endurance and muscular strength align with evidence reported by Strong et al. (2005) and Neil-Sztramko et al. (2021). This is in line with the concept that multilateral physical programs are effective for developing global movement skills in primary school children.

Social data analysis revealed significant improvements in children's social skills. The mean scores from the Social Skills and Behavioral Competence Scale (SSBS) increased, indicating improvements in cooperation, assertiveness, self-control, and responsibility. Paired-sample t-test results showed that the mean cooperation scores increased from 3.4 to 4.0, while self-control scores rose from 3.2 to 3.8. Variance analysis indicated that social skills improvements were significantly greater in children who participated in team sports compared to those engaged primarily in individual sports. Social outcomes also are in line with Eime et al. (20213 and and Zuckerman et al. (2021), which highlight how participation in team sports promotes cooperation, emotional regulation and interpersonal skills.

Direct observations and open-ended questionnaire responses provided qualitative insights into how children experienced the sports intervention. Observations during the

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sports sessions offered further insights into the changes in children's social behavior. Instructors reported increased active participation, more positive peer interactions, and stronger respect for rules and others. Key themes emerging from the qualitative analysis included increased self-confidence, as many children reported feeling more confident and capable of tackling challenges. Instructors confirmed that children were more willing to try new activities and engage in difficult tasks. Another theme was the improvement in interpersonal relationships, as children developed stronger friendships and demonstrated greater cooperation and mutual respect during activities. Observations revealed an increase in positive interactions and a reduction in conflicts during sports sessions. Children enhanced their sense of belonging to the sports group, describing the sessions as an important part of their day. This sense of community contributed to their emotional and social well-being. Finally, children learned to better manage negative emotions such as frustration and disappointment through the experience of sports. Instructors observed that children were better able to control their emotional reactions and resolve conflicts constructively.

The observed improvements in psychological, physical, and social well-being indicate that regular participation in sports activities can have significant positive effects on children. Improved self-esteem and reduced anxiety and depression symptoms align with psychological theories linking physical activity to mental health (Carter et al., 2021). Our study supports this theory, suggesting that sports can provide a context where children feel competent, autonomous, and connected to others. The improvements in cardiorespiratory endurance, muscular strength, and BMI indicate that regular physical activity can contribute to better physical health in children (Rossi et al., 2021). These findings may be valuable to primary school educators, both generalists and specialists, in developing educational programs that promote the integration of physical activity into children's daily lives, with the goal of enhancing not only physical health but also psychological and social well-being.

Conclusions

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The sports intervention provided children with regular opportunities for physical exercise, contributing to their overall physical development. The social skills improvements observed in our study suggest that sports can play a crucial role in children's social development. Participation in team sports offers opportunities for social interaction, cooperation, and the development of relational skills. These findings are supported by the theory of planned behavior, which emphasizes the importance of social support and social norms in promoting positive behaviors. The results of this study have important practical implications for schools, educators, and educational policymakers. Schools should consider integrating structured sports programs into the curriculum and providing regular opportunities for physical activity for all students. Educators should be trained to recognize the importance of sports in children's development and to use physical activity as a tool for promoting psychological and social well-being. Additionally, it is important to create a positive and supportive environment where all children feel included and motivated to participate. Future studies could extend the duration of the intervention to examine the long-term effects of sports on children's well-being. Furthermore, the sample was limited to children aged 6-10 from a specific geographic region, Campania. Future studies could include larger and more diverse samples to examine the impact of sports on different populations of children. In summary, our study demonstrated that regular participation in sports activities can have significant positive effects on the psychological, physical, and social well-being of primary school children.

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