

Analysing the social dimension of sustainable development. Analysis of interaction preferences in Physical Education in Secondary School

Análisis de la dimensión social del desarrollo sostenible. Análisis de las preferencias de interacción en Educación Física en Secundaria

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Resumen. El objetivo de esta investigación fue analizar los componentes de la interacción social que influyen en el aprendizaje cooperativo en las clases de educación física durante la educación secundaria obligatoria (ESO), abarcando edades de 11 a 16 años, y su contribución al desarrollo sostenible. Se incluyeron objetivos secundarios, como comparar estas dimensiones por género y nivel de grado, y determinar la etapa de la ESO más recomendable para implementar el aprendizaje cooperativo en educación física. El estudio fue de corte transversal, cuantitativo y descriptivo, con direccionalidad prospectiva y control observacional. Participaron 372 estudiantes de ESO de un instituto público en Elche, de un total de 412 invitados. La muestra se distribuyó entre 119 estudiantes de 1º de ESO, 119 de 2º, 62 de 3º y 72 de 4º. Se utilizó el cuestionario "Escala Graupera/Ruiz de Preferencias de Interacción Social en Educación Física (GR-SIPPEL)". Los principales resultados mostraron una preferencia general por la cooperación en educación física, con puntuaciones más altas en competitividad para las niñas. Además, se observó una disminución en cooperación y afiliación a medida que los estudiantes avanzaban de curso, con un aumento en competitividad e individualismo. Como conclusión se puede decir que los estudiantes de secundaria mostraron una fuerte preferencia por la cooperación durante las clases de educación física.

Palabras clave: interacción social, aprendizaje cooperativo, educación física, educación secundaria, desarrollo sostenible.

Abstract. The aim of this research is to analyze the components of social interaction that influence cooperative learning (CL) in physical education (PE) classes during compulsory secondary education (ESO), spanning ages from 11 to approximately 16 years old, and its contribution to sustainable development (SD). Secondary objectives include comparing these dimensions by gender and grade level, and determining the most advisable stage of ESO to implement CL in PE. The study is cross-sectional, quantitative, and descriptive, with prospective directionality and observational control. A total of 372 ESO students from a public institute in Elche participated, out of 412 invited. The sample was distributed among 119 1st ESO students, 119 2nd ESO students, 62 3rd ESO students, and 72 4th ESO students. The "Graupera/Ruiz Scale of Social Interaction Preferences in PE (GR-SIPPEL)" questionnaire was used. Results indicate a general preference for cooperation in PE, with higher competitiveness scores for girls. Additionally, a decrease in cooperation and affiliation is observed as students progress through grades, alongside an increase in competitiveness and individualism. In conclusion, secondary school students exhibit a strong preference for cooperation during PE classes.

Key words: social interaction, cooperative learning, physical education, secondary education, sustainable development.

Fecha recepción: 15-11-23. Fecha de aceptación: 19-02-24

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Introduction

The Sustainable Development Goals (SDGs) adopted by the United Nations in 2015 contain the most ambitious global agenda approved by the international community to mobilize collective action around common goals (UNESCO, 2017). This organization also points out that the SDGs, in addition to addressing extreme poverty, encompass three essential dimensions of sustainable development (SD): economic, social, and environmental, "providing a valuable roadmap for shaping global policy formulation". Additionally, Alonso-Sainz (2021) emphasizes the strong connection of the SDGs to the defense of human rights, gender equality, women's empowerment, and the elimination of unsustainable consumption patterns, all of which are linked to SDGs 1 (end of poverty), 2 (zero hunger), 3 (health and well-being), 4 (quality education), 5 (gender equality), 10 (reduction of inequalities), and 12 (responsible consumption and production).

In this regard, UNESCO (2018) warns that today, there is great concern about the increasing global inequalities, not only among countries but also within nations. Furthermore, this same organization suggests that the role that education can play in reversing the trend of rising inequality is of great

relevance. However, the first step to achieve this is to increase the likelihood of high-quality public education (SDG 4) so that all children have the right to access it, an education without discrimination or exclusion (SDGs 5 and 10). To achieve this, it would be relevant to reduce the presence of violence, as Rodríguez et al. (2020) warn of the existence of violence as a social phenomenon, arguing that it is experienced by millions of people in society, making it one of the main issues of today's society.

It is worth noting that this is a complex social problem, a human rights issue, and a global health concern since it negatively impacts various aspects of people's lives in different contexts and levels, directly affecting SDG 3. Regarding violence in schools, Osornio-Callejas (2016) points out that it directly affects social interactions, creating an unfavorable environment for the teaching and learning process of students. This would create a working environment that limits cooperation among people, an aspect that affects the achievement of SDG 17 (partnerships to achieve the goals) (UNESCO, 2017).

The initial advancements following the approval of the SDGs showed some significant improvements: the decrease in extreme poverty and child mortality, progress in combating diseases such as HIV and hepatitis, as well as

advancements in gender equality and access to electricity in less developed countries (Naciones Unidas, 2023). However, these achievements were fragile and slow, and over the last three years, the COVID-19 pandemic, the conflict in Ukraine, and climate-related disasters have exacerbated these vulnerabilities, further weakening the progress made (Naciones Unidas, 2023).

Importance of Education for Sustainable Development

With accelerated lifestyles and work routines, changes in the planet and in humanity are constantly speeding up. This has resulted in a global emergency in which education appears to have something to say and do (Alonso-Sainz, 2021). However, this same study warns that there is a need to enhance the training of teachers regarding SD because deficiencies in their sustainability competencies were detected, which should be addressed in both initial and ongoing education.

Studies like that of Escámez and López (2019) caution that education today bears the responsibility of promoting strong values and skills that respond to the challenges and aspirations of the twenty-first century, leading to sustainable and inclusive growth and peaceful coexistence. They also state that people need knowledge, skills, values and attitudes that can contribute to SD, and therefore quality education (ODS 4) is crucial to achieve this development. In earlier studies such as Setó-Pamies and Papaoikonomou (2016), this idea is also referenced, maintaining that the formal educational system is a very suitable arena for promoting sustainability as it can influence students' worldview and attitudes toward sustainability, contributing to deeper social change.

Returning to the study by Escámez and López (2019), it is worth noting the idea that SDE aims to develop people's capacity to think about their actions while opening new opportunities and directions. Furthermore, they emphasize that it is characterized by aspects such as self-directed learning, participation and collaboration, problem orientation, interdisciplinary and transdisciplinary learning, and both formal and informal education.

In this regard, if we link PE and SDE, as demonstrated in Baena-Morales et al. (2021) study, it showed how, out of the 169 targets that comprise the SDGs, direct contributions could be made to 24 of them. Aspect that could directly contribute to SDG 3 and goal 3.4, which aims to "reduce by one third premature mortality from non-communicable diseases through prevention and treatment, and promote mental health and well-being" (UNESCO, 2017), target that, in this case, also has a direct relationship with the social dimension of SD.

Physical Education and the Social Dimension of Sustainable Development

Guijarro et al. (2020) warn that international recommendations indicate that young people and adolescents should engage in at least sixty minutes of moderate to

vigorous physical activity each day, three times a week. Unfortunately, there has been a progressive decline in the levels of physical activity as children grow, particularly during adolescence, where levels of physical activity fall below the recommended guideline mentioned earlier (Viciano et al., 2015). Generally, physical activity in schools represents between 30 and 40% of the daily total moderate to vigorous physical activity in young people, making schools a factor that could directly contribute to addressing the failure to meet international recommendations and reducing inactivity among students (Guijarro et al., 2020).

In this context, Baena-Morales et al. (2023) stress the importance of education in achieving SD, stating that "ESD has been proposed as the educational sector's response to the challenges that the planet is facing, and that educational treatment would be one of the main avenues of action to ensure sustainability improvement in the coming years (UNESCO, 2017)." Additionally, Ruiz et al. (2010) affirm that PE in schools has, among its primary objectives, the promotion of social growth and the development of social behaviours in children and adolescents, including altruism, empathy, and understanding the needs of others, thus promoting the social dimension of SD.

However, the same study by Baena-Morales et al. (2023) warns, after reviewing the existing literature on these aspects, that it has been observed that PE teachers do not have a clear conception of what the concept of SD and the SDGs encompasses. This problem affects not only PE but is a situation that a significant proportion of teachers and the educational community share.

Furthermore, it is important to highlight that some research is beginning to associate various pedagogical models as a key to promoting the SDGs and incorporating them into PE, as is the case with CL (Baena-Morales et al., 2020).

Cooperative Learning and Physical Education

Studies such as the one by Fernández-Río et al. (2018) emphasize that current pedagogical models highlight the interdependence of the four fundamental elements in any teaching and learning process: student, teacher, content, and context. In this work, we will delve more deeply into one of them: the CL model.

CL is an educational methodology based on working in small groups, typically heterogeneous, where students combine efforts and share resources to enhance their own learning as well as that of other group members (Valls Castillo et al., 2017). Furthermore, this same study points out that when implementing this methodology, it's crucial to recognize that it goes beyond simple group activities. By employing CL, each student not only aspires to learn specific content but also facilitates the necessary assistance to help their peers achieve that learning. CL replaces the structure based on mass production and competitiveness, which prevails in most schools, with another organizational structure based on teamwork and high performance (Johnson et al., 1999). With CL, the teacher becomes an engineer who organizes and facilitates team learning, instead of merely

filling students' minds with knowledge, like a gas station attendant filling car tanks. As (Johnson et al. (1999) states, CL benefits the teacher in several ways. First, it enhances the performance of all students, including both the talented and those who struggle. Second, it fosters positive relationships among students, creating a learning community that values diversity. Third, it provides students with experiences for healthy social, psychological, and cognitive development.

In this regard, the CL model can be defined as a pedagogical model in which students learn with, from, and by other students through a teaching and learning approach that facilitates and enhances positive interaction and interdependence (Johnson et al., 2000). Both teachers and students act as co-learners (Fernández-Río et al., 2016). This statement aligns with the idea of Méndez-Giménez and Fernández-Río (2016), who consider that the definition of CL encompasses the two fundamental concepts currently involved in CL: promoting interaction among learners and between learners and the teacher. The notion of acting as co-learners is a recent addition to the methodology, a novelty that, according to these authors (Fernández-Río & Méndez-Giménez, 2016), is rooted in the recognition that the teacher also learns from everything students do to either apply what is positive or modify any negative aspects found, whether immediately, in the short term, medium term, or long term.

It's worth noting that there is consensus on the fundamental characteristics that any CL structure should entail (Fernández-Río et al., 2016; Johnson et al., 1999): (1) Positive interdependence: group members rely on each other to achieve the objective. (2) Promotive interaction: students are in direct contact with each other within the group to help each other during tasks. (3) Individual accountability: each group member takes individual responsibility for a part of the overall work. (4) Group processing: all students in the group must speak and discuss to jointly process available information. (5) Social skills: as a result of the above, students will develop interpersonal communication skills, group management, and leadership.

Casey and Fernández-Río (2019) point out that the importance of group goals and individual accountability lies in providing students with an incentive to help each other and encourage them to give their best effort. If students understand that they can only succeed by ensuring that all group members have learned the material, then group members will be motivated to teach each other. Therefore, if a teacher can truly get their students to work cooperatively, the entire teaching and learning process will be positively impacted (Fernandez-Río et al., 2018).

Moreover, it's worth mentioning the CL Cycle discussed by Fernández-Río (2017), which represents a structure that takes both the teacher and students from initial steps to more complex structures of this pedagogical model, proposing three phases (Figure 1).

This same study by Fernández-Río highlights various barriers to consider for the proper development of CL in

PE classes, such as the excessive use of competition as a motivating element for students, the likely loss of control in the classroom when students take on the role of the teacher in their group, non-compliance with rules to achieve victory in cooperative activities, and potential negative reactions toward group peers for not being the first in such activities. Taking these factors into account, it becomes evident that cooperation, competitiveness, and individualism exhibit a different relationship between the task to be performed and the goal to be achieved when students practice for learning (Ruiz et al., 2010).

In conclusion, considering these aspects of CL, it can be affirmed that the implementation of this teaching methodology demonstrates how PE is a subject that offers the opportunity to teach behaviours that respect gender equality, emotional mastery, equal opportunities, and non-discrimination for any reason (Baena-Morales et al., 2023).

Based on the aforementioned points, this study seeks to provide answers regarding whether CL should be more extensively implemented in secondary school PE classes to promote social interactions among students and align with their preferences.



Figure 1. Phases of the Cooperative Learning Cycle.

Gender and age

Research findings exploring learning preferences indicate that boys and girls are socialized to perceive, relate, and behave in distinct and often stereotypical manners. Studies also highlight differences in the type and frequency of physical activities engaged in by boys and girls. The content of these activities, which often includes components aimed at improving endurance, may impact the overall development of physical fitness (Lisowski et al., 2020). This research revealed that boys, in comparison to girls (mean age 6.95 ± 0.43), showed a greater preference for activities such as biking, running, and team sports, while they participated less frequently in roller skating and dance. According to Lampinen et al. (2017), the most prevalent supervised physical activity among girls (aged 6–8 years) was dance and gymnastics, while among boys, it was ball games. Also in many studies have revealed that girls tend to exhibit more cooperative, empathetic, and supportive behaviors compared to boys (Ruiz et al., 2010). Furthermore, (Seabra et al., 2011) investigated the influence of age, sex, socioeconomic status, siblings, and parents/peers on the physical activity of children and adolescents (aged 10-18 years). In Spain, research indicates that girls (aged 10-18 years) demonstrate greater sensitivity, empathy, and respect in both primary and secondary education settings, as well as showing more concern for others and paying more attention

to younger children than boys (Calvo et al., 2001).

Therefore, the hypothesis of the present study was to test whether there is a greater preference for cooperation in physical education classes during secondary education (ESO), which will lead to higher levels of commitment and participation in cooperative learning. In addition, the aim is to check whether boys show higher levels of competitiveness and, as the grades progress, a tendency towards individualism is observed. For this reason, the overall objective of this research is to analyse the components of social interaction that influence CL in PE classes during ESO, where ages range from 11 to about 16 years old, in addition to its contribution to SD. It's also worth noting that there are secondary objectives of the study, such as comparing these dimensions by gender and grade level and determining in which stage of ESO it would be more advisable to implement CL in PE.

Materials and Methods

Study Design

The study conducted is a quantitative cross-sectional study with a descriptive nature. In terms of directionality, it is a prospective study, and in terms of control criteria, it is an observational study.

Participants

A total of 412 ESO students from a public institute in a district of the town of Elche were invited to participate, with 372 ESO students ultimately taking part in the study. The sample consisted of 119 1st ESO students, 119 2nd ESO students, 62 3rd ESO students, and 72 4th ESO students. Table 1 provides the age distribution by grade of the participants. Of these, 165 are male (44.2%), 193 are female (51.7%), and 15 students (4%) chose not to specify their gender in their response, selecting the "other" option. In these cases, the decision was made to exclude these responses from the comparative analysis between genders.

Table 1.
Ages per grade

	N	Mean	SD ¹
1 st ESO	119	12.32	0.68
2 nd ESO	119	13.43	0.57
3 rd ESO	62	14.60	0.40
4 th ESO	72	15.53	0.47

¹ Standard deviation

We also emphasize that this is an intentional or convenience sample, as the study was conducted with the available students at the specific school, and the completion of the questionnaire was voluntary. Furthermore, the participants were informed about the study, and all of them provided informed consent to participate.

Instrument

The tool used for the development of this study was the questionnaire called the "Graupera/Ruiz Scale of Social Interaction Preferences in PE (GR-SIPPEL)," developed by

Ruiz et al. (2010). The questionnaire consists of twenty-eight items covering different dimensions: cooperativeness (Item 10. I think that group work is necessary for everybody), competitiveness (Item 9. I try to be the best in my class), individualism (Item 8. My best way of doing things well is doing them alone), and affiliation (Item 7. I need to participate in group work to feel well). Respondents used the same four-level Likert scale designed by the authors to indicate their agreement or disagreement with each item (1= Strongly Disagree; 2= Somewhat Disagree; 3= Somewhat Agree; 4= Strongly Agree). The instrument's authors assessed the reliability of internal consistency for the social interaction domains (Cronbach's α). The Cronbach's α reliability coefficients were 0.77 (CI 95%: 0.76–0.78) for cooperation, 0.70 (CI 95%: 0.69–0.71) for affiliation, 0.83 (CI 95%: 0.83–0.84) for competitiveness, and 0.77 (CI 95%: 0.76–0.78) for individualism. These coefficients demonstrated internal consistency (since they meet or exceed ≥ 0.70) and were considered appropriate.

Procedure

The data were collected from the students at the local school in south-eastern Spain. Some difficulties were encountered in conducting the study during PE classes, in addition to not having contact with all ESO groups. Therefore, an initial meeting was held with the school's management team, during which a report detailing the intention to administer a questionnaire to the school's students, along with its objectives, was drafted. After obtaining approval from the school's management, a meeting was scheduled with the tutors of all ESO groups. The report was presented to them, and upon their approval, a date and time were set to visit their tutoring hours and propose that their students anonymously complete the GR-SIPPEL questionnaire using the Google Forms tool. Consent to participate was given by the students, and parental consent was obtained.

After three weeks dedicated to data collection, a total of 372 responses were recorded. Subsequently, data analysis was carried out.

The study design respects the ethical aspects presented in the Declaration of Helsinki. This research was approved by the ethics committee of the University of Alicante under code UA-2022-03-17.

Data Analysis

To perform the analysis of the data obtained from the sample, IBM SPSS 26.0 software for Windows was used. Descriptive analyses (mean, median, and standard deviation) were conducted for the data obtained through the questionnaire. The Shapiro-Wilk test was conducted to assess the normality of the data, yielding results that indicated a non-normal distribution ($p < 0.05$). This justified the choice of non-parametric statistical methods for subsequent analysis. Additionally, non-parametric tests such as Mann-Whitney U and Kruskal-Wallis H tests were performed to compare variables by gender and grade level. This study was conducted with a 95% confidence level and a 5% margin of

error, ensuring the reliability and accuracy of the findings within the specified parameters.

Results

In Table 2, the descriptive statistical analysis of each of the variables to be analysed through the GR-SIPPEL questionnaire is presented. It's worth noting that the items have been grouped according to the different dimensions that will be examined regarding the interaction among students as follows: cooperativeness (2, 6, 10, 14, 18, 22, 26), competitiveness (1, 5, 9, 13, 17, 21, 25), individualism (4, 8, 12, 16, 20, 24, 28), and affiliation (3, 7, 11, 15, 19, 23, 27).

Table 2.

Descriptive statistics of interaction dimensions

	N	Mean	SD ¹	Median
Cooperativeness	372	3.12	0.58	3.21
Competitiveness		2.59	0.76	2.57
Individualism		2.33	0.66	2.29
Affiliation		2.41	0.59	2.43

¹Standard deviation

Subsequently, in Table 3, you can observe the descriptive statistics grouped within the different dimensions of interaction, but this time making a comparison between genders. Moreover, after confirming that the sample does not follow a normal distribution in the normality test, the non-parametric Mann-Whitney U test was performed to carry out this gender comparison. Significant differences by gender were observed in two of the four dimensions covered by the questionnaire: competitiveness (Boys: M=2.76, SD=0.72; Girls M = 2.92, SD= 0.71) and individualism (Boys: M=2.48, SD=0.64; Girls M=2.23, SD=0.65), with a significance level of p<0.05.

Table 3.

Comparison and contrast between genders.

	Sex				Non-parametric test	
	Boys (n=164)		Girls (n=193)		U of Mann-Whitney	p
	Mean	SD	Mean	SD		
Cooperativeness	3.11	0.53	3.14	0.60	14755,00	0,269
Competitiveness	2.76	0.72	2.92	0.71	11800,00	<0,001*
Individualism	2.48	0.64	2.23	0.65	12165,50	<0,001*
Affiliation	2.38	0.56	2.42	0.61	15269,00	0,565

*Significance; ¹Standard deviation

On the other hand, in Table 4, the descriptive analysis of the aforementioned dimensions was conducted once again, and it presents the comparison of this analysis by each of the grade levels of the students in the sample.

Table 4.

Comparison of descriptive statistics among grade levels.

	Grade							
	1 st ESO (n=119)		2 nd ESO (n=119)		3 rd ESO (n=62)		4 th ESO (n=72)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Cooperativeness	3.25	0.58	3.00	0.61	3.15	0.47	3.04	0.56
Competitiveness	2.45	0.81	2.48	0.74	2.97	0.68	2.66	0.65
Individualism	2.27	0.66	2.22	0.64	2.48	0.65	2.50	0.64
Affiliation	2.48	0.60	2.42	0.60	2.42	0.58	2.26	0.55

Furthermore, the non-parametric Kruskal-Wallis H test was conducted (Table 5) as a contrast test among the four grade levels regarding the dimensions examined. Subsequently, significant differences were observed in cooperativeness, competitiveness, and individualism. Therefore, a pairwise Mann-Whitney U test was conducted once again to determine between which grade levels these differences exist (Table 6).

Table 5.

Contrast among the four grade levels.

	H Kruskal-Wallis	p
Cooperativeness	16.23	0.001*
Competitiveness	23.47	<0.001*
Individualism	12.83	0.005*
Affiliation	5.98	0.112

*Significance

Table 6.

Pairwise comparison between grade levels.

	p			
	Cooperativeness	Competitiveness	Individualism	Affiliation
1 st ESO – 2 nd ESO	<0.001*	0.632	0.509	0.371
1 st ESO – 3 rd ESO	0.044	<0.001*	0.044	0.617
1 st ESO – 4 th ESO	0.004*	0.060	0.021	0.015
2 nd ESO – 3 rd ESO	0.157	<0.001*	0.009	0.843
2 nd ESO – 4 th ESO	0.793	0.136	0.003*	0.099
3 rd ESO – 4 th ESO	0.284	0.004*	0.879	0.116

*Significance

In the results of Table 6, the Bonferroni test was applied to determine the level of significance of the test conducted (p< (0.05/6)). Subsequently, we can observe significant differences in the following cases: between 1st ESO and 2nd ESO in terms of cooperativeness (with higher values in 1st ESO: M = 3.25 (Table 4)); between 1st ESO and 3rd ESO regarding competitiveness (with higher values in 3rd ESO: M = 2.97 (Table 4)); between 1st ESO and 4th ESO in the dimension of cooperativeness (again in favour of 1st ESO); between 2nd ESO and 3rd ESO in terms of competitiveness (again in favour of 3rd ESO). Additionally, in this comparison between 2nd ESO and 3rd ESO, it is worth noting that there are also notable differences in terms of individualism, although they do not reach significance by a small margin (with higher values in 3rd ESO). On the other hand, in the comparison between 2nd ESO and 4th ESO, there are significant differences in the dimension of individualism, with higher values in the 4th ESO students. Finally, in the comparison between 3rd ESO and 4th ESO, there are significant differences in competitiveness, where 3rd ESO again obtains the highest values.

Discussion

The aim of this study was to analyse the components of social interaction that influence CL in PE classes during secondary education, as well as to examine differences by gender and grade level. First, the results obtained confirm a general preference for cooperativeness in PE, which would confirm part of the hypothesis and is similar to the findings of Navarro-Patón et al. (2019). Following cooperativeness, the next preference is based on competitiveness, followed

by affiliation and, lastly, individualism. This order of preference among secondary students aligns with the findings of various authors, such as Ruíz-Pérez et al. (2004), who consider it essential given the prevailing belief that competition and individualism dominate in education, and hence, they conclude that cooperative attitudes should be developed. Additionally, studies like Gómez-López et al. (2015) indicate that students perceive participation in physical activities as a means to foster cooperation and increase interest in learning, which could explain the high preference for cooperativeness. Regarding the high values obtained for affiliation, they might be due to the adolescent desire for acceptance, group belonging, or self-esteem protection (Navarro-Patón et al., 2019).

Secondly, in terms of competitiveness, it's noteworthy that girls obtained higher scores than boys, and these differences were significant, which would contradict part of the hypothesis. This data also contradicts the findings of other studies (Dabiriyani Tehrani & Yamini, 2022; Ruiz et al., 2010), where boys were observed to have higher competitiveness scores. Continuing the gender comparison, some studies suggest that girls obtain higher cooperativeness and affiliation scores than boys (Dabiriyani Tehrani & Yamini, 2022; Ruiz et al., 2010), consistent with our findings, even if the differences are not significant. Nevertheless, there are also studies where the data shows differences in affiliation, favouring boys (Martínez & Gómez-Mármol, 2017). On the other hand, similar to Ruiz et al. (2010), male students scored higher in individualism than female students. The causes of these gender differences in relation to cooperativeness, affiliation, and individualism could be along the lines of what Simões and Calheiros (2016) he comparisons between gender groups revealed a higher involvement of different self-regulation processes in girls' prosocial behaviors. This is an expected result, as girls show higher and earlier prosociality and self-regulation compared to boys, even in kindergarten (Simões & Calheiros, 2016). It is essential to highlight that as girls value peer interaction more than mastering skills, their cooperative preferences may impact both the amount of practice and perceived competence (Ruiz Pérez et al., 2004). This could be because girls sometimes feel pressured in PE classes due to their limited mastery of some sports skills (Rodríguez & Rodríguez, 2021).

Furthermore, regarding the comparison by grade level, our results show a decrease in cooperativeness and affiliation as students' progress through the grades, along with an increase in competitiveness and individualism, confirming the final part of the hypothesis. These trends align with the results observed in Navarro-Patón et al. (2019), who also state that as students grow, their preference for cooperativeness and affiliation tends to decrease, inversely proportional to their preference for competitiveness and individualism. Additionally, these authors consider it important to note that at the age of 15 and 16 (4th year of secondary education), competitiveness surpasses affiliation, similar to our study.

Overall, the hypothesis is partially confirmed and the

results indicate that cooperative preferences are already present in students. Therefore, educators may consider harnessing these existing preferences by creating scenarios that enhance and improve PE learning based on these preferences (Ruiz Pérez et al., 2004). Following this study, we believe that implementing CL methodology could be an appropriate approach for this purpose, as it is an effective strategy for promoting affective learning, focusing on social learning outcomes, such as cooperation and students' ability to encourage each other (Casey & Fernandez-Rio, 2019).

Furthermore, Valls et al. (2017) point out that during CL, it is appropriate to reduce or even eliminate the competitive aspect of activities and emphasize cooperation. However, given the elevated levels of preference for competitiveness observed in our study, completely eliminating the competitive element from tasks might not contribute to high student engagement during the activity. It may be more appropriate to reduce it while maintaining the cooperative element as the primary focus and the competitive aspect as secondary. Therefore, by promoting CL in PE, one contributes to SDG 4, which aims to ensure quality education for all by fostering social skills, teamwork, and problem-solving among students. Similarly, addressing gender differences in social interaction preferences in PE is also relevant to SDG 5, which promotes gender equality. Lastly, fostering cooperation over competition can contribute to SDG 16 by helping to build more harmonious relationships among students and promoting a peaceful and just school environment. Altogether, the balance between competition and cooperation in the educational context can be a powerful catalyst for advancing the global SD agenda.

With all of this, the social dimension of SD would be greatly enhanced, and the contribution of PE could be grounded in the internal relationships derived from the practice itself (Baena-Morales et al., 2023). This is because the tasks associated with CL are generally based on proposals aimed at reducing manifestations of inequality, violence, injustice, and individualism in games, promoting attitudes of awareness, cooperation, communication, and solidarity (Osornio-Callejas, 2016). These aspects are important today, as the stagnation in achieving the SDGs affects globally, but it is the developing countries and the poorest, most vulnerable people worldwide who bear the brunt of our collective lack of progress (Naciones Unidas, 2023). The combination of climate impacts, the COVID-19 pandemic, and economic inequalities is diminishing the options and resources of many developing countries to attain the Goals (Naciones Unidas, 2023). Furthermore, Osornio-Callejas (2016) also emphasizes that while students have fun without winning as the primary objective, they try not to exclude or discriminate against anyone and foster an environment of mutual appreciation and respect where others are not seen as rivals but as playmates. On the other hand, Casey and Fernández-Río (2019) point out a key factor that promotes inclusion, namely that students with special needs are also safely integrated into the tasks of the CL model and have a perfect place in it. All these aspects are relevant, as

the integration of ESD through CL will enable us to progress towards the achievement of the SDGs, as ESD decisively enables the achievement of all SDGs and achieves its purpose by transforming society (UNESCO, 2020).

Limitations and Future Lines of Work

We believe that this study could undergo some improvements to provide more information and clarify the aspects analysed in it. As proposals, the sample size could be increased by including other educational institutions in the same locality, and even covering different schools in other geographical areas, including analysis and comparison with the high school stage.

As a possible future line of work, research could be conducted on the potential causes of the decrease in cooperative and affiliative preferences as students grow and explore potential methodological solutions to counteract this trend.

Conclusions

The main conclusion that can be drawn from this study is that secondary school students have a strong preference for cooperativeness during PE classes. Furthermore, it's worth noting the high values of preference for competitiveness, with significant differences by gender, where girls obtain higher scores. Additionally, there is a very low preference for individualism, with boys scoring significantly higher than girls. On the other hand, the study reveals a trend towards decreased cooperative and affiliative attitudes, as well as an increase in competitiveness and individualism as students' progress through the courses of secondary education. Therefore, addressing the objective to determine at which level of secondary education CL should be optimally implemented, our findings suggest that early introduction and consistent reinforcement of CL strategies throughout secondary education, particularly from the onset, could leverage the natural cooperative inclination observed in younger students while counteracting the developmental trend towards competitiveness and individualism. Consequently, it may be advisable to maintain a cooperative structure in PE throughout secondary school, with special emphasis in the later years. In conclusion, the implementation of CL in PE classes during secondary education would be a useful tool to make effective use of students' cooperative preferences and positively contribute to the development of the social dimension of SD.

Practical applications of incorporating cooperative learning in Physical Education

Incorporating CL into PE classes can enhance student engagement and foster a positive learning environment. One practical approach is to organize students into small groups to work together on specific tasks or challenges, such as designing and performing group fitness routines, participating in team sports tournaments, or creating

cooperative games that emphasize teamwork and communication. For instance, students can collaborate to develop strategies for team-based activities like relay races or team-building exercises where they must rely on each other's strengths to achieve common goals. Furthermore, integrating CL strategies into warm-up exercises or cool-down activities can encourage peer support and social interaction, enhancing the overall experience of PE classes.

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