

High- versus Low-structured cooperative learning in secondary physical education: impact on prosocial behaviours at different ages.

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Abstract

Despite the research exploring the benefits of using cooperative learning in secondary physical education, several research gaps still remain, namely, limited research on its effects on prosocial behaviours, the impact on adolescents as they grow up, and the lack of assessment of differently-structured cooperative learning frameworks. The goal of this study was to compare high- versus low-structured cooperative learning frameworks and assess their impact on adolescents' prosocial behaviours at different ages. The study followed a quasi-experimental pretest-posttest design. 286 students (150 girls) participated and were distributed into four groups: Control 1 (year-8 students), Control 2 (year-10 students), Experimental 1 (year-9 students) and Experimental 2 (year-11 students). All groups experienced the same Acrosport unit, but the control groups within a low-structured cooperative learning context and the experimental groups within a high-structured cooperative learning framework. Cooperative learning and prosocial behaviours were measured before and after the intervention. Results showed that students who experienced a high-structured framework at a younger age significantly increased their scores on the five variables that mediate the effectiveness of cooperative learning, and their prosocial behaviours. The older the adolescents, the fewer the changes in cooperative learning, and with no changes in prosocial behaviours. Students who experienced a low-structured framework did not improve their cooperative learning and decreased their empathy, social relations and leadership at younger ages. In conclusion, cooperative learning must be properly structured to produce a positive impact using heterogeneous working groups, teachers' feedback and shared regulation. However, older adolescents need specifically-designed cooperative learning contexts with longer learning units.

Key words: empathy; respect; leadership; social skills; adolescents.

Introduction

Vygotsky's (1978) constructivist theory of learning emphasizes the importance of the community of learners to promote active learning. Rooted in this idea, Britton (1990) highlighted that a basis of learning is conversation and interaction among students (and sometimes with the teacher), and he recommended placing students in groups, letting them create their own rules, procedures and structures to learn. For Johnson and Johnson (2018): "The heart of collaborative learning... is the cooperative foundation of students working together to maximize their own and each other's learning" (p. 61). However, Panitz (1999) highlighted that in an adequate cooperative learning framework, teachers maintain control of the class (i.e. ask questions, provide feedback), remaining available for consultation. The problem is that cooperation does not come naturally and, although many teachers worldwide claim that they use cooperative learning (Johnson and Johnson, 2009), many are not implementing it in a correctly structured manner (Panitz, 2000). Consequently, teachers and students are not obtaining all the benefits that could be derived from the correct use of this pedagogical model.

According to Johnson and Johnson (2005), five different variables mediate the effectiveness of cooperative learning: a) positive interdependence: group members can reach their goals if, and only if, the other members reach the group goals; b) individual accountability: every group member must do his/her part of the task to obtain the set goals; c) promotive interaction: group members push each other to work well in order to reach the desired goal; d) group processing: the group must review its work to agree upon which actions should continue or be modified to improve its functioning; and e) interpersonal skills: group members must learn to support each other, to share resources and to listen to others to be able to work better together. Recently, group processing, promotive interaction and individual accountability were signalled as the most

important of the five variables to create cooperative classrooms at any age (Leon et al., 2021).

Besides these five variables, there are two other key elements to consider when implementing cooperative learning. The first one is co-regulation (Salonen et al., 2005). When placed in groups, individuals interact and this interaction can oscillate between three types of co-regulation (Järvelä and Hadwin, 2013; Vauras et al., 2003): a) other-regulation: one student in the group feels more qualified than the others and assumes an instructional role; b) shared regulation: all group members co-regulate the group's functioning; and c) self-regulation: students follow individual strategies to achieve individual goals. Shared regulation is considered the most effective type of co-regulation, but it needs all group members to negotiate and adopt regulation processes in order to achieve the collective goals. Darnon et al. (2002) warned that in cooperative learning, group conflicts may arise and that they can be solved by focusing on performing the task (epistemic) or on the social comparison of competences (relational); the latter is negative for learning. When members of a group share identical information, they tend to make comparisons among themselves and conflict arises, but if they share complementary information, they tend to cooperate to solve the task. Students often need the teacher's help to learn to co-regulate. In line with this idea, Kagan (1995) introduced the concept of equal participation as another important element for cooperative learning structures to function, and this is only possible in shared regulated groups.

The second key element to consider when to implement cooperative learning, aligned with the first element, is teachers' feedback (Fernández-Rio, 2017). Unfortunately, some teachers place students in groups to work cooperatively, but they feel that they must stay "on the sidelines" and not interact, unless the students ask them.

The problem is that they disregard their role as “facilitators”, which includes questioning and explaining to provide feedback in order to help all the students make progress (Goodyear and Dudley, 2015). Again, the concept of equal opportunities of success (Kagan, 1995) arises as a critical element of cooperative learning structures, and teachers’ feedback can be fundamental to reach this goal. Researchers such as Wu and Liu (2020) or van Leeuwen and Jannssen (2019) highlighted teacher guidance through feedback as one of the most important elements for cooperative learning to work properly. They also indicated that it should be provided during the task (i.e. immediate feedback), and/or at the end of the task or the session (i.e. non-immediate feedback) (Tsai et al., 2015). Of course, feedback should be provided “on-demand” (when needed), avoiding a tutoring role to preserve the peer-tutoring conditions created in the cooperative learning groups (Topping and Ehly, 1998). This included individual (confidential) and/or group feedback delivered carefully so as not to harm the autonomy-support climate created in the groups (Jang et al., 2010). Whatever the case, feedback is absolutely essential in well-designed cooperative learning structures.

Research has shown that cooperative learning can create more productive learning contexts than competitive or individualistic learning to promote academic, personal and social variables (Roseth et al., 2008). Over the last couple of decades, it has been increasingly used in physical education, and several reviews (Bores-García et al., 2021; Casey and Goodyear, 2015; Dyson and Casey, 2016) have highlighted that cooperative learning can positively affect students’ four learning domains: cognitive, physical, social and affective. It can promote their intrinsic motivation (Fernández-Río et al., 2017), autonomy and decision skills (Dyson, 2001), emotional intelligence (Rivera-Perez et al., 2020), emotional regulation and empathy (Rivera-Perez et al., 2021), game performance and motor skills (Barret, 2005), or academic performance

(Leon et al., 2021). Despite the extensive research conducted, some scholars believe that the impact of cooperative learning structures on students' social and emotional learning still remains unclear (Dyson, Howley and Wright, 2021). Recently published research has uncovered this connection in primary education students (Dyson, Howley and Shen, 2021), but there seems to be a need to extend this scope into adolescence. This can be a very difficult period of life. Students experience physical, cognitive, social and affective changes which, in some cases, end in conflict and disruptive behaviours (Johns and Moyer, 2008). Their sometimes impulsive character, their worries and their fight for self-affirmation are some of the issues that affect adolescents, and they should all be considered (Virta and Virta, 2015). Cooperative learning has been found to "work" differently when implemented in different educational stages. Fernández-Rio et al. (2017) found that young adolescents (11-13 years) showed less improvements in the five different variables that mediate the effectiveness of cooperative learning than older adolescents (14-17 years). For their part, Hortiguela et al. (2019) found that older adolescents (15-16 years) improved their social interactions and their motivation more than younger adolescents (11-12 years) when using cooperative learning. A recent meta-analysis on the influence of this pedagogical model on students' motivation in physical education uncovered that at that stage of adolescence the impact of cooperative learning is smaller (Liu and Lipowski, 2021), therefore, highlighting that age should be considered when implementing it. To our knowledge, the previously mentioned are the only three published studies comparing the effects of cooperative learning implementation in different age groups of adolescents, and they produced contradictory results. In a recent systematic review, Bores-Garcia et al. (2021) indicated that this gap needs to be filled.

As previously mentioned, cooperative learning has been found to promote students' social skills such as mutual help (Casey and Goodyear, 2015). Moreover, a recent systematic review has shown that physical education can be beneficial for youngsters' personal and social development, cooperation among students being one of the key elements to do so (Opstoel et al., 2019). Nevertheless, few studies have been piloted to uncover the connections between cooperative learning and prosocial behaviours in physical education. These have been defined as those actions conducted to benefit others or to promote harmonic relations (Bergin, 2018), and they are usually antagonistic of antisocial behaviours like fighting, bullying or aggressiveness (Van Ryzin et al., 2020). Prosocial behaviours include actions such as help, interchange and altruism in relations with others, which promote compliance with social rules. Scientific literature has highlighted four specific prosocial behaviours: empathy (i.e. the ability to emotionally understand what other individuals feel), respect (i.e. due regard for the feelings or rights of other individuals), social relations (i.e. interactions among individuals), and leadership (i.e. the action of leading a group of people) (Eisenberg et al., 2006). The positive connection between cooperative learning contexts and prosocial behaviours, uncovered by only a few studies, refers that in cooperative tasks there is positive social reinforcement among groupmates, which generates positive relations and promotes prosocial behaviours (Van Ryzin et al., 2020). Moreover, some of the variables that mediate the effectiveness of cooperative learning (i.e. positive interdependence, promotive interaction) are expected to cause these positive prosocial conducts (Dyson, Howley and Shen, 2021). These contexts can help students build a positive perception of the group and, at the same time, build interpersonal skills such as respect for others and tolerance, which can contribute to individual as well as group achievements (Goodyear et al., 2014). In the same vein, Metzler (2011) highlighted that

interpersonal relations built in cooperative contexts help promote students' academic, physical, social and affective skills, improving their social links, too. These are pillars of cooperative learning contexts (Lund, 2013), but it seems necessary to go deeper into the mechanisms that promote prosocial behaviours.

Although students' attitudes towards physical education are generally positive (Phillips and Silverman, 2015), these attitudes become more negative in secondary education because students feel that the curriculum is repetitive, boring and that it focuses on competitive team sports like basketball or football (Phillips et al., 2020). Four contextual domains that impact the taught curriculum have been identified (Sirotnil and Oakes, 1981): personal (i.e. ethnicity, socioeconomic background), instructional (i.e. class characteristics, grouping patterns), institutional (i.e. budget, time allocated to the different subjects), and societal (i.e. support to the school, competence requirements for teachers).

Based on the aforementioned, the present study aims to address several existing gaps in the scientific literature: 1) the limited research on the possible effects of cooperative learning structures on prosocial behaviours such as empathy, respect, social relations and leadership; 2) the effect of cooperative learning on adolescents as they grow up, since results have been inconsistent and contradictory; and 3) differently-structured cooperative learning frameworks have not been assessed in secondary education. Therefore, the goal of this study was to compare high- versus low-structured cooperative learning frameworks to teach rhythmic/gymnastic activities in secondary physical education and assess their impact on adolescents' prosocial behaviours at different ages. Aligned with this goal, the initial hypothesis was that students experiencing high-structured cooperative learning would show greater improvements in the five variables that mediate the effectiveness of cooperative learning. The second

hypothesis was that this framework would produce stronger changes in their prosocial behaviours. The third and final hypothesis was that age would be a determinant element in the outcomes.

Method

Design and participants

The study followed a quasi-experimental, pretest-posttest research design (Cohen et al., 2011). Using intentional sampling, a total of 311 secondary education students, enrolled in the same school in northeast Spain, agreed to participate. Unfortunately, 25 students were excluded from the study for not fully completing the assessment instruments used. Therefore, the final sample included 286 students (136 boys, 150 girls) with an age range of 12-17 years (13.72 ± 1.26 years). Participants were distributed into four study groups: Control 1 (C1): 78 year-8 students (12.23 ± 0.45 years); Control 2 (C2): 66 year-10 students (14.39 ± 0.56 years); Experimental 1 (E1): 74 year-9 students (13.26 ± 0.53 years); and Experimental 2: 68 year-11 students (15.28 ± 0.48 years). All groups experienced the same Acrosport learning unit, but the control groups (C1 and C2) within a low-structured cooperative learning context and the experimental groups (E1 and E2) within a high-structured cooperative learning framework. One physical education teacher with 15 years' professional experience, but limited knowledge of cooperative learning (he received basic training at college) conducted the control groups. He was totally blind to the study, and he agreed to implement an Acrosport learning unit using cooperative learning. In contrast, a physical education teacher with only two years' professional experience, but highly-trained in cooperative learning (she received intensive training at college and attended a specific seminar prior to the start of the study, and she also received feedback from

experts on cooperative learning to design and implement the learning unit), conducted the experimental groups.

Procedure

After the pre-test, participating classes were randomly distributed into an experimental group (years 8 and 10), which experienced high-structured cooperative learning, and a control group (years 9 and 11), which experienced low-structured cooperative learning. At midpoint, to validate the design, to detect errors and re-shape the intervention programme, if necessary (Fletcher et al., 2018), students in the experimental group answered the initial questionnaire on cooperative learning again (results are shown in the fidelity of the intervention subsection). At the end of the intervention programme, all participants completed the initial questionnaires again (post-test).

Regarding ethics, first, the approval was obtained from the University Ethics Commission. Second, the main researcher obtained permission from the target school. Third, the project was fully explained to all the students' parents, and those willing to let their children participate signed a written consent. Fourth, data collection followed the ethical principles of the Declaration of Helsinki (WMA 2013): questionnaire administration was conducted by the main researcher during a physical education class, but the teacher was absent to prevent any influence on the students' responses. Participants responded individually using a computer. They were told that their answers would be kept anonymous and that these would not impact their grades. Data collection took 20-25 minutes.

Instruments

Cooperative learning. The Spanish validated Cooperative Learning Questionnaire (Fernández-Rio et al., 2022) was used. It includes 20 items grouped into five subscales: interpersonal skills (e.g. “We work on discussing, debating, and listening to others”), group processing (e.g. “We talk to each other to make sure that everyone in the group knows what is being done”), positive interdependence (e.g. “We cannot finish the tasks without the groupmates’ contributions”), promotive interaction (e.g. “Groupmates relate with each other and interact during the tasks”), individual accountability (e.g. “Every group member has to participate in the group’s tasks”). Participants responded on a 5-point Likert scale ranging from one: “totally disagree” to five: “totally agree”. Confirmatory Factor Analyses showed adequate indices that fit the five-factor structure at pre-test: $\chi^2(160) = 292.831, p < .001$; CFI = .922; TLI = .908; RMSEA = .054, IC90% = .044-.064 and post-test: $\chi^2(160) = 261.561, p < .001$; CFI = .940; TLI = .929; RMSEA = .047, IC90% = .037-.057. Similarly, internal consistency (McDonald Omega) was adequate at pre- and post-tests: interpersonal skills: .752/.771; group processing: .739/.789; positive interdependence: .676/.658; promotive interaction: .706/.663; and individual accountability: .767/.785. The instrument also produces a global cooperation factor, when all items are evaluated together, with an internal consistency of .918/.908 in pre- and post-tests.

Prosocial behaviours. The Spanish validated Prosocial Behaviour Questionnaire (Martorell et al., 2011) was used. It includes 54 items grouped into four subscales: empathy (19 items; e.g. “when someone has problems, I worry”), respect (16 items; e.g. “When I bother someone, I apologize”), social relations (11 items; e.g. “I like to talk with my friends and mates”), and leadership (eight items; e.g. “I like to lead working groups”). Participants responded on a 4-point Likert scale from (1) never to (4) always. Confirmatory Factor Analyses showed adequate indices that fit the four-factor structure

at pre-test: $\chi^2(396)=618.405$, $p < .001$; CFI=.927; TLI=.919; RMSEA=.044, IC90%=.037-.051 and post-test: $\chi^2(396)=700.157$, $p < .001$; CFI=.913; TLI=.904; RMSEA=.052, IC90%=.045-.058. Internal consistency (McDonald Omega) was also adequate at pre- and post-tests: empathy: .914/.919; respect: .847/.866; social relations: .752/.758; and leadership: .785/.817.

Intervention programmes

Both study groups experienced an Acrosport learning unit. Acrosport is considered a rhythmic/gymnastic activity connected to cooperative learning and teamwork. These contents have been traditionally under-researched (Bores-García et al., 2021) due to reasons such as teachers' low self-efficacy in these contents (Banville et al., 2021), especially male teachers (Fairclough et al., 2002).

Students worked in small groups to represent figures with their bodies. These figures could be dynamic or static, individual or in groups, and they could even integrate music (Abós et al. 2017). All group members were required to construct the figures successfully. The 10-session learning unit implemented lasted for five weeks (two sessions per week, 50 minutes each). In sessions one and two, groups had to perform different Acrosport figures (individual and group) provided by the teacher or found on the Internet. From sessions three to nine, each group had to design a group choreography using the different figures represented and adding music. In the final session, each group's performance was recorded to be assessed on originality, coordination among group members and the movement-music combination using self- and co-assessment instruments.

High-structured cooperative learning. On the one hand, the teacher in the experimental groups tried to promote the five variables that mediate the effectiveness of cooperative learning: a) Group processing: students were asked to assess their

functioning to decide which actions should continue or be modified; b) Individual accountability: each student signed a written contract to engage in the group's work; c) Promotive interaction: students assisted each other to create the best figure possible; d) Positive interdependence: students became aware that each individual success was dependent on the group's success; and e) Interpersonal skills: students encouraged each other, discussed ideas, celebrated the group success, etc. Furthermore, the implementation of the learning unit followed the so-called Cooperative Learning Cycle (Fernandez-Rio, 2017), which included three phases: a) build group cohesion: the aim was to build classes where all adolescents could work together to learn (i.e. all students interacted with each other during the first session to build cohesion); b) cooperative learning as the content: the aim was to teach students to learn to cooperate using simple techniques (i.e. students experienced Coop Coop Play to learn to spot, to make grips); and c) cooperative learning as the framework: the aim was to help students use complex techniques (i.e. students used Learning Teams to create the final choreography). After the first phase, the teacher created heterogeneous working groups in terms of gender, skill and ethnic background for the rest of the learning unit. Teachers' feedback was also a key element in the implementation. The teacher provided constant feedback (immediate and non-immediate) to all the groups to help students progress, becoming an activator. Moreover, she provided group and individual information on performance, but also on the cooperative behaviour (i.e. help, support, share). Finally, each group had a portfolio, where students kept all the resources (e.g. figure cards, instructions, information on cooperative learning, self- and co-assessment sheets, etc.). The goal was to promote each group's autonomy and help them co-regulate the activity. The learning unit was assessed by means of formative assessment procedures (i.e. observation tools) and self- and peer assessment procedures (i.e. rubrics and check lists).

Low-structured cooperative learning. As mentioned earlier, the teacher in the control groups (completely blind to the study) was asked to use cooperative learning to teach Acrosport. Therefore, students worked in small groups, but the five variables that mediate the effectiveness of cooperative learning were not fully promoted (i.e. group functioning assessment, group success for individual success, active individual participation, help groupmates to achieve the best outcome, support other group members when performing a task). In lesson one, the teacher created small working groups, but these were not fully heterogeneous, because students were grouped randomly. No roles were assigned, and no external prompts were used to help students organize the work in their groups (Cecchini et al., 2021; Supanc et al., 2017). Due to his limited knowledge about cooperative learning, the teacher used Mosston and Ashworth's spectrum of teaching styles throughout the unit: a) command: "reproducing a predicted response or performance on cue" (2008, p. 76); b) reciprocal: "social interaction, reciprocation, receiving and giving immediate feedback (guided by the teacher's specific criteria" (2008, p. 116) but without promotive interaction; and c) self-check: "...performing a task and engaging in self-assessment guided by specific teacher provided criteria" (2008, p. 141). Finally, the groups did not keep a portfolio and teacher feedback was scarce, remaining "on the sidelines" most of the time. Features like tasks, materials and instructional procedures used in the high-structured cooperative learning groups were used in the low-structured cooperative learning groups, but the teacher did not develop high-structured cooperative learning strategies (i.e. group and individual information on performance and cooperative behaviour, specific techniques) (for a more complete description of the tasks and the cooperative learning applied strategies see Santed, 2022). The learning unit was assessed using a traditional final

assessment procedure (i.e. observation tool from the teacher) and a peer assessment procedure (i.e. check-list).

Fidelity of the intervention

Following Hastie and Casey (2014), it is extremely important to assess the fidelity of any intervention when implementing pedagogical models. In the present study, the Spanish validated Cooperative Learning Questionnaire (Fernandez-Rio et al., 2022), adapted to the context of the Acrosport learning unit, was used. After session five, students participating in the experimental group responded to the different items, taking into consideration the physical education class they were participating in. Results showed high scores, close to five (maximum) in the five variables that mediate the effectiveness of cooperative learning and in the global factor in both experimental groups (Table 1). No significant differences were found between these groups: Wilks' Lambda=.950; $F_{(6, 279)}=1.122$; $p=.353$; $\eta_p^2=.050$). Therefore, both cooperative learning interventions could be considered similar.

Table 1. Fidelity of the intervention. Descriptive and difference analyses among experimental groups.

Session 5	EG (all) N=144 M (SD)	E1 (year-9) N=76 M (SD)	E2 (year-11) N=68 M (SD)	F	p
Global cooperation factor	4.10(0.42)	4.12(0.45)	4.08(0.38)	0.394	.531
Interpersonal skills	3.81(0.58)	3.87(0.61)	3.76(0.54)	1.322	.252
Group processing	3.83(0.58)	3.89(0.62)	3.77(0.55)	1.324	.252
Positive interdependence	4.27(0.51)	4.29(0.57)	4.23(0.43)	0.364	.547
Promotive interaction	4.21(0.51)	4.18(0.56)	4.23(0.45)	0.282	.596
Individual accountability	4.38(0.54)	4.38(0.55)	4.38(0.52)	0.000	.993

Note: M=Mean; SD=Standard Deviation; EG=Experimental Group; E1=Experimental 1; E2=Experimental 2.

Statistical analyses

Data analyses were conducted using SSS 25.0 and MPlus 8.0: confirmatory factor analyses, McDonald's Omega, multivariate (time x group) analyses of covariance

(MANCOVAs) controlled by gender. Effect size via partial eta squared (η_p^2) was calculated, considering values above 0.01 as small, above 0.06 as moderate, and above 0.14 as large (Field, 2017).

Results

Initial homogeneity of variance among groups was calculated at pre-test. Levene's test showed that variances among the four groups were homogeneous in both the cooperative learning and the prosocial behaviour variables ($p > .05$). The MANCOVA showed a principal Time (pre-post) x Group (C1-C2-E1-E2) effect in the cooperative learning variables: Wilks' Lambda = .831; $F_{(18, 783)} = 2.955$; $p < .001$; $\eta_p^2 = .060$. Within-group analyses showed no significant pre-post difference in groups C1 and C2. On the contrary, a significant increase in E1 (year-9) was observed in the five variables that mediate the effectiveness of cooperative learning, and only in the global cooperation factor, group processing and interpersonal skills in E2 (year-11). In the same line, a larger effect size was observed in E1 ($\eta_p^2 = .158$) than in E2 ($\eta_p^2 = .056$).

Regarding prosocial behaviours, a main effect was observed in the Time (pre-post) and Group (C1-C2-E1-E2) interaction: Wilks' Lambda = .894; $F_{(12, 738)} = 2.670$; $p = .002$; $\eta_p^2 = .037$. Within-group analyses showed that: a) in C1, there was a significant decrease at post-test in empathy, social relations and leadership with a small to moderate effect size ($\eta_p^2 = .042$); b) in C2, there were no significant pre-post differences; c) in E1, there was a significant increase at post-test in empathy, respect and leadership with a moderate effect size ($\eta_p^2 = .069$); and d) in E2, there were no significant pre-post differences (Table 3).

Table 2. Pre-post within-group differences in cooperative learning.

	Pre - Test	Post-Test	<i>p</i>
	M (SD)	M (SD)	
C1 (n=78) (Wilks' Lambda=.981; $F_{(6, 276)}=0.871$; $p=.517$; $\eta^2_p=.019$)			
Global cooperation factor	4.07 (0.52)	4.05 (0.46)	.759
Interpersonal skills	3.72 (0.64)	3.60 (0.73)	.140
Group processing	3.79 (0.70)	3.81 (0.68)	.801
Positive interdependence	4.18 (0.60)	4.16 (0.60)	.859
Promotive interaction	4.19 (0.60)	4.17 (0.50)	.797
Individual accountability	4.47 (0.67)	4.51 (0.54)	.559
E1 (n=74) (Wilks' Lambda=.842; $F_{(6, 276)}=8.650$; $p<.001$; $\eta^2_p=.158$)			
Global cooperation factor	3.73 (0.57)	4.07 (0.50)	<.001
Interpersonal skills	3.29 (0.71)	3.83 (0.63)	<.001
Group processing	3.48 (0.68)	3.89 (0.63)	<.001
Positive interdependence	3.80 (0.71)	4.18 (0.59)	<.001
Promotive interaction	3.90 (0.61)	4.07 (0.55)	.015
Individual accountability	4.20 (0.71)	4.36 (0.56)	.058
C2 (n=66) (Wilks' Lambda=.987; $F_{(6, 276)}=0.585$; $p=.742$; $\eta^2_p=.013$)			
Global cooperation factor	3.73 (0.65)	3.75 (0.47)	.742
Interpersonal skills	3.29 (0.83)	3.24 (0.59)	.557
Group processing	3.48 (0.71)	3.44 (0.68)	.576
Positive interdependence	3.84 (0.78)	3.92 (0.54)	.333
Promotive interaction	3.86 (0.73)	3.88 (0.62)	.793
Individual accountability	4.19 (0.71)	4.29 (0.62)	.237
E2 (n=68) (Wilks' Lambda=.945; $F_{(6, 277)}=2.731$; $p=.015$; $\eta^2_p=.056$)			
Global cooperation factor	3.74 (0.60)	3.87 (0.60)	.041
Interpersonal skills	3.19 (0.77)	3.50 (0.71)	.001
Group processing	3.40 (0.79)	3.64 (0.73)	.005
Positive interdependence	3.86 (0.67)	3.94 (0.68)	.269
Promotive interaction	4.02 (0.62)	4.04 (0.62)	.719
Individual accountability	4.22 (0.70)	4.20 (0.75)	.836

Note: M=Mean; SD=Standard Deviation

Table 3. Pre-post within-group differences in prosocial behaviours.

	Pre – Test	Post -Test	<i>p</i>
	M (SD)	M (SD)	
C1 (n=78) (Wilks' Lambda=.958; $F_{(4, 278)}=3.051$; $p=.017$; $\eta^2_p=.042$)			
Empathy	3.10 (0.38)	3.03 (0.41)	.057
Respect	3.26 (0.37)	3.21 (0.40)	.142
Social relations	3.26 (0.31)	3.18 (0.35)	.019
Leadership	2.79 (0.49)	2.65 (0.53)	.002
E1 (n=74) (Wilks' Lambda=.931; $F_{(4, 278)}=5.140$; $p=.001$; $\eta^2_p=.069$)			
Empathy	2.80 (0.43)	2.98 (0.42)	<.001
Respect	3.06 (0.41)	3.13 (0.43)	.024
Social relations	3.10 (0.39)	3.12 (0.34)	.527
Leadership	2.52 (0.53)	2.62 (0.55)	.035
C2 (n=66) (Wilks' Lambda=.989; $F_{(4, 278)}=.755$; $p=.556$; $\eta^2_p=.011$)			
Empathy	2.70 (0.40)	1.72 (0.40)	.656
Respect	3.04 (0.34)	3.09 (0.35)	.189
Social relations	3.04 (0.39)	3.01 (0.36)	.501
Leadership	2.49 (0.55)	2.48 (0.53)	.856
E2 (n=68) (Wilks' Lambda=.989; $F_{(4, 278)}=.771$; $p=.526$; $\eta^2_p=.011$)			
Empathy	2.94 (0.49)	2.93 (0.44)	.884
Respect	3.15 (0.41)	3.14 (0.41)	.653
Social relations	3.04 (0.35)	3.03 (0.39)	.753
Leadership	2.43 (0.43)	2.20 (0.48)	.150

Note: M=Mean, SD=Standard Deviation.

Discussion

The goal of this study was to compare high- versus low-structured cooperative learning frameworks in secondary education and assess their impact on adolescents' prosocial behaviours at different ages. Results showed that students who experienced a high-structured framework at a younger age underwent a significant increase in the five variables that mediate the effectiveness of cooperative learning, as well as in their empathy, respect, social relations and leadership, while at older ages, there were only changes in the global cooperation factor, interpersonal skills and group processing.

The initial hypothesis was that students experiencing high-structured cooperative learning would show greater improvements in the five variables that mediate the effectiveness of cooperative learning, and the results confirmed this partially, because this increase only occurred in the five variables of cooperative learning in younger

students (in older students there was an increase in group processing and interpersonal skills). On the one hand, the tasks included in the learning unit were designed to promote all the mentioned variables, since they forced students to assess their functioning to perform the best possible Acrosport figure (group processing). In addition, each student had a part in the group's work (individual accountability) and all of them had to assist each other to construct each figure (promotive interaction). Students also became aware that each one was successful only if the group was successful, too (promotive interaction), and they learned to support each other, to share ideas or to listen to each other (interpersonal skills). On the other hand, the framework used was high-structured cooperative learning, which included constant feedback and guidance from the teacher (group and individual information on performance and cooperative behaviour) and a group portfolio. The constant feedback became an activator, which has been found to be a key element for the successful implementation of cooperative learning (Goodyear and Dudley, 2015). Moreover, the guidance from the teacher probably helped to promote the students' autonomy and the group's shared regulation. Furthermore, the implementation tried to build group cohesion using icebreakers and trust tasks first, simple techniques (coop play, collective score) to help students learn to cooperate, ending with complex techniques (i.e. think-share-perform) to follow the so-called Cooperative Learning Cycle (Fernandez-Rio, 2017). Finally, another important element in the framework was for the teacher to create heterogeneous working groups in terms of gender, skill and ethnic background. This has been underscored as essential in any cooperative learning context (Johnson et al., 2013).

The second hypothesis was that students experiencing high-structured cooperative learning would show greater improvements in their prosocial behaviours, and the results have partially confirmed this. Younger adolescents significantly

improved four of the five prosocial behaviours assessed: empathy, respect, social relations and leadership, while older adolescents showed no changes. The observed growth in the five variables that mediate the effectiveness of cooperative learning could have produced this increase: when students work closely together, they build connections (social relations), they share efforts recognizing others' work (respect), they lead the group's work when needed (leadership), and they learn to understand what other groupmates feel during the task (empathy). Regarding this last variable, previous research has already shown the connection between cooperative learning and empathy (Rivera-Perez et al., 2021), and results from the present study strengthen this connection, including other prosocial behaviours. Furthermore, promotive interaction, one of the five variables that mediate the effectiveness of cooperative learning, encourages positive support among groupmates, which seems to build leadership skills (Dyson and Casey, 2016). Along the same line, the students' interpersonal skills developed in cooperative learning contexts (i.e. listening to each other, sharing resources) help to stimulate social relations (Dyson, Howley and Shen, 2021). Finally, individual accountability, another variable that mediates the effectiveness of cooperative learning, builds leadership skills because individuals must "take a step forward" to help the group reach its goals (Rivera-Perez et al., 2021). Moreover, shared regulated cooperative learning groups distribute the groups' governance among their members (Salonen et al., 2005), which probably helps to build their individual leadership skills. Results from the present study support these connections at a younger age. Previous research uncovered that perceived in-class cooperation is an important element to produce positive outcomes (Leon et al., 2021), and in the present study, it probably impacted more on older students. Finally, it is worth mentioning that there was a significant decrease in social relations and leadership skills in younger students in the

control group. Therefore, just placing students in groups to work together without the previously mentioned “other ingredients” is not enough (Darling-Hammond et al., 2020). Many teachers, with limited knowledge in the use of cooperative learning in educational contexts, forget that features such as roles, external prompts to help students organize the work in their groups or group, and individual information on performance and cooperative behaviour are fundamental for this pedagogical model to be successful. Results from the present study showed that high-structured cooperative learning programmes are needed to avoid any decrease in the individuals’ psychosocial variables, and promote an adequate social and emotional development (Liu and Lipowski, 2021). Individual’s prosocial behaviours can only be developed through properly structured cooperative learning programmes (Lavasani et al., 2011), like the one described in the present study.

The third and final hypothesis was that age would be a determinant element in the outcomes, and the results confirmed this, since the high-structured intervention programme was more effective in the younger students. Previous research showed contradictory results: Fernandez-Rio et al. (2017) and Hortigüela et al. (2019) found that cooperative learning produced a lower impact on younger adolescents (11-13 years), while a recent meta-analysis showed the opposite (Liu and Lipowski, 2021). Results from the present study support the latter: cooperative learning “works worst” in older adolescents. Students’ attitudes towards physical education decline in secondary education because they feel that the curriculum is repetitive, boring and focused on competitive team sports (Phillips et al., 2020). However, in the present study a rhythmic/gymnastic activity was implemented (Acrosport) with the same results (Alpert, 2011). Students, as they get older, become more critical, amotivated and tend to show behavioural problems (Zavala et al., 2008). Adolescence can be a difficult period

of life, because individuals experience many physical, cognitive, social and affective changes (Johns and Moyer, 2008) that are often difficult to manage (Virta and Virta, 2015). Therefore, results from the present study indicate that age, in addition to length of the implementation, needs to be carefully considered when using cooperative learning, since the same intervention programme might not be as effective in older students. The whole framework should be modified to meet these students' needs. Personal, instructional, institutional and societal factors impact the curriculum (Sirottil and Oakes, 1981) and, consequently, the students. On the one hand, adolescents are highly susceptible to peer norms, which favour social success and not academic excellence, and, on the other hand, they have been exposed longer to an educational system that does not give them responsibility, authority or active participation in their classes (Slavin, 1996). Both should be carefully considered to design programmes that fit older adolescents' characteristics. They might need more time, through longer learning units, to integrate cooperative learning and its effects on different psychosocial variables (Legrain et al., 2019). A prominent researcher on this pedagogical model, Robert Slavin, stated (1996): "Cooperative learning is not a panacea for all of the problems of adolescence, but it can provide means of harnessing the peer-oriented energies of adolescents for pro-social rather than antisocial activities" (p. 203).

The present study also has several limitations. The first one is the length of the intervention. 10 sessions could be considered short, and this type of programme could produce limited results (Casey and Goodyear, 2015). Therefore, longer implementations should be conducted. The study design could be considered the second limitation, since it only used quantitative data. Future studies should use mixed designs to obtain qualitative data that could provide a broader view. Finally, the study was conducted in

the same school, which could be considered the third limitation. Future studies should include students from different schools.

Conclusions

Cooperative learning must be properly structured to produce a positive impact on secondary education students' prosocial behaviours. Furthermore, elements such as heterogeneous working groups, teachers' feedback and shared regulation are needed for the variables that mediate its effectiveness (group processing, individual accountability, promotive interaction, positive interdependence and interpersonal skills) to produce a significant effect. Unfortunately, its impact was found to be stronger at younger ages, indicating that older adolescents need specifically-designed cooperative learning contexts to have a stronger impact on them. On the other hand, rhythmic/artistic contents can also be implemented using cooperative learning to improve students' psychosocial variables. This finding supports the use of other contents besides team sports and go beyond multi-activity, sport-technique-based curricula.

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