

Cooperative learning and SDG 5. An intervention for physical education in secondary schools

AITANA BOFILL-HERRERO¹, SALVADOR BAENA-MORALES², OLALLA GARCÍA-TAIBO³,
ALBERTO FERRIZ-VALERO⁴

^{1,2,4} Department of General Didactics and Specific Didactics. University of Alicante. Alicante. SPAIN.

^{2,4} EDUCAPHYS research group.

³ Department of Physical Education and Sport. Pontifical University of Comillas. CESAG-Mallorca. Palma de Mallorca. SPAIN

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Abstract

Background: Nowadays, there is great concern about gender inequality in many areas of the recent scenario; an aspect that is being pursued through the Sustainable Development Goals (SDGs), exactly through SDG 5; cooperative learning seems to be one of the ways to achieve gender equality in secondary school students. It is essential to investigate new methodologies to try to curb many of the problems that have been active for many years, and it is crucial to promote and encourage these values in society at the educational stages. However, there is still not enough research that has been carried out on this subject, so there is still much to learn. Therefore, the aim of this research is to analyse whether the effect of a didactic unit of Physical Education through cooperative learning shows improvements in the attitudes of coeducation in secondary school students. **Method:** A total of 131 secondary school students (74 females), with a mean age of 14.46 ± 0.64 years, carried out the study. A quasi-experimental, pre-post study was carried out using a control and experimental group. The sample was not randomised. For 5 weeks, the control group maintained normal Physical Education sessions, following a more traditional methodology based on direct command. **Results:** The experimental group, on the other hand, carried out the 5 sessions of the didactic unit based on the cooperative learning methodology, through mixed groupings. To assess the normality of the sample, the Kolmogorov Smirnov test was used to confirm that the sample was non-parametric. To measure the effect of the intervention, Mann Whitney and Wilcoxon tests were performed. The statistics showed that the experimental group was significantly higher than the control in two of its factors in the pre, but no significant differences were shown in the post. **Conclusions:** These findings do not verify the main objective of the study, perhaps as a consequence of the quantitative difference of the samples between groups and between stages (pre-post), or as a consequence of insufficient or erroneous programming. Finally, it would be interesting to evaluate the same results by segmenting by gender to see if more significant differences are shown.

Keywords: Cooperative learning, gender equality, tolerance, physical education, SDGs.

Introduction

Towards social change. Sustainable development as a key factor

The evidence illustrates that today we live in a world that is in constant transformation, with large climatic variations of which we know the beginning, but not the end (IPCC, 2021). Restricting the calamitous increase in global temperatures by the consent of nations should be an essential act to stabilise the effects of climate change (COPS26, 2021). The results of this major problem are reflected in both heat waves and torrential rains in various parts of the world (IPCC, 2021). This situation of global instability is not only a consequence of an environmental crisis, but at the current level, a series of socio-economic problems have been identified that have increased social injustice and inequality (UNESCO, 2018). The economic crisis that has prevailed for several years has led to more precarious and inconsistent employment situations, producing economic imbalances mainly in the most disadvantaged families (EAPN, 2021).

This has increased after the global pandemic generated by COVID-19, where a global economy characterised by unemployment, misery and inequality is manifested (FENADECO, 2021). Another crisis, but with different consequences, is the so-called "mental health crisis", a problem that has intensified especially in recent years and is already present in 10-20% of the world's young population (UNICEF, 2020). This crisis has also been aggravated after COVID-19, isolation and situations of confinement have led to 1 in 4 young people up to 14 years of age suffering from pathologies such as anxiety and depression, two very common mental health symptoms which are related to the vulnerability of this sector of the population (UNICEF, 2021). This degree of vulnerability in young people is reflected in the Suicide worldwide in 2019, which states that the consequences

of a mental health crisis can lead to suicide or attempted suicide, which is the fourth leading cause of death in people up to the age of 30 (WHO, 2021). Likewise, a few days before the end of the year, a total of 273 young people between 15 and 29 years of age have taken their own lives, of which 74.7% are male and the remaining 25.3% are female (INE, 2021).

Education. The key to a more prosperous world

Sustainable development, a concept that is defined by three dimensions, such as environmental, social and economic, all of which are interconnected, due to their dependence on each other and the significance of their consequences (Arushanyan et al., 2017). Despite this, the concept of sustainable development entails a number of constraints forced by the current state of technology and weaknesses in social organisation (UN, 1987). To this end, at the end of 2000, a declaration consisting of 8 goals, the Millennium Development Goals (MDGs), with the main goal of combating extreme poverty, was drawn up (UN, 2000). With the presence of the MDGs, a reduction in the extreme poverty rate of up to 50% was achieved, the number of children in education was increasing, better access to drinking water worldwide was achieved, and the constant fight against non-communicable and acute diseases was not to be neglected (UN, 2015). Through these goals, remarkable progress was made in the lives of many people, but they still fell short of a solid basis for verifying that these goals were being fully effective (UN, 2014). Following the 70th United Nations General Assembly in September 2015 and its subsequent signing, the so-called Sustainable Development Goals (SDGs) were adopted (UN, 2015). Providing systemic responses to the global and interconnected vision of sustainable development which addresses such issues as inequality and extreme poverty, unsustainable consumption patterns and environmental degradation, strengthening institutional capacity and global solidarity processes, and together through renewed methodological perspectives, are the primary objectives of the SDGs (Gómez, 2018). The SDGs, through their 15-year proposal (2015-2030) form a total of 17 sustainable development goals in addition to their 169 targets and have the potential to turn society around and enlist people and countries (UN, 2015). It is unquestionable to reconsider how to challenge the new educational reality to foster more sustainable societies (UNESCO, 2018). In the last year, we have been immersed in a pandemic climate that has impacted on the economy and the way we live and socialise with the outside world (European Commission, 2021; UN, 2020). The pandemic has caused widespread psychological distress throughout society and therefore measures must be taken, otherwise a mental health crisis will erupt, leading to a deterioration in the way we live in society, as mental health is the basis of society (United Nations, 2020). It is important to know that Mental Health is not simply the absence of mental illness (WHO, 2018). Mental health is considered a state of well-being in which you can carry out normal or everyday activities and cope with the stresses of everyday life, this is also related to interpersonal relationships, as people live in community and need to communicate (WHO, 2018). Currently we are surrounded by a panorama that is not consistent with the problem of mental health, as it is shown that there is a deficit in the provision of mental health services (WHO, 2021). Furthermore, there are prejudices and negative connotations surrounding mental health services (Campo-Arias, 2013), these prejudices make it more difficult for people who need mental health services to access them, and negative connotations reduce resources and produce a shortage of services (Campo-Arias, et al., 2014). According to the Spanish Confederation of Mental Health (2019), mental health is cross-cutting, i.e. it can be reflected in each of the SDGs. Firstly, it is related to goal 3 "Health and well-being" and secondly, to goal 4 "Quality education" and then transversally in each of them. Consequently, mental health falls under the social goal of sustainable development but is transversally linked to the economic and environmental goals (Spanish Confederation of Mental Health, 2019). In order to achieve these goals and objectives, education has been described as one of the main pillars to achieve them (UNESCO, 2017).

Education for Sustainable Development (ESD) is a concept that is not fully defined and uniform, and a conflict arises in relation to the term as ESD cannot be separated from the concepts of "sustainable development" and "sustainability" (Rieckmann et al., (2017). It seems that one of the main ways to address the current reality is through education, an empowered education with the capacity to promote human rights and dignity, to fight poverty reduction and to achieve sustainability, all in the perspective of equality, justice, diversity and in general the fundamental values of humanity (UNESCO, 2015). With the aim of fostering sustainable development, ESD proposes to develop certain skills that can enrich people's knowledge and enable them to self-reflect on their actions, bearing in mind their social, cultural, environmental and economic consequences (UNESCO, 2017). Furthermore, ESD aims to focus education also on aspects such as pedagogy and the learning environment, with the common goal of preparing individuals and society itself to develop sustainable lifestyles and ultimately to achieve social transformation (EOI, 2011). Education holds the key to ensuring the well-being of current and future society, and of the generations to come, and it is therefore urgent to carry out an analysis of the current situation of the SDGs in schools in order to guarantee an in-depth ESD (Muguerza and Chalmeta, 2020). Collaborating with society in the acquisition of the SDGs, by resembling the knowledge and skills needed to achieve a transformation into informed agents, is one of the key objectives that ESD enables in relation to students (Rickenmann, 2017). Analysing the importance of ESD in secondary education, the following is stated: "it is more than evident that education is key in this whole process, not only because one of the SDGs is linked to

it, Goal 4; quality education, but also because to achieve the other goals it is necessary to approach the task from the pedagogical and educational point of view" (Huertas, 2021, p.11). Although the concept of sustainability in schools manifests itself in a disparate way from the point of view of the subjects, there is a conviction that sustainability should be applied in compulsory education, in a compensated way in which through the different subjects covered a significant progression is carried out and is based on pedagogy during that stage (Sureda et al., 2013). On the other hand, (Dieste et al., 2019) state that a systematisation based on cooperation between those who make up the educational community and the teachers themselves and with a well-structured project must take place in order for ESD to culminate by linking it to the SDGs. In order to acquire the capacity to act locally, but with global thinking, a transformation is needed that starts in schools, the place where human rights are promoted throughout the planet (Aneas et al., 2017).

Cooperative learning in Physical Education. A blend that contributes to sustainability

Considering the planetary emergency that has been occurring for some years, it is necessary that individuals have the ability to implement sustainable behaviours by virtue of sustainable motor behaviours, which are educated through Physical Education (PE) (Otero, 2009). When asked what sustainable PE is, (Otero, 2009) describes it as "a type of contextualised education", which takes place in the daily lives of all people and is developed in a "practical and applied" way. Indeed, PE based on sustainable development has a very important weight for its transformation, according to (UNESCO, 2015) an important work can be carried out in the achievement of most of the goals related to development, peace and the consequent situations to disputes or calamities through PE. A main barrier hindering the PE and the SDGs is the fact that there is almost no published research on PE, SDGs and Agenda 2030, which is worrying as PE is recognised as necessary to achieve several of the SDGs set out (Lundvall and Fröberg, 2022). From an environmental point of view, (Rodríguez, 2017) mentions that PE classes can and should encourage certain behaviours and respectful attitudes towards the natural environment, due to the high degree of importance of sustainable physical-sports activities to instil these values. From another perspective, (Baena et al., 2021) affirm that PE classes generate very favourable environments where various factors and values such as respect, cooperation, co-education, among others, are developed, all of which are linked to the development of the SDGs. There is also controversy about how to integrate the SDGs into PE, an aspect that (Baena and González, 2022) propose that for the SDGs to reach students and generate attitudes that favour their emergence, it does not depend solely on the content and methods used; they state that the teaching approach used must also form part of the process.

In this sense, cooperative learning seems to be a great teaching tool in PE. Firstly, cooperative learning in PE is a methodology that is still considered innovative, since there are no existing studies prior to the 1990s, but this fact does not interfere with the empirical evidence that shows that cooperative learning in PE has advantages, even in the motor area, compared to traditional methodologies that are based on more individual and competitive work (Velázquez, 2004). Teaching in PE is a fundamental tool for achieving equality in sport and sporting practice and with it trying to reduce the inequality that exists today, providing the propagation of values that appear through teaching, and which (Rodríguez and Miraflores, 2018) state "teaching plays a crucial role and it is important to make teachers aware of the special attention they must devote to try to eradicate the problem and provide equal treatment and opportunities for students". According to Velázquez (2015), cooperative work is "an educational methodology based on working in small, generally heterogeneous groups, in which students join forces and share resources to improve their own learning and that of the other members of the team". Cooperative work approached to PE is understood through 5 elements that are considered essential when putting it into practice, the first of which is the positive interdependence of objectives, the second the promoting interaction, interpersonal skills are the third element, equal opportunities the fourth, and the fifth of which is individual responsibility (Velázquez, 2014). This concept also leads authors such as (Fernández-Río, 2018) to express that "equal participation and equal opportunities for success should be two fundamental premises in any educational context, so they should also be two of the objectives of every teacher". If the objective is focused on PE, the term co-education can be associated with the collaboration in the process of growth of the whole of an individual's abilities, regardless of the sex to which they correspond, promoting the comprehensive development of students (Baena and Ruíz, 2009).

PE offers so many possibilities that it stands out among many for its promotion of gender equality, a fact that is reflected in the improvement it brings about in terms of the acquisition of attitudes and values that reduce inequalities, with respect, help, solidarity, tolerance and equality predominating. In addition to the basic instrumental learning that is put into practice in the pupils, generating skills such as the prevention of violence, non-sexist physical attitudes, among others (Alonso, 2007). There are many more benefits to be obtained through cooperative work in the field of PE; (Capllonch and Figueras, 2012) affirm that through it, a climate of respect is created among all students regardless of their gender, and even promotes responsibility among students and dialogue. Through the figure of the PE teacher (Velázquez, 2004) suggests that by means of cooperative learning, instructors aim to seek joint help from students in order to achieve the greatest possible number of solutions to the various problems proposed to them by seeking different approaches and approaches, also aiming to ensure that students have the ability to develop social skills and, if a conflict arises, know how to regulate it

constructively, and that they develop democratic attitudes and create an atmosphere of motivation for learning. Several research studies have been devoted to cooperative learning as a means of promoting and fostering gender equality and SDG 5, and how it could be worked on in PE at the secondary education stage (Velázquez, 2013). Although there is some research showing the development of social attitudes thanks to the integration of cooperative designs (Pérez and Poveda, 2008), (Riera, 2011), there is not much research devoted to investigating and evaluating the effects on gender attitudes, especially in its implementation (Velázquez, 2015).

Therefore, the aim of this research is to analyse the influence of a cooperative didactic unit focused on favouring gender equality in PE students in secondary education. Also, as secondary objectives it aims to value cooperative work in order to achieve group objectives where values and personal responsibility are the basis for achieving them. In this way, a contribution could be made through cooperative techniques to SDG 4 "quality education" and SDG 5 "gender equality". Specifically, to targets 4.5, 5.5 and 5.c.



Materials & Methods

This study has followed a quasi-experimental design, because the distribution of the groups has not been done by chance, but by educational convenience. A control group and an experimental group are presented, both of which were measured before and after an intervention.

Participants

This research was carried out in the 3rd year of Secondary Education (ESO), of which we had 5 different classes. The total number of participants in the study was 131 students (74 females), aged between 14 and 17 (mean age 14.46 ± 0.64 years). The distribution of the proportion by control and experimental groups is presented in Table 1

Table 1. Number of students in each group and average age

	Boys	Girls	Average age
Control	27	17	$14,87 \pm 0,81$
Experimental	30	57	$14,40 \pm 0,49$

Procedure

To conduct this research, several phases were established (Figure 1). In the first phase, the control and experimental groups were established, in this case two of the classes (D and E) are those that follow their normal physical education routine, i.e., the control groups. On the other hand, the three remaining classes (A, B and C) are where the intervention proposal to be analysed, which will be discussed later, is tested. In the second phase, before starting the didactic unit, a preliminary evaluation is carried out on both groups by means of a questionnaire. In the third phase, in order to achieve the objectives, set, a didactic unit of block 3 of games and sports is carried out, in this case badminton, where a total of 5 sessions are developed. These 5 sessions have been carried out during the months of March and April 2022. Each session lasts 55 minutes. The days on which the sessions were held were Mondays and Fridays depending on the group, since the gymnasium of the centre is required for the implementation of this didactic unit, so each group has availability of the same on different days. As for the sessions, in order to improve the aspect of cooperation between pupils, in the experimental groups, different groups within the same class were randomly formed, which resulted in a total of 6 groups of 4 or 5 pupils in each of the classes. These groups work together during the 5 proposed sessions (Table 2), without changing, with the aim of cooperating as much as possible during all the sessions and overcoming the challenges that are proposed. It is important to note that all groups are composed of both boys and girls, i.e., all groups are mixed (Table 1). The fourth phase is complemented by the post-evaluation of the same questionnaire that was carried out at the beginning of the didactic unit. Finally, the fifth phase is the evaluation of the results obtained in

the questionnaires. All the participants were informed of the objectives proposed in the study and therefore signed an informed consent form for the transfer of the data obtained for scientific use. In addition, in the design of the study I respected the ethical aspects presented in the Declaration of Helsinki, research approved by the ethics committee of the University of Alicante with code UA-2022-03-07.

Figure 2. Phases of the investigation



Table 2. Control group and experimental group sessions

	Control	Experimental
Session 1	Individual technique, individual challenges.	Cooperative challenges to become familiar with the racket, shuttlecock, grip types, strokes, etc.
Session 2	Narrow and long field tactics, in pairs and then in groups.	Work on wide-short and long-narrow court technique.
Session 3	Tactics 1x1	Serving technique in singles and individual tactics.
Session 4	Tactics 2x2	Serving technique in doubles and doubles tactics.
Session 5	Championship in pairs	Championship in groups.

Instruments

Construction of tolerance and cooperation attitude scales for a multicultural context
 One of the instruments used to assess pupils' attitudes towards gender equality through co-operative work in secondary school pupils was the questionnaire by (Sánchez et al., 1996). This questionnaire shows scales where on the one hand, attitudes on cooperation are measured and on the other hand, attitudes on tolerance focused on different cultures, religions, social classes, gender, among others.

The factors determined for this questionnaire are: culture, ethnicity and religion (together), social class, physical and intellectual characteristics, school success-failure and gender. For this questionnaire, use is made of 5-point LIKERT-type attitude evaluation questionnaires, where 1 is "I strongly disagree" and 5 is "I strongly agree". The items that make up this questionnaire are as follows: 14 items assessing attitudes towards cooperation and 38 items assessing attitudes of tolerance.

The internalisation of gender stereotypes in young people and adolescents.
 On the other hand, the questionnaire developed by (Colás and Villaciervos, 2007) was used. This questionnaire identifies the main gender stereotypes present in secondary school students. The items of this questionnaire are divided into six main areas or dimensions: body, social behaviour, competence, emotions, affective expression and social responsibility.

The total number of items corresponding to this questionnaire is 22, which are divided into 3, 2, 6, 4, 5 and 2 in order of the above. For this questionnaire, use is also made of 5-point LIKERT-type attitude evaluation questionnaires, where 1 is "I strongly disagree" and 5 is "I strongly agree".

Statistical analysis

All continuous variables in the dataset were subjected to a normality test (Kolmogorov-Smirnov). In turn, the data were subjected to a chi-square analysis and univariate statistical analysis for non-parametric samples, more specifically the Mann-Whitney U test, to assess the differences between groups (EXP vs. CON) on two occasions: pre- and post-intervention. The significance level was set at $p < 0.05$ in all cases. The statistical programs Statistics Product and Service Solutions (IBM ® SPSS ® Statistics Version 24.0.0.0) (International Business Machines Corp., Madrid, Spain) and Microsoft Excel ® in its 2016 version (Microsoft Corp., Redmond, WD, USA).

Results

Descriptive analysis of the results

Table 4 shows the items of the evaluation questionnaire ordered according to the factor, the results obtained from the questionnaire are presented through the mean and standard deviation where both questionnaires are unified. The first column shows the four main factors that have been measured and each item of which they are composed. In addition, the data obtained in both the experimental group and the pre and post control are shown, as well as a column showing the difference obtained between them.

Tabla 4. Descriptive analysis expressed as mean and standard deviation. for the questionnaires: construction of tolerance and cooperation attitude scales for a multicultural context. And the questionnaire for the internalization of gender stereotypes in young people and adolescents, in secondary school students in the pre and post phase for the control and experimental group.

Items	Experimental			Control		
	PRE	POST	Dif.	PRE	POST	Dif.
Factor 1. Cooperation	3,03 (0,34)	3 (0,42)	-0,3	2,97 (0,52)	2,9 (0,51)	-0,07
I don't like having to do group work because we never agree	2,65 (1,15)	2,49 (1,17)		2,32 (1,26)	2,7 (1,03)	
Doing things in a group is a drag. I prefer to work alone	2,39 (1,26)	1,95 (1,15)		1,97 (1,19)	2,55 (1,15)	
I like to cooperate with my colleagues in the group.	3,93 (1,02)	4,02 (1,03)		3,65 (1,18)	3,3 (1,03)	
It is more fun to work in a group	4,10 (1,04)	4,19 (1,07)		3,97 (1,19)	3,45 (1,15)	
It is better to work in a group because you learn better.	3,43 (1,1)	3,64 (1,13)		3,77 (1,16)	3,45 (1,19)	
If I am in a group and the others want me to do something, I do it.	3,4 (1,08)	3,58 (1,13)		3,29 (1,04)	3,15 (0,99)	
When something is decided in a group, I listen even if I don't agree with it.	2,67 (1,29)	2,8 (1,26)		2,77 (1,23)	2,85 (1,18)	
I stand up for what my group says, even if I don't agree with it.	2,42 (1,17)	2,53 (1,24)		2,9 (1,33)	2,8 (1,06)	
When I am in a group of friends and colleagues, I always try to get them to do what I want them to do	2 (1,1)	1,97 (1,11)		2,06 (1,15)	2,2 (0,95)	
When I am in a group in class, I let the others finish talking before I say something.	2,46 (1,18)	2,37 (1,29)		2,1 (1,29)	2,15 (0,81)	
When I work in a group, I prefer to set the rules myself.	1,52 (0,9)	1,41 (0,87)		1,65 (1,03)	1,85 (1,09)	
Listening to others when I am in a group is a waste of time.	1,77 (0,97)	1,64 (1,11)		1,61 (0,75)	2,25 (1,16)	
When I am in a group, I get bored listening to what others say.	4,42 (0,94)	4,42 (0,95)		4,42 (1,11)	3,7 (1,08)	
It is important to listen to others when doing things in a group.	4,14 (0,94)	4,03 (1,11)		3,97 (1)	3,5 (1,05)	
I like to cooperate with my group mates.	4,1 (0,96)	4,03 (1,16)		4,10 (1,13)	3,6 (1,1)	
Factor 2. Tolerance	2,25 (0,79)	2,22 (0,9)	-0,03	2,61 (0,79)	2,28 (0,62)	-0,33
The facts show that men are superior to women	1,72 (1,2)	1,78 (1,18)		2,48 (1,27)	2,15 (1,18)	
Boys are able to do some things better and girls are able to do other things better.	2,52 (1,43)	2,75 (1,45)		2,81 (1,46)	2,1 (0,85)	
I think it is good that there are all-male sports	1,65 (1,04)	1,69 (1,12)		2,1 (1,29)	2 (1,17)	
Teachers think that girls are better students than boys because they create less problems in class	2,94 (1,2)	2,73 (1,39)		3,23 (1,16)	2,45 (1)	
Girls in my class are weaker than boys.	2 (1,15)	1,93 (1,26)		2,06 (1,35)	2,4 (1,05)	
Boys are worse partners than girls in schoolwork	2,69 (1,21)	2,42 (1,28)		3 (1,27)	2,6 (1,1)	
Factor 3. Subjective norm	4 (1,1)	4,05 (1,22)	+0,05	3,13 (1,36)	3,4 (0,94)	+0,27
If boys and girls relate to each other at school, when we are adult men and women there will be fewer social differences between the two sexes.	4 (1,1)	4,05 (1,22)		3,13 (1,35)	3,4 (0,94)	
Factor 4. Gender stereotype	2,5 (0,91)	2,52 (0,77)	+0,02	2,4 (0,87)	2,45 (0,77)	+0,05
Bold, daring and fearless behavior is more valued in boys.	2,92 (1,21)	2,8 (1,01)		2,58 (1,19)	2,7 (1,03)	
Discreet, prudent, and demure behaviors are more valued for women.	2,83 (1,22)	2,76 (1,12)		2,23 (1,05)	2,65 (0,99)	
Men are more able than women to perform technical and mechanical tasks	1,98 (1,13)	2,19 (1,11)		2,42 (1,32)	2 (0,92)	
Women are more able than men to perform organizational and cooperative tasks.	2,29 (1,12)	2,34 (1,15)		2,35 (1,29)	2,2 (1,06)	

Comparative statistics

To obtain the comparative results shown in Table 5, the normality test was previously carried out, and once the test had been performed, a non-parametric sample was obtained. Following this result, it was decided to analyse the data using the Mann Witney test.

Table 5. Mann Witney test for each of the factors that make up the questionnaires

		Pre			Post			
		N	Z	Sig.	N	Z	Sig.	
Cooperation	Exp.	57,33	-,089	,929	Exp.	41,18	-,818	,413
	Con.	57,95			Con.	36,26		
Tolerance	Exp.	53,10	-2,331	,020	Exp.	39,83	-,121	,904
	Con.	69,27			Con.	40,55		
Subjective Norm	Exp.	63,39	-3,241	,001	Exp.	40,43	-,313	,754
	Con.	41,74			Con.	38,63		
Gender stereotype	Exp.	58,34	-,445	,657	Exp.	39,96	-,029	,977
	Con.	55,26			Con.	40,13		

In the tolerance and subjective norm factors (table 5) statistically significant differences were observed in the pre period. In the post period, no significant differences were shown for any of the four items. However, there was a clear difference in that in the pre period all four factors scored higher compared to the post period, which resulted in a decrease in all four factors at the same time comparing pre to post. In the cooperation factor, both the experimental group and the control group showed a very similar score in the pre period, but there was a difference in the post period, as the control group scored lower in the post period, even though both groups decreased their scores. In the tolerance factor, which showed significant differences in the pre period, it was observed that there was also a decrease in the score in both groups, highlighting a difference of almost 30 points in the control group comparing pre and post. In the subjective norm factor, with significant differences in the pre period, it was also observed that, in both the experimental and control groups, the score decreased from pre to post, but in this case it is the experimental group who showed the greatest difference in score from pre to post, with the control group remaining very close to its initial score. Finally, in the gender stereotype factor, both groups started and ended with a similar score in both periods comparing the experimental and control groups, and of course, this score decreased. Looking at the results obtained (table 6), there were no significant differences between the pre and post periods in any of the four factors which are cooperation, tolerance, subjective norm and gender stereotype. Even so, it was observed that in the experimental group there were more positive ranges in the cooperation and gender stereotype factors, and, on the other hand, more negative ranges in the subjective norm factor, as well as a tie in the tolerance factor. Looking at the control group, it was observed that except for one of its factors, the other three obtained more negative ranks than positive ones, with a greater difference in tolerance, gender stereotype and a smaller difference in cooperation. Only the subjective norm factor showed more positive than negative ranks for this group (table 6).

Table 6. Wilcoxon signed-rank test for each intervention time and study groups

	Ranks	Experimental			Control		
		N	Z	Sig.	N	Z	Sig.
Cooperation	Negative	26	-,256	,798	11	-,463	,643
	Positive	29			8		
	Ties	5			0		
Tolerance	Negative	28	-,605	,545	14	-1,611	,107
	Positive	28			5		
	Ties	4			0		
Subjective Norm	Negative	22	-,303	,762	7	-,723	,469
	Positive	21			8		
	Ties	17			4		
Gender stereotype	Negative	22	-,940	,347	7	-,101	,920
	Positive	32			12		
	Ties	6			0		

Note: This table shows the ranges, Z and significance for the control and experimental groups

Discussion

The aim of this study was to analyse whether the influence of a didactic unit through cooperative learning improved coeducational attitudes in secondary school students in the subject of PE. There is widespread concern about gender equality and very few attempts to address this issue, which makes it all the more important to work on it from an early age and to focus on education as a goal to achieve it (Rodríguez and Miraflores, 2018). Having analysed the data obtained through the study carried out, the experimental group exposed to the didactic unit proposed to try to reduce gender disparities and promote gender equality, does not confirm its

improvement through cooperative work composed of mixed groups, decreasing its results from the beginning to the end. Among the results obtained in the four factors of cooperation, tolerance, subjective norm and gender stereotype, there was a decrease in their scores from the beginning of the didactic unit to the end of the unit as a whole. It can be observed that in the results obtained in the pre period, there are two factors that show significant differences, in the first case the tolerance factor, where the control group is the one that shows higher scores. This aspect can be justified by the fact that both classes in the control group are mostly composed of boys, whereas in the three classes of the experimental group there is a greater presence of girls in all classes. In addition, the control group includes more vulnerable pupils, repeaters and pupils with less stable situations at home, and therefore they may tend to behave more differently from the rest of the pupils (Blández et al., 2007). On the other hand, significant differences also appear in the pre-school period in the subjective norm factor, with a higher score in the experimental group, which can also be justified by the aforementioned and by the difference in the number of students between the two groups (Monforte and Úbeda, 2019).

The fact that there were no improvements in any of the factors of the two groups at the end of the didactic unit may have been due to the lack of maturity of the students, as it is well known that students in 3rd ESO, aged between 14 and 16, are in a situation where they are experiencing many social, physical and mental changes (Molina, 2006) and are not yet able to establish basic foundations related to gender equality (Ariel, 2004). Perhaps it is also caused by little or insufficient education and training on aspects such as tolerance, gender stereotypes, cooperative work as a goal to achieve objectives, among others (López, 2012). Cooperative work can be a very simple and useful way to work on gender equality in physical education and to involve both boys and girls in achieving the proposed objectives (Prieto and Nistal, 2009). However, the results obtained in the study do not confirm the aim of the study to reduce gender disparities through co-operative work in mixed groups. Among the factors that may have determined this result, one of the most investigated is a mistaken implementation by teachers, as they expect to obtain a positive result in situations that are perhaps too immediate and do not value the possible difficulties (Martínez and Sánchez, 2020). Another factor that may have influenced the results is the lack of having established a basic foundation on cooperation prior to implementation (Velázquez, 2018), as without this it would be almost impossible to make progress on the proposed objectives.

Finally, the proposed didactic unit may have created confusion between the cooperative learning methodology and group work (Velázquez, 2015), which may have meant that this methodology was not fully explored. At this point, having observed different results, it can be reasoned that these facts may be due to insufficient teacher training in cooperative work and also to the different ways in which this methodology is applied by each of the teachers. There is a theoretical basis on which they all start, but the difficulty seems to arise when it comes to putting this methodology into practice, which is so respected by teachers in its implementation (Alarcón et al., 2019).

Even though there are many studies that guarantee that cooperative learning generates great benefits in educational teaching, there are very few educational centres in which this type of teaching is frequently used, and there are several teachers who do work with it, but most of them do so intermittently and not continuously (Azorín, 2018). In the study conducted by Velázquez (2018), it was found that only 4% of the teachers participating in the analysis used the cooperative work methodology in their classes, which further verifies the scarce implementation of this methodology. Coinciding with this study, (Velázquez, 2013) states that PE teachers do not use the cooperative learning methodology repeatedly in their classes because there are not enough descriptions of it where the processes that lead to the application of cooperative learning are specifically detailed, so that other teachers are trained to be able to put it into practice with their students. In turn, (Velázquez et al., 2014) also stated that teachers who introduce cooperative learning in their PE classes do not have as their sole objective the motor learning of the student, but also seek to achieve social and affective-motivational objectives.

On the other hand, there are also studies that show significant differences in the group level when cooperative work is applied as the main teaching method, where the experimental group improves its results positively compared to the control group that uses a more traditional teaching methodology (Gröben, 2005). After the research, it can be concluded that there is a great deal of empirical evidence that verifies that cooperative work promotes a series of learning processes that favour the fundamental values to which all societies aspire, such as equality, justice, freedom, etc., as well as improving in different areas, such as motor, social, cognitive and affective aspects of the individual (Fernández, 2017).

It is important to continue to carry out this type of research, as one of the problems that may have occurred in this study was the drastic change from a traditional methodology to a methodology based on cooperative work, where they were used to following certain guidelines and working individually to working as a team and seeking a common goal rather than individually. Perhaps, if this type of methodology had been used from the beginning, these significant changes would not have taken place, which is why it is necessary to continue working and researching on this methodology and its benefits and above all as a barrier to curb the problem of gender inequality.

Prospective study and limitations

In relation to the limitations, the groupings that were carried out to make both the experimental group and the control group, and within these, the student work subgroups, could not be carried out randomly, as the research took place during the teacher's work experience stage and he/she had to work on the guidelines established by the centre. For the same reason, the duration of the research was not very long, which meant that it was insufficient to reach a minimum baseline, and the period was also interfered with by holidays and school excursions.

On the other hand, the samples established for the two groups to be investigated lacked similarities, as the experimental group had almost twice as many pupils as the control group, in addition to the large differences between the sexes, with much more females in the experimental group than in the control group. Finally, the samples obtained in the pre and post questionnaires did not coincide either, an aspect that varies the results and means that it was not possible to obtain more realistic results. Following this research, several proposals are put forward so that they can be analysed in the future with the aim of promoting SDGs 4 and 5 towards coeducational attitudes based on gender equality in secondary education through PE: (1) How a cooperative learning didactic unit influences to reduce gender inequalities between sexes. (2) How a teacher should improve coeducational attitudes in PE in secondary education and (3) Development of methodologies based solely on the reduction or elimination of gender inequalities in adolescents through PE.

Conclusion

Cooperative learning is being integrated in recent years as a methodology by PE teachers as an objective to achieve both the learning and motor development of students as well as social learning and the development of basic human values in students. This methodology seems to present the necessary characteristics to achieve SDGs 4 and 5, more specifically goals 4.5, 5.5 and 5.c, however, the results obtained in this research are not related to this statement, since on the one hand, the differences between both periods pre and post were not significant in any of its factors, and despite having subjected an experimental group to work through the methodology of cooperative work, their results obtained at the end are very similar to those of the control group, where they worked with a more traditional methodology.

On the other hand, significant differences were observed between both groups, experimental and control, in two of the factors of the pre period, with the subjective norm factor being positively better scored in the experimental group, and on the other hand, the tolerance factor being negatively worse scored in the control group. This observation does not support the above statement either. However, there is still little research published on cooperative learning and gender equality through PE in secondary education, and there is still less training and information available to teachers about this methodology, which still seems to be in the testing period, facts that seem to have influenced the results obtained in this study. If we want to live in a sustainable society where equality is the basis on which to climb, it is essential to raise the awareness of both students and teachers as early as possible, and to immerse them in new methodologies that will benefit a society of integrity.

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