SPORT EDUCATION MODEL: MOTIVATION AND LIFE SKILLS IN PHYSICAL EDUCATION

MODELO DE EDUCACIÓN DEPORTIVA: MOTIVACIÓN Y HABILIDADES DE VIDA EN EDUCACIÓN FÍSICA

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Abstract

The aim of this study was to evaluate, the effects of an educational intervention program based on the Sport Education Model taking into consideration Self- determination theory, the girls achieve better results than boys in motivational variables and, consequently, leadership interpersonal communication, teamwork and problem-solving skills. The study was conducted using a pre-experimental design with pre-post measures and no control group. A total of 82 students (34 girls and 48 boys; *M* = 14.24, *SD* = .*51*) belonging to three groups of 3rd of Secondary Education participated in the study. The intervention lasted for seven weeks (14 lessons). Four assessment questionnaires, namely Interpersonal Teaching Style, Social Basic Psychological Needs Scale, Motivation Scale and Life Skills Questionnaire were administered before and after the program. At the end of the intervention, the girls not only showed better results than the boys, as in the case of relatedness support, but they also improved in relation to themselves. Therefore, this study suggests that this pedagogical model could be useful as a strategy to promote an educational environment where girls and boys can enhance their skills and change the perception towards the subject of Physical Education.

Keywords: Intrinsic motivation, pedagogical model, secondary education, self-determination theory.

Resumen

El objetivo de este estudio fue analizar, tomando como referencia la Teoría de la Autodeterminación, si tras los efectos de un programa de intervención educativa basado en el modelo de Educación Deportiva, las chicas consiguen mejores resultados que los chicos sobre variables motivacionales y, consecuentemente sobre habilidades de liderazgo, comunicación interpersonal, trabajo en equipo y resolución de problemas. Se desarrolló un diseño pre-experimental con medidas pre/ post sin grupo control. Participaron un total de 82 estudiantes (34 chicas y 48 chicos; *M* = 14.24, *DT* = .51) de tres clases de 3º Educación Secundaria Obligatoria. La intervención tuvo una duración de siete semanas (14 sesiones). Antes y después de la implementación del programa se administraron cuatro cuestionarios: Estilo Interpersonal Docente, Satisfacción de las Necesidades Psicológicas Básicas, Motivación y Habilidades de Vida. Al finalizar la intervención, las chicas, no solamente mostraron mejores resultados, respecto a los chicos, como es el caso del apoyo a las relaciones sociales, sino que también mejoraron respecto a sí mismas. A este respecto, el presente estudio refleja que este modelo pedagógico se puede utilizar como estrategia para favorecer un entorno educativo en el que tanto las chicas como los chicos puedan sentirse en un ambiente donde puedan potenciar sus habilidades, cambiando de esta manera, la percepción hacia la asignatura de Educación Física.

Palabras clave: Educación secundaria, modelo pedagógico, motivación intrínseca, teoría de la autodeterminación.

Introduction

Physical activity (PA) among children and adolescents during school hours and in their leisure- time should be a key area of study for teachers and researchers. The literature has highlighted the negative consequences of physical inactivity for most age groups, particularly young people (Chaput et al., 2020). In this regard, studies have shown that the 11- to 13-year-old age group is a critical stage for schoolchildren, as they tend to lose interest in and motivation for physical activity (Sember

et al., 2020). In this age group, girls are a cause for greater concern as they have been shown to be less involved in PA (Mayorga-Vega et al., 2020). Furthermore, Lago-Ballesteros et al. (2018) demonstrated that, in the school environment, girls' motivation and satisfaction with physical education (PE) decreases substantially as the school year progresses. Given this, PE is essential, as it provides an ideal context for educational programmes offering all students the same opportunities to practise, thus increasing motivation and enjoyment of PA. These programmes help adolescents learn about health, exercise and fitness, and teach them to manage adversity, experience teamwork and sportsmanship (Pennington, 2019).

In this regard, model-based practice provides student-centred PE programmes, as evidenced by numerous literature reviews (Bessa et al., 2019; Guijarro et al., 2020). One notable model is the Sport Education Model (SEM; Siedentop et al., 2020), which provides students with authentic sporting experiences to develop competent, cultured and enthusiastic players based on cooperative and constructivist pedagogy. Based on the SEM methodology, Manninen and Campbell (2022) highlighted the benefits of certain characteristics of the model. Firstly, the SEM methodology encourages peer teaching, giving students the opportunity to provide feedback and leading to a higher level of engagement (Hastie & Wallhead, 2016). Secondly, it requires greater creativity from students when organising practices and preparing for festivities during the formal competition phase (Teixeira et al., 2020). Thirdly, during the sports season, students face different challenges and must collaborate to solve team problems (Chu & Zang, 2018).

The SEM considers motivation to be an important factor in achieving positive outcomes, such as pleasure, well-being, and enjoyment, for students during PE classes (Chu & Zang, 2018). According to Self-Determination Theory (SDT), an individual's motivations are reflected along a continuum of self-determination formed by different motivational regulations, such as intrinsic motivation, integrated regulation, identified regulation, introjected regulation, external regulation and amotivation. This theory establishes three basic psychological needs (BPNs) — competence, autonomy and relatedness — which are linked to the individual's social context and can therefore influence various types of motivation (Ryan & Deci, 2020). Indeed, SDT has formed the theoretical basis for studies in which SEM has been employed (Chu & Zang, 2018; Cuevas et al., 2016). Previous interventions have found that students who participate in Sport Education experience greater satisfaction of their autonomy, competence, and relatedness needs in PE. They also demonstrate greater self-determined motivation to engage in PA during their leisure-time and adopt a physically active lifestyle (Wallhead et al., 2014). Furthermore, they develop social skills and trust among team members (Van den Berghe et al., 2014). The literature also shows that this model allows for greater autonomy, responsibility, involvement and participation in sports practice (Perlman, 2012a; 2012b), thus creating an environment conducive to gender equality among peers and fostering a sense of team belonging. Furthermore, the SEM was developed to offer all students the same opportunities to practise, regardless of their skill level or gender. This enables them to learn to make decisions, solve problems and participate in the teaching and learning process, playing an active role in sports practice (Perlman, 2012a; Wallhead et al., 2014). These skills can be adapted to any sporting context, enabling the SEM to enhance interactions between the sexes and, consequently, eliminate stereotypical attitudes that may arise in PE (Reyes et al., 2021). For instance, boys tend to favour sports involving speed, competition and physical contact, whereas girls generally prefer non-aggressive sports (Chalabaev et al., 2013). However, this perception is changing. Although some studies have found that boys enjoy sports more than girls (Wallhead et al., 2014), other research (Burgueño et al., 2020) has shown that no differences were found between the two genders in motivational aspects, despite using content related to the male gender (football/basketball). On the other hand, Llanos-Muñoz et al. (2022) demonstrated that, at the end of the educational intervention with SEM, girls changed their perception of gender inequality and differentiation compared to boys. Similarly, the hybridisation of models (e.g. SEM/Teaching Games for Understanding) showed significant improvements in satisfaction with the three BNPs and consequently in autonomous motivation among girls in a domain recognised in the literature as being associated with masculinity: 'basketball' (Gil-Arias et al., 2021).

The creators of the model (Siedentop et al., 2020) aimed to make sure that all these learned and acquired skills could be transferred to all areas of daily life, such as schoolwork, home life and relatedness. They identified these skills as 'life skills' (Pierce et al., 2017). Some examples of life skills that can be developed in PE classes, and specifically with SEM due to the similarities between the two, are teamwork, interpersonal communication, leadership, and problem solving (Jenny & Rhodes, 2017). Indeed, previous studies have examined one or two life skills using this pedagogical approach. For example, McCaughtry et al. (2004) observed how some students were encouraged to take on leadership roles and work as a team. In contrast, García-López and Gutiérrez (2015) analysed the effects of SEM on empathy and assertiveness, finding that students showed significant improvements in assertiveness. However, despite the potential alignment between SEM characteristics

and life skills such as teamwork, interpersonal communication, leadership and problem solving, few studies have addressed this issue or considered the gender variable. The main objective of this study was therefore to analyse whether girls achieve better results than boys on motivational variables and, consequently, on leadership skills, interpersonal communication, teamwork and problem solving after an educational intervention programme based on SEM, using the SDT as a reference.

Materials and Methods

Participants

A total of 82 third-year secondary school students aged 14–15 (*M* = 14.24, *SD* = .51) from a public school in the south of the Community of Madrid participated in the study. Of these students, *n* = 34 were girls (*M* = 14.29, *SD* = .57) and *n* = 48 were boys (*M* = 14.21, *SD* = .45). The school is situated in a middle-class socio-economic area and the PE teachers delivered the sessions using direct instruction. The students had no prior experience of SEM. However, the students had experience of playing different invasion sports, such as handball, floorball and football.

Instruments

Teaching Interpersonal Style: Students' perception of the support or control regarding BPNs was measured using the Spanish version of the Interpersonal Behaviour Questionnaire adapted by Burgueño & Medina-Casaubon (2021). This questionnaire began with the statement, "In Physical Education classes, the teacher..." The instrument consisted of 24 items that allowed information to be collected on the following: autonomy-supportive behaviour (e.g. 'supports the choices that I make for myself'; α pre = .77; post = .85), competence-supportive behaviour (e.g. 'encourages me to improve my skills'; α pre = .65; post = .84), relatedness-supportive behaviour (e.g. 'takes the time to get to know me'; α pre = .75; post = .83), autonomy-thwarting behaviour (e.g. 'pressures me to do things their way'; α pre = .68; post=.71), competence-thwarting behaviour (e. g., 'points out that I will likely fail'; α pre = .61; post = .61), relatedness thwarting behaviour (e.g. 'does not comfort me when I am feeling low; α pre = .51; post = .66).

Satisfaction of basic psychological needs: Students' satisfaction with the three BPNs was measured using the Spanish-validated scale by Moreno-Murcia et al. (2008). The 12-item questionnaire began with the statement 'In Physical Education classes...' and was divided into three categories: satisfaction with autonomy (e. g., 'The exercises I do are in line with my interests'; α pre = .79, post = .83), satisfaction with competence (e. g., 'Exercise is an activity that I excel in'; α pre = .73, post = .79), and satisfaction with relatedness (e. g., 'I interact very amicably with the rest of my classmates'; α pre = .90, post = .90).

Motivation: The various motivational factors were recorded using Ferriz et al. (2015) Perceived Locus of Causality Scale in PE, which incorporated integrated regulation. The questionnaire began with the statement 'I participate in Physical Education classes...' and comprised 24 items, categorised under the following factors: intrinsic motivation (e. g., 'Because Physical Education is fun'; α pre = .82; post = .82), integrated regulation (e. g., 'Because it fits in with my lifestyle'; α pre = .94; post = .89), identified regulation (e. g., 'Because I want to learn sports skills' (α pre = .80; post = .78), introjected regulation (e. g., 'Because I want the teacher to think I am a good student'; α pre = .64; post = .70), external regulation (e. g., 'Because I will get into trouble if I don't'; α pre = .78; post = .80), amotivation (e. g., 'But I don't really know why'; α pre = .82; post = .76).

Life skills: These were measured using a Spanish translation of the Cronin and Allen (2017) questionnaire. The questionnaire was translated from English into Spanish in accordance with the guidelines of the International Test Commission (Muñiz et al., 2013). In its original version, the questionnaire began with the statement 'In Physical Education classes...' and consisted of 47 items. However, in this study, only the items referring to the factors of teamwork (e.g. 'I accept suggestions for improvement from others'; α pre = .78; post = .65), interpersonal communication (e.g. 'I pay attention to what others say'; α pre = .57; post = .61), leadership (e.g. 'I set high standards for the team'; α pre = .80; post = .72), and problem solving (e.g. 'I think carefully about problems that arise'; α pre = .74; post = .73) were used.

The first and third instruments feature a likert scale response ranging from 1 (strongly disagree) to 7 (strongly agree), while the second and fourth instruments feature a scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Design

The study was conducted using a pre-experimental design with pre- and post-test measurements, but with no control group. The sample was selected by convenience sampling, using the grade with the largest number of student groups

as a reference point. The variables analysed in this study were: teaching interpersonal style (autonomy, competence and relatedness control and supportive), BPNs satisfaction (autonomy, competence and relatedness), motivation (intrinsic, integrated, identified and introjected regulation, as well as external regulation and amotivation) and life skills (teamwork, interpersonal communication, leadership and problem solving).

Procedure

The relevant permissions were obtained from the ethics committee (0103202311923), and the school management team was contacted to request their collaboration, as well as to inform them of the purpose, requirements and objectives of the educational intervention. As the students were minors, informed consent was subsequently obtained from their parents or legal guardians. The anonymity and privacy of the students were respected at all times. Both measurements were taken in the students' usual classroom and in the presence of the researcher in charge, who was on hand to answer any questions that arose during the process. Due to the large number of questions, and to make them easier to understand, the instruments were completed at two different times, three days apart, in both the pre-test and the post-test. The students spent 10–15 minutes completing the instruments at each of the measurement moments.

Intervention

The SEM teaching unit comprised 14-50-minute sessions delivered over a period of seven weeks. The intervention was carried out by a PE teacher who had acquired knowledge of SEM through seminars and master's degree courses. This enabled him to apply two units based on the characteristics of SEM to invasion sports such as basketball and football. For the purposes of this study, a ten-hour training course was conducted, comprising theoretical and practical sessions. Once the intervention began, the PE teacher attended a weekly one-hour seminar to discuss any difficulties encountered and the progress made. The last author of this study led this seminar.

To analyse the fidelity of the SEM intervention, the following recommendations of Hastie and Casey (2014) were adhered to: (a) a detailed description of the curriculum elements; (b) validation of the implemented model; and (c) description of the programme context. In this regard, a 14-session sports programme based on the main elements of the SEM and using basketball as the sport was designed. The essential characteristics of the SEM were present throughout the intervention: (1) a long season; (2) developing a sense of affiliation and belonging to a team; (3) regular competition involving both friendly and formal matches; (4) data recording by the referee and sports director; (5) a final event comprising the semi-finals and finals; and (6) a celebration involving an awards ceremony (Siedentop et al., 2020).

The structure of the sports season followed the four phases established in the SEM (Siedentop et al., 2020) (see Table 1): (1) organisation and affiliation phase (Session 1); (2) pre-season phase, divided into two parts: (a) the teacher-led pre-season (sessions 2–5); and (b) the student-led pre-season (sessions 6–8); (3) the regular competition phase (sessions 9–13); and (4) the final phase (session 14). In the first phase (organisation and affiliation), the SEM methodology was explained. Given that the teacher was aware of the students' skill levels, the teams were formed with the aim of achieving heterogeneity among the group members. Five mixed groups of six students were formed, with the aim of making the level as equitable as possible. During this phase, each group completed the affiliation form by consensus, deciding on a team name, the first and last names of the team members, the kit colour and a chant for the competition, as well as the roles they would play. The roles selected for this intervention were coach, sporting director, referee 1, referee 2, journalist and physical trainer. To facilitate the selection of roles, a dossier was provided detailing the functions and personal characteristics associated with each one.

The second phase of the intervention (*pre-season*) comprised two parts. In the first part, led by the teacher, technical and tactical content was taught to prepare for regular competitions. In the second part, the teacher gradually gave the students more autonomy. As well as working on technical and tactical aspects, the roles of physical trainer and coach were put into practice during the initial sessions, with each team being assigned its own space. Conversely, students in the same role who belonged to different teams formed committees, enabling them to make decisions that affected the formal competition phase. The disciplinary committee (referees), for example, was responsible for determining the rules of the game and refereeing the matches. The sports management committee (sports directors), meanwhile, was responsible for designing the competition and scoring system. The physical preparation committee (physical trainers), meanwhile, developed a common warm-up protocol for all teams, while the communications committee (journalists) established guidelines and a general outline for writing pre- and post-match reports.

In the third phase (*regular competition*), all teams competed against each other, with four teams competing each day. A schedule was established to determine which team would referee each match. At the same time, the other roles continued with their duties. For example, the journalists wrote a report on each of the matches, while the sports directors were responsible for recording the matches played and the results, and the referees ensured that each team complied with the established rules. In addition, the teacher provided opportunities for reflection, in which the coaches, with the collaboration of all team members, had to determine the strengths and weaknesses of their own team and their opponents, as well as design strategies for the next match.

Finally, in the fourth and *final phase and festivity*, the semi-final and final matches were played to simulate a festive atmosphere, followed by the awards ceremony. Prizes were awarded for first, second and third place, as well as for roles, the most original team and fair play. Students voted for these prizes, on the condition that they could not vote for themselves or their teammates.

Table 1

Season Planning Sport Education

Lesson	Phase	Sport Education
1	Organization/ affiliation	Introduction to the model, team formation and role assignment
2	Pre-season (Teacher)	Basic technical aspects: dribbling, passing, receiving and shooting
3	Pre-season (Teacher)	Working on the principles of maintaining possession and progressing Collective offensive tactics: support running and breakaway running
4	Pre-season (Teacher)	Collective defensive tactics: retreat (defensive balance) Team defence
5	Pre-season (Teacher)	Collective defensive tactics: retreat (defensive balance) Team defence
6	Pre-season (Student)	The fitness coach leads the warm-up The coach works on 'defensive rebounding' Design of documents for the competition phase: rules, competition schedule, guidelines and outlines for interviews and pre-match warm-up
7	Pre-season (Student)	The role of the physical trainer leading the warm-up The role of the coach working on the 'counterattack' Design of documents for the competition phase: rules, competition schedule, guidelines and outlines for interviews and pre-match warm-up
8	Pre-season (Student)	The coach works on 'offensive rebounding' Friendly matches
9-13	Formal competition	Competition Role performance
14	Final event/festivity	Semi-final and final matches, followed by an awards ceremony

Validity of the Intervention

The intervention was validated using a checklist consisting of four items that reflected the most significant characteristics of SEM (see Table 2). To this end, an external researcher with knowledge of sports pedagogy, specifically pedagogical models, and previous experience in this role, conducted direct and systematic observations. This observation was made over a total of six sessions, representing more than 12.5% of the total number of sessions (Tabachnick & Fidell, 2013). The observer determined that all the criteria included in the checklist were implemented by the teacher in each of the sessions observed.

Statistical Analysis

All analyses were performed using the SPSS statistical package (version 24.0). Prior to the main analyses, the normality of the data was assessed using the Kolmogorov–Smirnov test ($p > 0.05$). Descriptive statistics (mean and standard deviation)

were then calculated for each variable, gender and time of study. Additionally, Cronbach's alpha coefficient was calculated to assess the reliability of the scales. In terms of instrument reliability, Cohen et al. (2007) state that a Cronbach's alpha value of .60 or greater for factors with a small number of items is valid for the main analyses. However, values well below this threshold (e.g. control of relatedness) were excluded from the main analyses. Before analysing the effects of the intervention, a MANOVA was performed to check for significant gender differences (between boys and girls) in the pre-test results. This analysis revealed significant differences between the two groups in some of the dependent variables, which were included as covariates in the MANCOVA performed for the intergroup analysis of the post-test results. Finally, a 2 x 2 multivariate analysis of time of measurement (pre-test and post-test) x gender (boys and girls) was performed for the intra-group analysis. The Bonferroni correction factor was used to control for Type I errors arising from multivariate comparisons. If a significant multivariate effect was found, univariate analyses of variance were performed for both boys and girls to determine which specific constructs contributed to the overall effect. The effect size was calculated using the partial eta-squared statistic (ηp^2), which provides an indication of the magnitude of the observed differences. According to Cohen (1998), the effect size was considered small if it was equal to or greater than .01, medium if it was equal to or greater than .06, and large if it was equal to or greater than .14. The level of statistical significance was set at $p \leq 0.05$ (*95% confidence interval*).

Results

Inter-Group Analysis (Post-Test)

Intergroup analyses revealed differences only in the teaching of interpersonal styles. Specifically, girls achieved significantly higher post-test scores than boys for the relatedness support variable (p = .042), while boys achieved significantly higher post-test scores than girls for the autonomy control variable (p = .014) (see Table 2).

Table 2

Descriptive Statistics and Inter-Group Analysis for Each Variable by Gender

Time	Variables	Boys M (SD)	Girls M (SD)	*p*
Pre-test	Autonomy support	4.89 (1.15)	4.96 (.99)	.782
	Competence support	5.79 (.92)	6.05 (.70)	.171
	Relatedness support	4.68 (1.08)	5.02 (.99)	.167
	Autonomy control	3.20 (1.03)	3.12 (1.29)	.760
	Competence control	1.80 (.85)	1.80 (.98)	.994
	Autonomy satisfaction	3.46 (.73)	3.01 (.94)	.019
	Competence satisfaction	3.90 (.75)	3.52 (.82)	.033
	Relatedness satisfaction	4.18 (.71)	3.48 (1.15)	.001
	Intrinsic motivation	5.74 (1.29)	5.17 (1.52)	.073
	Integrated regulation	5.15 (1.82)	4.59 (1.88)	.185
	Identified regulation	5.69 (1.44)	5.38 (1.30)	.313
	Introjected regulation	3.85 (1.48)	3.14 (1.41)	.033
	External regulation	1.79 (.84)	1.80 (.98)	.962
	Amotivation	1.64 (1.08)	2.06 (1.53)	.145
	Teamwork	3.90 (.64)	3.74 (.70)	.288
	Leadership	3.73 (.68)	3.56 (.68)	.274
	Interpersonal communication	4.04 (.64)	3.69 (.73)	.028
	Problem solving	3.68 (.76)	3.66 (.80)	.890

M = media; *SD* = Standard Deviation

Table 2 (cont.)

Descriptive Statistics and Inter-Group Analysis for Each Variable by Gender

Time	Variables	Boys M (SD)	Girls M (SD)	*p*
Post-test	Autonomy support	4.93 (1.26)	5.31 (1.13)	.174
	Competence support	5.66 (1.00)	6.08 (.86)	.057
	Relatedness Support	4.91 (1.24)	5.47 (1.10)	.042
	Autonomy control	3.22 (1.33)	2.55 (.95)	.014
	Competence control	2.02 (.93)	1.71 (.79)	.119
	Satisfaction autonomy	3.73 (.69)	3.44 (.86)	.901
	Satisfaction competence	4.20 (.56)	3.86 (.87)	.969
	Relatedness satisfaction	4.22 (.71)	3.72 (1.19)	.858
	Intrinsic motivation	5.69 (1.01)	5.56 (1.35)	.917
	Integrated regulation	5.37 (1.47)	4.92 (1.66)	.358
	Identified regulation	5.77 (1.07)	5.61 (1.23)	.833
	Introjected regulation	3.69 (1.47)	3.61 (1.25)	.233
	External regulation	2.86 (1.63)	2.76 (1.48)	.778
	Amotivation	1.69 (.98)	1.90 (1.12)	.406
	Teamwork	4.10 (.47)	3.82 (.53)	.135
	Leadership	3.84 (.51)	3.69 (.61)	.841
	Interpersonal communication	4.18 (.55)	3.97 (.75)	.864
	Problem solving	3.83 (.74)	3.80 (.71)	.360

M = media; *SD* = Standard Deviation

Intra-Group Analysis (pre-Test- Post-Test)

Table 3

Intra-Group Analysis of Each Variable by Gender

Time	Gender	Variable	Difference in means (J-I)	*p*	*95% CI*
Pre-test Post-test	Boys	Autonomy support	-.044	.795	[-.384; .295]
		Competence support	.128	.344	[-.139; .395]
		Relatedness support	-.222	.134	[-.514; .070]
		Autonomy control	-.022	.897	[-.362; .318]
		Competence control	-.228	.081	[-.484; .028]
		Autonomy satisfaction	-.277	.015	[-.498; -.055]
		Competence satisfaction	-.303	.001	[-.476; -.131]
		Relatedness satisfaction	-.043	.658	[-.233; .148]
		Intrinsic motivation	.047	.721	[-.213; .307]
		Integrated regulation	-.224	.195	[-.565; .117]
		Identified regulation	-.073	.606	[-.353; .207]
		Introjected regulation	.161	.394	[-.213; .536]
		External regulation	-1.073	.000	[-.1557; .-589]
		Amotivation	-.057	.709	[-.362; .247]
		Teamwork	-.201	.018	[-.366; -.036]
		Leadership	-.117	.111	[-.262; .028]

Time	Gender	Variable	Difference in means (J-I)	*p*	*95% CI*
		Interpersonal communication	-.138	.063	[-.284; .008]
		Problem solving	-.149	.113	[-.334; .036]
	Girls	Autonomy support	-.353	.076	[-.744; .038]
		Competence support	-.022	.887	[-.329; .285]
		Relatedness supportive behaviour	-.449	.010	[-.785;. -112]
		Autonomy control	.574	.005	[.182; .965]
		Competence control	.088	.553	[-.206; .383]
		Autonomy satisfaction	-.434	.001	[-.694; -.173]
		Competence satisfaction	-.346	.001	[-.548; -.143]
		Relatedness satisfaction	-.243	.034	[-.467; -.018]
		Intrinsic motivation	-.390	.014	[-.698; -.081]
		Integrated regulation	-.331	.108	[-.736; .075]
		Identified regulation	-.235	.163	[-.568; .098]
		Introjected regulation	-.471	.039	[-.916; -.025]
		External regulation	-.963	.001	[-.1539; -.388]
		Amotivation	.162	.376	[-.200; .523]
		Teamwork	-.080	.415	[-.274; .114]
		Leadership	-.129	.136	[-.299; .041]
		Interpersonal communication	-.272	.002	[-.444; -.100]
		Problem solving	-.147	.182	[-.365; .071]

M = media; *SD* = Standard Deviation; *CI* = Confidence Interval

In terms of teaching interpersonal skills, multivariate contrasts revealed a significant effect for girls (Wilk's lambda = 0.792; F (6, 72) = 3.158; p = 0.008; ηp^2 = 0.20), but not for boys (Wilk's lambda = 0.863; F (6, 72) = 1.889; p = 0.093; ηp^2 = 0.13). In pairwise comparisons, and specifically among girls, significantly higher scores were obtained in the post-test than in the pre-test in support of relatedness (p = .010). In contrast, significantly lower scores were achieved in the autonomy control variable in the post-test than in the pre-test (p = .005) (see Table 3).

With regard to satisfaction with the three BPNs, multivariate contrasts revealed a significant effect, with a larger effect size for girls (Wilk's Lambda = .826; F (3, 77) = 5.424; p = .002; ηp^2 = .17) than for boys (Wilk's Lambda = .855; F (3, 77) = 4.343; p = .007; ηp^2 = .14). More specifically, based on pairwise comparisons, both girls and boys achieved significantly higher post-test scores for all three BNPs compared to the pre-test, except for satisfaction with relatedness among boys (see Table 3).

In terms of motivation, multivariate contrasts revealed a significant effect, with a smaller effect size observed for girls (Wilk's Lambda = .823; F (6, 75) = 2.681; p = .021; ηp^2 = .17) than for boys (Wilk's Lambda = .755; F (6, 75) = 4.049; p = .001; ηp^2 = .24). Based on pairwise comparisons, girls showed significant improvements in intrinsic motivation, introjected regulation and external regulation in the post-test compared to the pre-test. In contrast, boys demonstrated significantly greater external regulation in the post-test compared to the pre-test (see Table 3).

Finally, with regard to life skills, multivariate contrasts revealed a significant effect for girls (Wilk's lambda = 0.873; F (4, 76) = 2.754; p = 0.034; ηp^2 = 0.12), but not for boys (Wilk's lambda = 0.919; F (4, 76) = 1.667; p = 0.166; ηp^2 = 0.08). In pairwise comparisons, girls achieved significantly higher post-test scores than pre-test scores for the interpersonal communication variable.

Discussion

The main objective of the study was to analyse whether girls achieve better results than boys on motivational variables and, consequently, on leadership skills, interpersonal communication, teamwork and problem solving following an educational intervention programme based on SEM, using SDT as a reference. The results showed that, compared to their original scores, the girls achieved significant improvements and significantly higher scores than the boys in terms of support for relatedness after the intervention. The boys achieved the same results in the autonomy control variable. In this regard, the fact that some of the girls took on the role of coach may have set an example for the other students in the class, reinforcing their sense of responsibility and improving their perceptions of interpersonal relationships with their classmates (Burgueño et al., 2020). On the other hand, the fact that boys perceived greater control over their autonomy may be because, although the model a priori promotes student autonomy (Siedentop et al., 2020), they feel inhibited when it comes to making decisions because they have to fulfil their roles successfully and demonstrate greater knowledge of the sport than girls. However, the fact that boys tend to make their own decisions and take responsibility during PE classes may be one of the reasons why girls reported having less autonomy.

Taking the STD framework as a reference point and considering the PE teachers' interpersonal behaviours the findings determined that, between the beginning and end of the intervention, girls experienced a change in their perception of relatedness-supportive behaviour and greater autonomy. In this regard, the teacher led the first pre-season sessions, as the students had no previous experience with the model. This may explain why the girls felt they had more control over their autonomy. On the other hand, a greater perception of support for relatedness is determined by some of the SEM own strategies, such as forming different committees. Although this model is effective in improving social relations among students (Perlman, 2012b), forming committees consolidates these relations beyond the team itself. This is because, in addition to promoting intragroup relations through tasks such as choosing a team name or chant for the competition by consensus, it also benefits intergroup relations. This is because the different roles require interaction with other team members in order to make decisions. For example, the disciplinary committee (the referees) established the rules of the game, while the physical training committee designed a standardised warm-up protocol for all teams. From this perspective, implementing different committees can be essential to creating adaptive learning environments that allow participants to experience things they have not encountered before. However, the content selected, together with the negative consequences that competition can bring, especially for girls, as well as the teacher's greater involvement so that the girls learned to make decisions and solve problems independently, may be one of the reasons why these differences were observed, in an attempt to increase motivation towards PE classes.

With regard to BPN satisfaction and taking into account STD, previous studies, such as that by Xiang et al. (2018), have shown that boys and girls may react differently in the same learning environment in terms of satisfaction with autonomy, competence and relatedness, and the results of this study confirm the findings of the aforementioned author. The significant improvements in autonomy and competence satisfaction achieved by both girls and boys between the pre-test and post-test may be due to the strategies used in the model. For instance, during the intervention, students collaborated in small groups to develop their team identity and select a role based on their interests or strengths. Combined with the adaptation of tasks according to skill level, this may explain why they felt more competent. Additionally, the pre-season phase, during which students were given autonomy to perform different types of warm-ups, design the competition schedule, establish rules and select prizes, may explain why their autonomy satisfaction improved.

In terms of satisfaction with relatedness, no differences were found among the boys despite strategies to support this need being implemented, such as team membership and inter- and intra-group meetings. Boys tend to be involved in team sports (Pastor-Vicedo et al., 2019), so these relationships may already be in place, which could have diluted the effect of the aforementioned strategies. By contrast, the girls reported significant improvements in their satisfaction with relatedness. This increase may be due to the constant interactions that took place within and between teams during class development (Chu & Zang, 2018). The model offers students the opportunity to value social interactions. Specifically, girls feel that they can contribute valuable ideas to their teams (Harvey et al., 2014). For example, they demonstrated greater development, commitment and responsibility when performing team roles through role-playing, compared to boys (Layne & Hastie, 2016).

Conversely, the results revealed greater intrinsic motivation among girls, a finding that has been corroborated in prior studies (Gil-Arias et al., 2021). The characteristics inherent in this model, such as grouping, affiliation, leadership and teamwork, promote intrinsic motivation levels, enabling students to develop interest, enjoyment and satisfaction (Llanos-

Muñoz et al., 2022). On the other hand, improvements in introjected regulation among girls may be due to performing roles such as coach, referee and scorer, which foster a sense of responsibility and a desire to perform well in order to participate in the activities proposed (Burgueño et al., 2020). However, despite the benefits of the model itself, previous findings on external regulation for both genders should be noted. These results differ from those expected based on the intentions promoted by the SEM. Some of the characteristics of the model in which students prioritise winning over enjoyment and enthusiasm during sports practice include formal competition and data recording. Specifically, boys tend to be more motivated and committed to interventions involving competitive environments (Navarro-Patón et al., 2017). To achieve the opposite effect, based on the possibilities offered by SEM, it is recommended that the competition phase is approached not only in terms of points won in each match, but also in terms of fair play, roles, and flags or coats of arms. This will encourage students, especially boys, not to focus solely on competition.

As a result, a greater effect size was found for girls than for boys with regard to life skills. While the study results showed an increase in all life skills variables (teamwork, leadership, interpersonal communication and problem solving) from the start to the end of the intervention, only significant differences were found in the interpersonal communication variable for girls. The characteristics of SEM enable students to develop these life skills throughout the sporting season. As Siedentop et al. (2020) suggest, students work in small groups, developing a sense of belonging to a team and learning to resolve any problems that may arise between team members. However, during constant team interaction to solve problems or find the most appropriate strategy, girls were more involved in providing positive feedback to classmates on how to improve tasks, while boys focused on competition. It is therefore considered necessary for students to learn to work in small groups so that they can improve their social skills with their peers before, during and after PE classes (Cronin & Allen, 2017).

No significant differences were found in relation to the leadership variable, which is a positive aspect when implementing the model. Previous studies have highlighted how SEM can create environments in which children dominate PE classes (Parker & Curtner-Smith, 2012) or where the voices of less skilled students are silenced (Brock et al., 2009). However, differences were found in the interpersonal communication variable, which may be due to the moments of reflection encouraged by the teacher before and after the competition, during which any tactical problems arising from previous matches could be solved. Furthermore, Llanos-Muñoz et al. (2022) state that working in small groups gives students the opportunity to mediate in various game situations, thereby improving communication, particularly among girls.

Despite the results found, the study has the following limitations: Firstly, there is no control group, so it is not possible to compare the results with those of students who have been taught using other pedagogical approaches. Secondly, the sample size is small, and the sample is from a single school and year group. For future studies, it is necessary to expand the sample to include other schools and different educational levels. Thirdly, a questionnaire was used that was not fully adapted or validated for the Spanish context.

Conclusions

In conclusion, the results of this study show that, despite using content recognised in the literature as masculine, this model provides equal opportunities for boys and girls to develop their social and sporting skills in an environment that fosters this development. This changes perceptions of PE as a subject.

Ethics Committee Statement

In this section, you must include the statement and approval number of the Ethics Committee, if applicable to your research. Add 'The study was conducted in accordance with the Declaration of Helsinki and was approved by the Ethics Committee: Rey Juan Carlos University (0103202311923, 31-03-2023).

Conflict of Interest Statement

Specify that the funding bodies or institutions had no influence on the design of the study, the analysis of the data or the interpretation of the results. There are no conflicts of interest among the manuscript's authors.

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Authors' Contribution

For multi-authored research articles, you must detail their individual contributions. For this purpose, use the CRedit taxonomy (https://credit.niso.org/): ""Conceptualization A.G., I.R. & F.C; Methodology A.G., I.R. & F.C.; Software A.G., I.R. & F.C.; Validation A.G., I.R. & F.C.; Formal Analysis A.G., I.R. & F.C.; Investigation A.G.; Resources J.C.; Data Curation A.G.; Writing – Original Draft A.G., I.R., F.C. & J.C; Writing – Review & Editing A.G., I.R., F.C. & J.C.; Visualization A.G., I.R., F.C. & J.C.; Supervision A.G., I.R., F.C. & J.C.; Project Administration A.G., I.R., F.C. & J.C.; Funding Acquisition I.R. All authors have read and agreed to the published version of the manuscript.'

Data Availability Statement

The data is not available because the ethics committee reported that only the authors of the manuscript would process these data.

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