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Effects of a hybrid sport education and TGfU unit on pre-service PE teachers' PNB and autonomy

Efectos de una unidad híbrida (MED/TGfU) en las NPB y autonomía de educadores físicos en formación

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Abstract

As traditional teaching methods in physical education evolve, innovative models are increasingly crucial for enhancing students' motivation and sense of autonomy. This research aimed to analyse the impact of two teaching units in handball. One was a hybrid SEM/TGfU unit, and the other was a CLA unit. The focus was on assessing their effects on students' Basic Psychological Needs (BPN) and autonomy support. These models were selected for their proven effectiveness in enhancing motivation and autonomy in physical education, while CLA was included for its focus on task constraints and decision-making. The study was conducted within a Spanish university setting, involving 38 university students (11 females, 29 males) who participated in a hybrid SEM/TGfU unit or a CLA unit over 12 handball lessons. Motivation and satisfaction were assessed using validated questionnaires in a pre/post-intervention quasi-experimental design. A 2 (pedagogical model) x 2 (test-time) multivariate analysis of variance revealed significant improvements in autonomy ($p = 0.01$, $d = -0.78$) and competence ($p = 0.08$, $d = -0.62$) for the hybrid group, with no significant change in relatedness ($p = 0.54$, $d = -0.21$). Additionally, students taught with the hybrid model reported a greater perception of teacher autonomy support in terms of interest in students' opinions ($p = 0.001$, $\eta^2 = 0.76$) and assessment of autonomous behavior ($p = 0.01$, $\eta^2 = 0.36$). Motivation and satisfaction were assessed using validated questionnaires, administered in a pre/post-intervention design to measure changes resulting from each intervention. This study provides preliminary evidence that a hybrid SEM/TGfU unit can effectively enhance students' motivation and satisfaction, leading to notable improvements in autonomy, competence, and perceptions of teacher autonomy support, while no significant differences were observed in relatedness.

Keywords: hybrid model; team sports; self-determination theory; autonomous motivation; satisfaction.

Resumen

A medida que evolucionan los métodos tradicionales de enseñanza en educación física, los modelos innovadores son cada vez más cruciales para mejorar la motivación y el sentido de autonomía de los estudiantes. Esta investigación pretendía analizar el efecto de una unidad híbrida SEM / TGfU de balonmano en comparación con una unidad de Enfoque Liderado por Restricciones (CLA) sobre la NPB y el apoyo a la autonomía de los estudiantes universitarios. El estudio incluyó a 38 estudiantes universitarios (11 mujeres, 29 hombres) que participaron en una unidad híbrida SEM/TGfU o en una unidad CLA durante 12 clases de balonmano. La motivación y la satisfacción se evaluaron mediante cuestionarios validados en un diseño cuasi-experimental pre/post-intervención. Un análisis multivariante de varianza 2 (modelo pedagógico) x 2 (tiempo de prueba) reveló mejoras significativas en autonomía ($p = 0,01$, $d = -0,78$) y competencia ($p = 0,08$, $d = -0,62$) para el grupo híbrido, sin cambios significativos en relación ($p = 0,54$, $d = -0,21$). Los estudiantes del modelo híbrido percibieron un mayor apoyo a la autonomía por parte del profesorado, especialmente en cuanto al interés por sus opiniones ($p = 0,001$, $\eta^2 = 0,76$) y evaluación del comportamiento autónomo ($p = 0,01$, $\eta^2 = 0,36$). Este estudio

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muestra que una unidad híbrida SEM/TGfU en balonmano mejora la autonomía y competencia de los estudiantes, sin diferencias significativas en la relación.
Palabras clave: modelo híbrido; deportes colectivos; teoría de la autodeterminación; motivación autónoma; satisfacción.

Introduction

Self-Determination Theory (SDT) has emerged as a robust psychological framework, providing insights into motivation and self-regulation across various domains, notably in higher education. This theory highlights the importance of satisfying basic psychological needs (BPNs)—autonomy, competence and relatedness—to foster well-being, engagement and motivation in daily activities (Benlahcene et al., 2021; Chacón-Cuberos et al., 2021; Deci & Ryan, 1985; Ryan & Deci, 2000, 2017). In education, SDT helps explain how students self-motivate and how teachers can support this process. Emotional regulation and the fulfillment of belonging needs are particularly relevant in university, a period marked by academic pressure and transition to the workforce.

Traditionally, university settings, particularly sports science programs, have followed teacher-centered, linear pedagogies. Though effective for teaching specific technical skills, these methods limit autonomy and hinder students' exploration of strategic options in games (Moy et al., 2016). This approach is linked to reduced satisfaction, learning and autonomy (Gil-Arias, Diloy-Peña, et al., 2021; Gil-Arias, Harvey, et al., 2021), and may also affect student-teacher relationships. As a response, there has been a move toward non-linear pedagogies and practice-based pedagogical models.

Practice-Based Pedagogical Models (PBM) and active methodologies emphasize students' active involvement, encouraging reflection and decision-making in authentic or simulated contexts. These models support interaction with content and foster knowledge through practical experience (Renshaw et al., 2016). In physical education, models like the Sport Education Model (SEM), Teaching Games for Understanding (TGfU), and the Constraint-Led Approach (CLA) help develop both technical and tactical skills while enhancing motivation and autonomy (Hastie & Wallhead, 2016). These approaches also promote collaboration, teamwork and independent learning—essential in both sport and broader educational contexts (González-Víllora et al., 2018; MacPhail, Trish, et al., 2008). PBMs were designed to overcome the shortcomings of traditional methods.

The TGfU approach offers a comprehensive way to teach sports games, fostering deeper understanding and appreciation of the sport. Its holistic perspective enhances autonomy and motivation, helping learners engage more meaningfully (Gómez et al., 2023). Research shows TGfU promotes intrinsic motivation in PE (García et al., 2022),

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increases autonomy (Morgan et al., 2005), and supports the BPN of competence (Mandigo et al., 2008). TGfU has evolved to meet the varied needs of educators and students. In handball, it provides sports science students with tools to teach both technical and tactical elements (Mazzardo et al., 2020), emphasizing decision-making through tactical understanding (Balakrishnan et al., 2011). Small-sided games (SSG) further enrich learning by fostering dynamic, interactive environments (Sahli et al., 2022), especially useful for future coaches or PE teachers.

Similar to TGfU, the Constraints-Led Approach (CLA) encourages active learner interaction with the environment, but focuses on task and context constraints to support autonomous decision-making. It promotes procedural learning by shaping behavior through constraint manipulation (Renshaw et al., 2016; Renshaw & Chow, 2019). CLA supports the BPNs of autonomy, competence and relatedness by encouraging active roles, teamwork and problem-solving (Liu, 2023). In handball, task constraints have been shown to support performance goal learning and may be transferable to broader educational contexts like undergraduate studies (Flores-Rodríguez & Ramírez-Macías, 2021).

While CLA emphasizes adapting to constraints, the Sport Education Model (SEM) goes further by placing students in leadership and decision-making roles within full-game contexts. This fosters social and leadership development alongside technical skills, promoting student autonomy (Hastie & Wallhead, 2016). SEM builds both tactical and leadership skills (Rocamora et al., 2019) and encourages students to take responsibility for organizing games (Layne & Hastie, 2015). It has been shown to improve motivation and satisfaction in PE (Chu & Zhang, 2018), increase intrinsic motivation (Sproule et al., 2007), and strengthen team responsibility (Manninen & Campbell, 2022). SEM is especially relevant for students training to become coaches or PE teachers, helping them develop leadership, organizational and management skills (Hastie & Wallhead, 2016; Rocamora et al., 2019; Manninen & Campbell, 2022).

Incorporating and combining multiple pedagogical models is crucial for meeting diverse student needs and enhancing learning. Each model contributes uniquely to developing autonomy, competence and relatedness—core components of SDT (Deci & Ryan, 1985; Ryan & Deci, 2000). Hybrid models like SEM and TGfU provide dynamic, student-centered learning environments that foster participation, decision-making and skill acquisition. These approaches promote leadership and autonomy, especially important in higher education settings for preparing future professionals (González-Víllora et al., 2018; Hastie & Wallhead, 2016). Research on SEM-TGfU hybridization highlights benefits for BPN satisfaction and SDT principles, leading to higher motivation and greater learning autonomy (Gil-Arias et al., 2020).

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The hybrid SEM and TGfU approach not only enriches PE instruction but also offers new opportunities for application in university contexts. Though effective in primary and secondary education, research is lacking on their use with university students, particularly in sports science. The shift from traditional to non-linear pedagogies, in line with SDT, represents a promising path to improving higher education experiences (Hardin et al., 2013). Applying TGfU, CLA and SEM—and their combinations—has yielded positive results in autonomy, competence and relatedness (Gil-Arias, Diloy-Peña, et al., 2021; Gil-Arias et al., 2017, 2020). These models provide valuable learning opportunities for students aspiring to be PE teachers or handball coaches. Moreover, hybrid models enable students to take on roles like coach, statistician or fitness leader, developing transferable skills in planning, reflection, communication and leadership.

To guide this study, three hypotheses were formulated to compare the impact of the SEM/TGfU hybrid unit and the CLA unit on students' BPN. First, students in the hybrid unit were expected to report higher autonomy post-intervention, as autonomy is key to intrinsic motivation (Deci and Ryan, 1985). Second, the hybrid group was expected to report greater perceived competence, due to the model's engaging, leadership-focused structure. Third, the hybrid group was predicted to show stronger relatedness, supported by the collaborative nature of the intervention.

Therefore, this study aimed to analyse the effect of a hybrid SEM/TGfU handball unit compared to a CLA unit on university Sport Sciences students' BPN. We hypothesized that the hybrid unit would yield higher post-intervention scores in: a) autonomy, b) competence, and c) relatedness, compared to the CLA unit.

Method

This study employed a quasi-experimental pre/post-intervention design to assess the impact of a hybrid SEM/TGfU unit and a CLA unit on Basic Psychological Needs (BPN) satisfaction and autonomy support among university physical education students.

Participants

A priori sample size calculation was conducted using G*Power (www.gpower.hhu.de; accessed on 8 December 2022), with a power of 90% and $\alpha = 0.05$, based on previous studies (Farias et al., 2015). The analysis indicated that 42 participants were needed to ensure statistical power. Initially, 44 students were recruited; however, 4 were excluded for not meeting inclusion criteria, and 2 were removed as outliers. The final sample included 38 participants (see Figure 1 for details). Prior research on similar topics (Farias et al., 2015; Hastie & Curtner-Smith, 2006; Muñoz-Llerena et al., 2021) used smaller samples, further supporting the reliability of the present findings.

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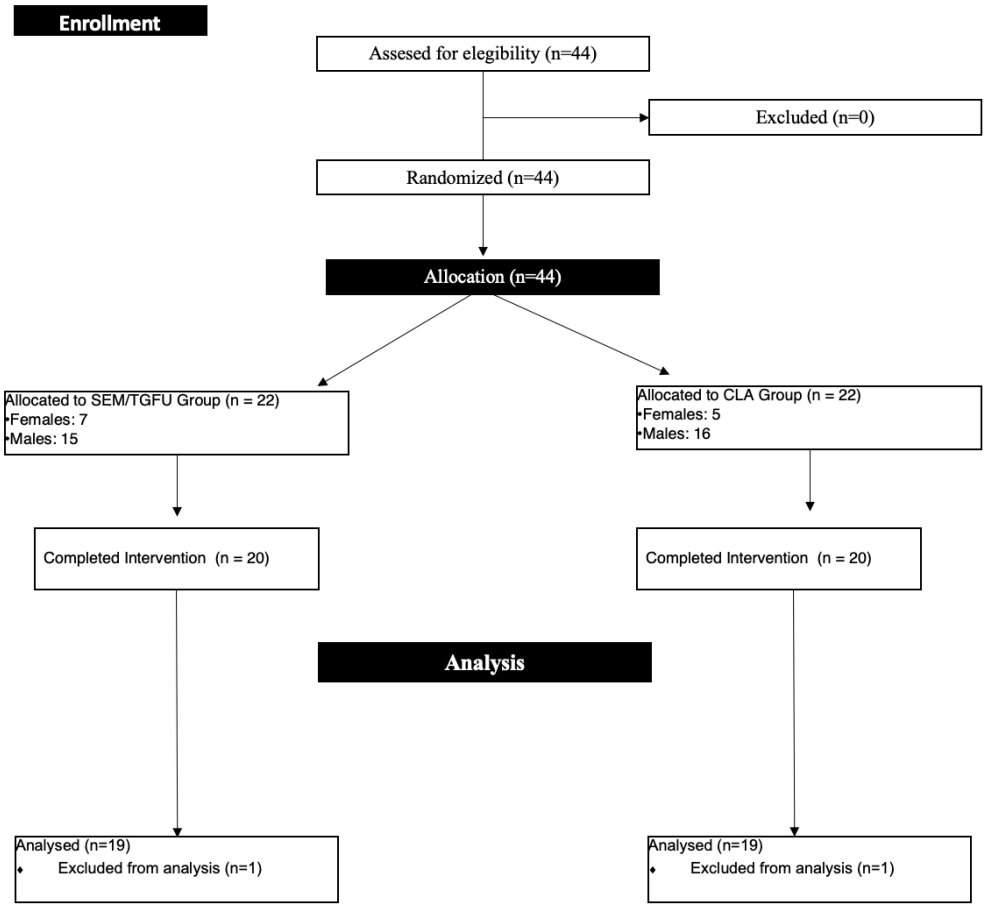
The final sample consisted of 38 university students (11 females, 27 males) in the second year of a Sports Science degree at a Spanish university, with a mean age of 19.6 ± 0.7 years. Inclusion criteria included no injuries affecting physical activity and at least 80% attendance during the intervention. Students were randomly assigned to two groups, with separate randomisation for males and females to ensure balanced sex distribution. The SEM/TGfU group included 6 females (19.5 ± 0.8 years) and 13 males (19.6 ± 0.7). The CLA group included 5 females (19.4 ± 0.6) and 14 males (19.7 ± 0.5). The overall mean age was 19.6 ± 0.7 years.

Participant recruitment and inclusion criteria: second-year Sports Science students at a Spanish university were invited to participate through classroom announcements and emails sent by instructors. They were informed of the study's aims, procedures, and the voluntary nature of participation. Students with injuries preventing physical activity or who failed to attend at least 80% of sessions were excluded.

Figure 1

Consort flow diagram



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Teachers of both groups had 4–5 years of experience teaching at the university level and were familiar with Small-Sided Games and designing learning tasks accordingly. However, they had no prior experience with the Sport Education Model (SEM). To address this, one teacher completed a training course on SEM, which led to discussions on teaching through a hybrid SEM/TGfU unit.

Before the study began, students were informed about the research aims and procedures, emphasizing the voluntary nature of participation. The study was approved by the Ethics Committee for Research with Human Beings from the lead university and followed the Declaration of Helsinki (2013). Informed consent was obtained from all participants, ensuring confidentiality and voluntary participation.

Data collection

A Likert scale from 1 (strongly disagree) to 5 (strongly agree) was used for the questionnaires. The first author was present during completion to assist with any questions. All students completed the questionnaires in 20–25 minutes without their teachers present.

Since the instruments had not been previously applied in a university context, a confirmatory factor analysis (CFA) was conducted to validate the scales using data from this study. Theoretical models used in the Spanish versions were tested. Cronbach's alpha values assessed the reliability of all instruments.

Basic Psychological Needs. Motivation and satisfaction were measured with validated questionnaires: the Basic Psychological Needs in Exercise Scale (Vlachopoulos & Michailidou, 2006) and the Autonomy-Supportive Coaching Strategies Questionnaire (Conroy & Coatsworth, 2007). Both instruments showed acceptable reliability in PE contexts (Cronbach's alpha > 0.80). All items began with "In my Handball lessons…" and included 12 items (four per factor), covering autonomy (e.g., "I have the opportunity to choose how to perform the exercises"), competence (e.g., "I carry out the exercises effectively"), and relatedness (e.g., "I feel very comfortable when I do exercise with other colleagues").

Autonomy support. The Spanish version (Conde et al., 2010) of the Autonomy-Supportive Coaching Strategies Questionnaire (Conroy & Coatsworth, 2007) was used. Items also began with "In my handball lessons…" and consisted of nine statements in two dimensions: five on interest in student input (e.g., "My teacher asks me what I want to do in handball lessons") and four on praise for autonomous behavior (e.g., "My teacher values my attitude in handball lessons"). Prior research in secondary PE confirmed its reliability (Gil-Arias et al., 2020).

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Procedures

Before the intervention, the teacher underwent training led by the last author. Over the first month, the teacher spent about nine hours reading key papers on SEM (e.g., Hastie, 2013) and hybrid models (Gil-Arias, Diloy-Peña, et al., 2021). Two two-hour meetings were held to discuss the content, during which planning for a hybrid SEM/SSG unit began. In contrast, the teacher delivering the SSG-only unit did not receive this training. In the second month, the first and last authors, along with both teachers, co-designed the hybrid unit for handball, following the structure proposed in Gil-Arias, Harvey, et al. (2021). This planning phase included the season outline (see Table 1) and the selection of individual technical-tactical contents for each lesson.

After teacher training, baseline data were collected, and the intervention started. It lasted 12 lessons over six weeks (two 55-minute sessions per week). Data were collected at three points: before, midway, and after the intervention. Both the hybrid SEM/TGfU and CLA units were implemented simultaneously, with different groups. Pre-intervention data included baseline BPN satisfaction and autonomy support, followed by the same measures mid- and post-intervention. Midpoint assessment was conducted after the learning phase.

Intervention

The intervention followed guidelines by Siedentop et al. (2011) for SEM and Harvey & Jarrett (2013) for TGfU. The SSG structure was adapted from Renshaw et al. (2016), focusing on task constraints and tactical complexity.

Intervention program 1. Sport Education and SSG. The unit was based on SEM elements: season structure, team affiliation, formal competition, record keeping, a final event, and festivity. It had three phases: (a) learning (lessons 1–7), (b) formal competition (lessons 8–11), and (c) final event (lesson 12).

In lesson one, students were assigned to three mixed-gender, mixed-ability teams (6–7 students), which remained constant throughout the season (per Siedentop et al., 2011). Students selected roles (e.g., fitness leader, coaches, captain, equipment manager, statistician) based on interests or strengths. Roles were rotated after two lessons. They also played 5 vs. 5 matches to get familiar with the game and their roles. Resting teams used checklists to learn rules.

From lessons 2–7, tasks followed SSG principles: modification representation (e.g., 1 vs. 1 to 5 vs. 5), tactical complexity (e.g., numerical superiority in attack like 2 vs. 1), and modification exaggeration (e.g., replacing goals with zones to emphasize movement and positioning). Each lesson focused on a specific phase: attack, defense, attacking transition, or defending transition (see Table 1). Although the teacher planned tasks, students had responsibilities. To promote autonomy, teachers offered two task

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options per segment (warm-up, main tasks, cool-down), and students chose between them. Task complexity varied to meet competence needs. As lessons advanced, both player numbers and tactical difficulty increased. Teachers also provided individualized feedback through guided questioning (Vickers, 2007) to support personal progress.

During the formal competition phase, all teams played matches. Non-playing students assumed rotating roles such as referee, VAR, linesman, fourth official, delegate, journalist, or mascot. As in the learning phase, these roles changed after lesson nine and were introduced the day before.

The final event decided winners and awards: best team, most original team, most organized team, fair play, MVP, and best goalkeeper. The teacher collected data during the competition on team performance, fair play, organization, and originality. Progress records were shared throughout the unit so teams could monitor their development.

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Table 1. Season plan for the hybrid SEM/TGfU unit.

Lesson	TGfU component	SEM component
Initial evaluation		
1	Learning focused on rules and formations	5 vs. 5 SSG Teacher-direct instruction within-team practice. Introduction to the concept of the season. Explanation of the model and competition format. Development of team identity. Assignment of roles to the learning phase.
2 3	Learning focused on the attacking phase	Student-directed instruction Within-team practice (1 vs. 1 → 3 vs. 3) + Teacher-directed instruction With all the teams (5 vs 5) Shared-directed instruction: both, teacher and students plan some learning tasks. **Duty responsibilities:** Fitness leader conduct warm-up (5´). Second coach conducts the first task (15´). First coach conducts the second task (15´). Teacher conducts the third task (15´). Fitness leader conduct cool down (5´). Captain encourages his teammates and help them. Equipment manager gathered the equipment. Statistician collected data with a checklist to analyse the main team (decision-making and execution of technical-tactical skills).
4 5	Learning focused on the defending phase	
6	Learning focused on the attacking transition phase	
7	Learning focused on the defending transition phase	
Intermediate evaluation		
8	Learning focused on the attacking phase	5 vs 5 SSG Student directed instruction. Championships for season points. Scrimmages with the opposing teams. **Duty team responsibilities of teams that play the match:** Fitness leader conducted the general warm-up. Second coach conduct the specific warm-up with a technical-tactical task. Equipment manager gathered the equipment. With the statistical report, first coach and captain conduct a pre-match talk, oriented to the phase that it was time to learn. Also, the first coach didn't play the match, to give instruction to his players. **Duty team responsibilities of teams that not playing:** Referee, two liners and VAR controlled the compliance of the game rules. Fourth official/delegate completed the match sheet. Journalist did a report oriented to the game phase. Photographer took pictures and interviewed a player after the match
9	Learning focused on the defending phase	
10	Learning focused on the attacking transition phase	
11	Learning focused on the defending transition phase	
12	Learning focused on all phase of the game play	5 vs 5 SSG Culminating event and awards. Culminating event – Festivity Final match **All duty responsibilities were developed** (teams that play and teams that not playing)

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	In this lesson, the mascot appeared (new role) with the responsibilities of the photographer.
Final evaluation	

Intervention program 2. CLA. The CLA unit involved a series of structured lessons focused on task constraints, emphasizing tactical and technical skill acquisition through small-sided games. Instruction was teacher-led, with predefined learning tasks targeting specific phases of play (e.g., attacking, defending, transitions). The intervention aimed to develop decision-making and technical execution under varying constraints. The format followed in this unit shared some characteristics of the hybrid unit: (a) lessons were highly structured (warm-up, first task, second task, third task and cool down), increasing the number of players and the technical-tactical complexity as the lessons progressed; (b) practice was focused in the learning of both technical and tactical skills within small-sided games and (c) success criteria provided to the students were based on the successful technical-tactical skills execution and decision-making. However, there were some differences: (a) the teacher was the instructional leader of the unit, setting the learning goals and tasks; (b) groups were not persistent across lessons.

Finally, it is necessary to indicate that in both intervention program, the learning contents were the same (see Table 2). Although, in 8-11 lessons the contents were the same, the technical-tactical complexity was increased.

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Table 2. Learning contents to design Small-Sided Games for both interventions.

Learning contents			
Lesson	**Game phase**	**Tactical**	**Technical**
1	All phases	Introduction	Introduction
2	Attacking	Breadth and depth Introduction to first offensive line (3-3 offensive formation)	Pass + reception Uncheck
3	Attacking	Pass and go + successive penetration. First and second offensive line (3-3 offensive formation)	Pass + reception Offensive body positioning Step cycle + Dribble
4	Defending	Distance marking Collective defensive movement in closed defenses (6-0 defensive formation)	Feints (for offensive movement feints) Defensive Base Position Blocking
5	Defending	Proximity marking + Anticipation Pressure + coverage in opened defenses (5-1 defensive formation)	Feint (for pass, dribble, and throw) Defensive technique (arm-hip) Blocking
6	Attacking transition	First wave counterattack Unfolding (overlapping)	Long Pass + Throw (Jump throw and no-jump throw)
7	Defending transition	"Foul" after loss of ball Marking (even defender and odd defender) Retreat	"Foul" after loss of ball
8		Attacking	
9		Defending	
10		Attacking transition	
11		Defending transition	
12	All phases	All	All

Finally, the flow of the intervention is presented in the Figure 2 to a better comprehensive of the study.

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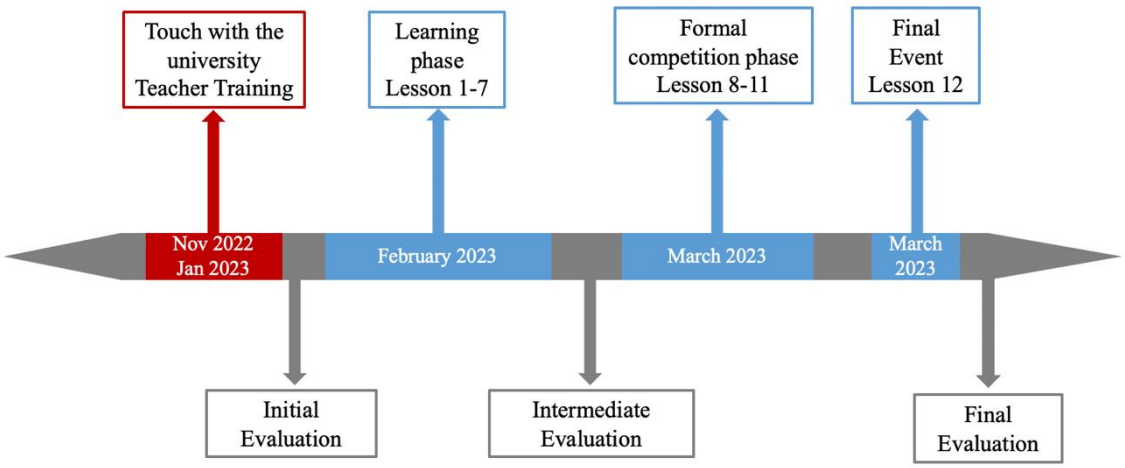
Figure 2

Timeline of the study



Statistical Analysis

We employed appropriate statistical methods to calculate percentages, as well as central and dispersion parameters, including the arithmetic mean and standard deviation (SD). Descriptive statistics were computed for each variable (see Table 3). Additionally, we performed normality tests (Kolmogorov–Smirnov) and tests for homogeneity of variances (Levene's test) on all metrics.

The paired sample t-test was employed to assess differences through a repeated measures analysis (before intervention – after intervention) for the Basic Psychological Need in Physical Education Scale, which includes autonomy, competence, and relatedness. Cohen's d served as the indicator for effect size. To interpret the magnitude of this effect size, we employed the following criteria: d = 0.20 indicates a small effect, d = 0.50 a medium effect, and d = 0.80 a large effect. To assess between-group differences, an ANCOVA test was conducted, utilizing the pretest as a covariate and measuring the times before and after the intervention as factors. For interpreting the magnitude of the effect size in ANCOVA, we applied these criteria: $\eta p2 = 0.02$ represents a small effect, $\eta p2 = 0.06$ a medium effect, and $\eta p2 = 0.14$ a large effect.

Posteriorly, a repeated measure analysis of variance (ANOVA) test was performed with three groups (direct instruction and sport education model) and three moments (pre intervention, intermediate and post intervention) was performed for autonomy support questionnaire (interest in students and autonomous behaviour). Statistical analyses were performed using SPSS (version 26) for Mac. For all analyses, significance was accepted at $p < .05$.

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Results

Basic Psychological need in physical education Scale

Data were analysed using SPSS (version 26) for Mac. Statistical methods included paired t-tests to assess within-group differences, ANCOVA to control for baseline differences between groups, and repeated measures ANOVA to evaluate changes across the three measurement points. Effect sizes were calculated using Cohen's d and η^2, with significance set at $p < 0.05$."

Table 3 summarizes the main outcomes of the Basic Psychological Needs questionnaire, showing pre- and post-intervention differences in autonomy, competence, and relatedness for both groups. Repeated measures ANCOVA (see Table 3) revealed significant influence of pre intervention level on the variations occurring on autonomy (p=0.001; η_p^2=1.31) and competence (p=0.020; η_p^2=0.69). However, pre intervention level not significantly influenced the social relationship (p=0.540; η_p^2=0.21).

Table 3.

Basic Psychological Need before (pre) and after (post) the intervention period (mean ± SD).

	Direct instruction (n = 19)			Sport Education Model (n = 19)			Differences between Groups (ANCOVA)
	Pre intervention	Post Intervention	RM t-test (p)	Pre intervention	Post Intervention	RM t-test (p)	
AUT	3.38±0.57 [3.03-3.73]	3.11±0.73 [2.65-3.56]	p = 0.170 d= 0.42	3.57±0.46 [3.28-3.85]	3.99±0.61 [3.61-4.36]	**p = .010*** d= 0.78	**p = .001**** η_p^2=1.31
COMP	3.95±0.49 [3.64-4.25]	3.75±0.72 [3.31-4.19]	p = 0.080 d= 0.32	3.92±0.33 [3.71-4.13]	4.16±0.43 [3.89-4.42]	**p = .080** d= 0.62	**p = .020*** η_p^2= 0.69
RS	4.37±0.81 [3.87-4.87]	4.29±0.60 [3.92-4.66]	p = 0.360 d= 0.15	4.68±0.40 [4.44-4.93]	4.59±0.52 [4.27-4.91]	**p = .540** d= 0.21	**p = .260** η_p^2= 0.41

Note. Values are presented as mean ± standard deviation [95% confidence interval]. Effect sizes are reported using Cohen's d for within-group differences and partial eta squared (η^2p) for between-group comparisons. * p < .05, ** p < .01.

As shown in Table 3, the within-group analysis with autonomy values, dataset revealed that SEM model significantly increased (p=0.010; d=0.78), while SSG did not provoked this significantly increase (p=0.170; d=0.42). Regarding within-group analysis with competence values, dataset did not reveal significative differences in both groups, SE model (p=0.080; d=0.32) and SSG (p=0.080; d=0.62). Although no significant within-group differences were found for competence, the SEM/TGfU group showed a trend toward improvement, whereas the CLA group exhibited a slight decline. Finally, a new within-group analysis with social relationship did not reveal significative differences in SE or SSG groups (p=0.36; d=0.15; p=0.54; d=0.21), respectively.

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Autonomy support

The descriptive statistics of the autonomy support measures status are in Table 4.

Table 4

Handball unit satisfaction variables before (pre), during (intermediate) and after (post) the intervention period (mean ± SD).

	Direct instruction (*n* = 19)			Sport Education Model (*n* = 10)			Repeated measures ANOVA		
	Pre intervention	Intermediate	Post Intervention	Pre intervention	Intermediate	Post Intervention	Group	Moment	Time * Moment
Interest in students' opinion	4.17±1.14 [3.46-4.87]	2.71±1.30 [1.90-3.51]	2.61±1.39 [1.75-3.47]	4.48±0.99 [3.87-5.10]	5.38±0.74 [4.92-5.84]	5.41±1.33 [4.58-6.23]	*F*=55.87 ***p*= .001**** η^2_p=0.76	*F*<1	*F*=24.53 ***p* =.001**** η^2_p =0.58
Assessment of autonomous behaviour	4.82±0.91 [4.25-5.38]	4.34±1.31 [3.53-5.16]	4.30±1.26 [3.52-5.08]	5.11±0.88 [4.56-5.65]	4.93±1.16 [4.22-5.65]	5.68±0.91 [5.12-6.25]	*F*=10.10 ***p* = .010*** η^2_p = .36	*F*<1	*F*=4.22 ***p* = .020*** η^2_p =0.19

Note. Values are presented as mean ± standard deviation [95% confidence interval]. Effect sizes are reported using Cohen's d for within-group differences and partial eta squared (η^2p) for between-group comparisons. * p < .05, ** p < .01.

A repeated measures ANOVA, with participants' mean *interest in students' opinion* measures, revealed a significant main effect of group, F (1, 18) = 55.87, p = 0.001, η^2_p = .76. These differences between groups (see Figure 3), were found in favor of SE group (5.09±1.02) in comparison with the SSG group (3.16±1.28).

Regarding the interaction between group and moment (Figure 4), pairwise comparisons showed significant differences in intermediate moment (p= 0.001, d = -2.51) and in the post intervention moment (p= 0.001, d = -2.10). However, the comparison between pre intervention moment (p= 0.47, d = -0.28) did not revealed significant differences.

In addition, dataset revealed interaction between group and moment, F (2, 36) = 24.53, p = 0.001, η^2_p = .58. However, dataset did not reveal a significant main effect of moment, F<1.

Figures 3 and 4 present the evolution of students' perception of teacher interest in their opinions across the intervention timeline.

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Figure 3

Interest in students' opinion in both groups both

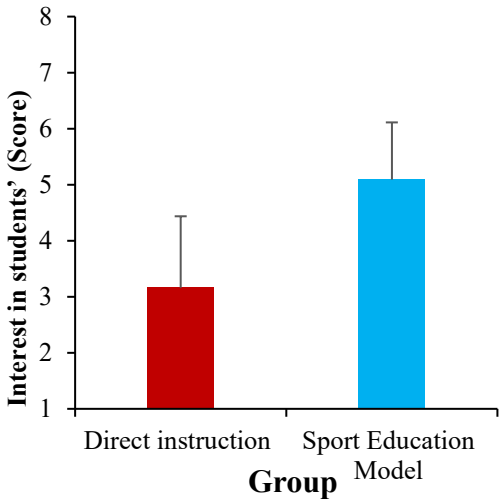
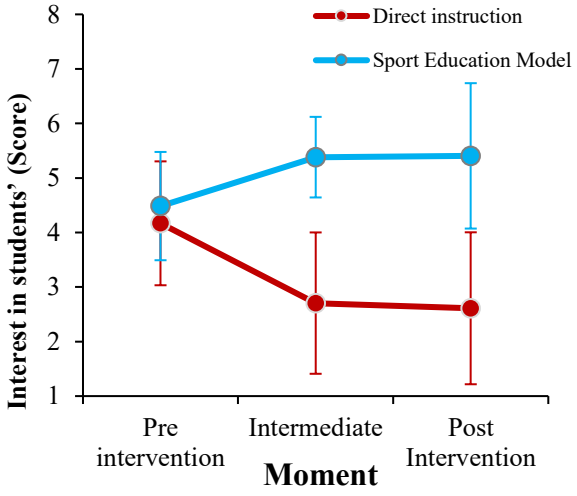


Figure 4

Interest in students' opinion in groups for each Moment.



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Another repeated measures ANOVA, with participants' mean *assessment of autonomous behaviour*, showed a significant main effect of groups, F (1, 18) = 10.10, p = 0.01, η^2_p = .36. In addition, dataset revealed interaction between group and moment, F (2, 36) = 4.22, p = 0.002, η^2_p = .19. Last, dataset did not reveal significant differences in the main effect of moment, F (2, 36) = 1.24, p = 0.30, η^2_p =0.06.

At this point, pairwise comparisons were performed. Figure 5 shows these differences between groups were found in favor of SEM group (5.24±0.98) in comparison with the SSG group (4.49±1.16). Regarding the interaction between group and moment (Figure 6), pairwise comparisons showed significant differences in post intervention moment (p= 0.001, d = -1.29). However, in pre intervention moment (p= 0.43, d = -0.28) and intermediate moment (p= 0.10, d = -0.49) did not revealed significant differences.

Figure 5
Assessment of autonomous behavior in both groups (left Figure)

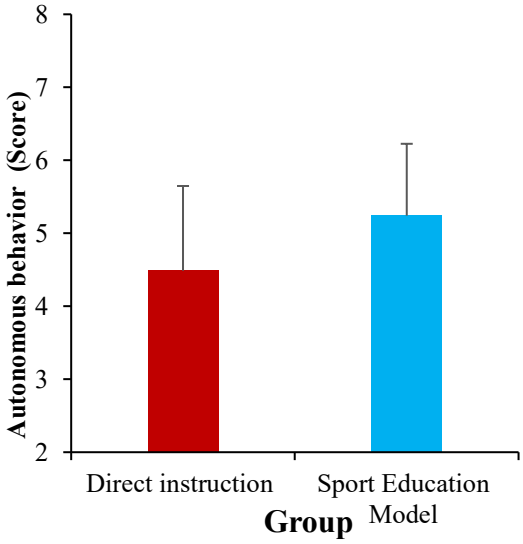
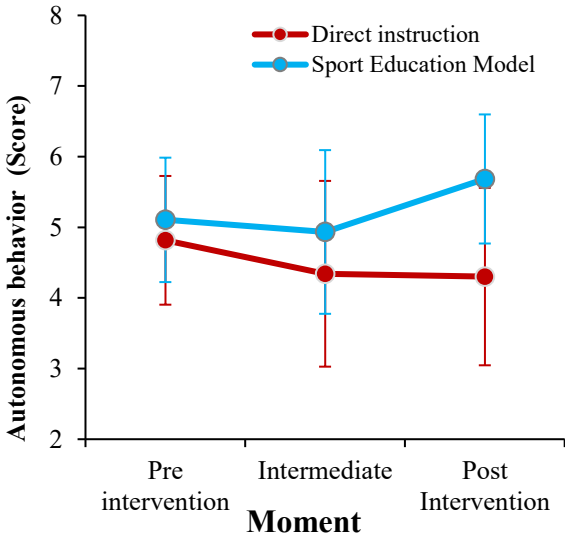


Figure 6
Assessment of autonomous behavior in both groups for each moment (right Figure).



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Discussion

Consequently, this study aimed to examine the effects of a hybrid SEM/TGfU unit on university students' BPN and perceived autonomy support, compared to a CLA unit. Overall, results showed significant differences favoring students taught through the hybrid model.

The *first hypothesis* proposed that students in the hybrid SEM/TGfU group would report higher autonomy scores post-intervention than those in the CLA group. Based on different questionnaires and perspectives, this hypothesis can be partially accepted.

Results indicated significantly higher autonomy levels among students in the hybrid group. These findings align with previous SEM studies (Perlman, 2012; Sinelnikov et al., 2007; Wallhead & Ntoumanis, 2004). Contributing factors include rotating roles (e.g., player, referee, coach), which helped students take ownership of their learning (MacPhail, Gorely, et al., 2008). This practical structure is consistent with SDT, which links autonomy-supportive environments with intrinsic motivation. Additionally, the phased unit structure (preseason and season) echoes previous research supporting SEM's role in promoting student choice (Knowles et al., 2018; Méndez-Giménez et al., 2015; Perlman, 2012). In TGfU, autonomy was likely enhanced through modified games (SSCG), which promoted decision-making, defined as students selecting appropriate actions in context (Rietveld & Kiverstein, 2014). The teacher's use of questioning further encouraged inquiry (Vickers, 2007), avoiding control-based strategies. Through task manipulation and open-ended prompts, TGfU fostered autonomy-supportive environments (Gil-Arias et al., 2020).

Students also reported significantly higher scores on autonomy support dimensions (interest in student opinion and praise for autonomous behavior) in the hybrid group, consistent with past studies (Meroño et al., 2015; Wallhead & Ntoumanis, 2004). An interim assessment conducted post-preseason revealed significant group differences in student opinion, but not yet in autonomous behavior. During the learning phase, teachers offered two choices per lesson segment (e.g., warm-up, main tasks, cool-down), increasing perceived choice. However, rotating roles every two sessions may not have been enough time to influence behavior scores. By the final evaluation, both dimensions improved significantly in favor of the hybrid group, showing that the full implementation—especially the competition phase—was key in reinforcing autonomy support.

Recent studies affirm that student motivation improves in autonomy-supportive environments (Manninen et al., 2022; Mossman et al., 2022). In the hybrid unit, students chose roles across both phases (e.g., fitness leader, coach, captain; later referee or journalist), reinforcing student choice (Knowles et al., 2018; Méndez-Giménez et al., 2015; Perlman, 2011). SEM encouraged students' responsibility through varied roles,

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with many expressing enjoyment and confidence in their autonomy (MacPhail, Gorely, et al., 2008).

The *second hypothesis* posited that the hybrid group would report higher competence post-intervention. This hypothesis was confirmed, with significantly higher competence scores in the hybrid group. These results support SDT by demonstrating how structured roles (e.g., coach) increased perceived effectiveness and capability—core to intrinsic motivation. For pre-service teachers, such roles simulated real teaching tasks like planning and instruction.

These findings align with previous studies showing that role selection enhances competence (e.g., referee or coach in Hastie & Sinelnikov, 2006; Gil-Arias et al., 2020). Here, students selected three roles in the learning phase and two in the competition phase, offering continuous opportunities for success. SEM's structure supports competence, as shown in PE settings (Cuevas et al., 2015; Siedentop, 1994), and TGfU's game-centered model (Harvey & Jarrett, 2013) complements this. Notably, CLA implementations struggled to show tactical development (Harvey & Jarrett, 2013; Kinchin & O'Sullivan, 2003), while the hybrid model facilitated pedagogical knowledge transfer through the student–coach role (Araújo et al., 2017). Thus, the hybrid model outperformed the CLA-only unit (González-Víllora et al., 2019).

The *third hypothesis* predicted higher relatedness in the hybrid group. This was not confirmed; no significant differences were found. This contrasts with prior studies (Clarke & Quill, 2003) that reported improved social relationships through SEM. A potential explanation is the lack of cooperative learning structures or the use of ability-based, rather than affinity-based, groupings.

Vallerand (2001) emphasized that intrinsic motivation depends on supporting all three BPNs. In this study, autonomy and competence improved, but not relatedness. This contrasts with research highlighting SEM's capacity to promote positive peer and teacher connections (Clarke & Quill, 2003; Kinchin, 2001; Perlman & Goc Karp, 2010; O'Donovan, 2003). Perlman (2011) argued that persisted teams and fair play guidelines support relatedness. However, Fernández-Río et al. (2018) pointed out that teamwork doesn't always imply cooperation, which requires explicit elements (Johnson, 1998). In this study, heterogeneous teams were formed based on skill rather than affinity, which may have limited social bonding. Lavega et al. (2014) and Iglesias et al. (2017) emphasized the need to teach cooperation directly to build positive social dynamics. These findings support the inclusion of Cooperative Learning (CL; Johnson, 1994) or Teaching for Personal and Social Responsibility (TPSR; Hellison, 2011) to foster psychosocial development (Casey & MacPhail, 2018; Fernández-Río & Menéndez-Santurio, 2017; Gubacs-Collins & Olsen, 2010).

This study offers preliminary evidence that a hybrid SEM/TGfU unit can be successfully implemented in university sport education. It led to improvements in

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autonomy, competence, and perceived autonomy support, confirming two hypotheses. However, no differences were found in relatedness. Due to the small sample size and short duration, these results should be interpreted cautiously. More longitudinal research is needed to explore the long-term impact and broader applicability of hybrid pedagogies. Nonetheless, these findings have clear implications for teacher training, as the hybrid model mirrors real-life teaching and coaching roles, helping pre-service teachers develop practical and transferable skills.

Limitations and future research

Despite its contributions, this study had several limitations. First, the sample was small, though similar to or larger than previous research (Farias et al., 2015; Hastie & Curtner-Smith, 2006; Muñoz-Llerena et al., 2021). Second, only a short-term hybrid program was tested. Future studies should examine longer interventions spanning an academic year. Third, the intervention was isolated and not linked to prior or subsequent content. Introducing models like CL (Johnson, 1994) or TPSR (Hellison, 2011) beforehand may enhance outcomes such as relatedness in future units. Still, this remains the first university-level study exploring a hybrid SEM/TGfU implementation.

Conclusions

The Sport Education Model (SEM) emphasizes student responsibility, teamwork, and role rotation within a season-like structure, while Teaching Games for Understanding (TGfU) focuses on tactical awareness and decision-making through modified game play. This hybrid approach aims to combine the strengths of both models. The hybridization of Pedagogical Models suggest that this is an effective pedagogical strategy in comparison with the implementation of single Pedagogical Models (González-Víllora et al., 2019). Specifically, in our study, students in the hybrid SEM/TGfU group showed a significant increase in autonomy ($p = .010$, $d = 0.78$), moderate gains in competence ($p = .080$, $d = 0.62$), and higher perceptions of teacher autonomy support ($p = .001$, $\eta^2p = 1.31$). In contrast, no significant improvement was found for relatedness ($p = .540$, $d = 0.21$). Between-group differences at post-test were also significant for autonomy ($p = .001$, $\eta^2p = 1.31$) and competence ($p = .020$, $\eta^2p = 0.69$), further supporting the model's effectiveness. These findings are consistent with prior research highlighting the motivational benefits of hybrid models in school settings (e.g., Gil-Arias et al., 2020; Manninen & Campbell, 2022), and extend this evidence to the university context. Given the relatively small sample size and the short duration of the program, these findings should be interpreted with caution. This preliminary evidence suggest that it can be implemented in a university learning sport unit like handball, in order to increase motivation and the students' engagement with the subject.

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Practical implications

Summarizing and to clarify the main ideas, it has been considered the following practical implications:

A) To promote *autonomy*, it is convenient that (within the SEM) students could choose roles and select tasks. On the other hand, assigning too many roles too frequently (every two sessions, in our case). may disrupt learning flow and reduce students' sense of autonomy. Teachers should provide more structured guidance to ensure that students maintain ownership while navigating multiple responsibilities. According to TGfU, if the tasks are designed from this perspective, for example, modified games (SSCG), the students could feel autonomous when making decisions during their development, as well as the dialogue with the teacher to reflect on the possible solutions taken.

B) To promote *competence*, it is a positive strategy for students to play the role of coach (within the SEM). Acting as a coach allowed students to lead segments of the session in a guided and structured environment. This contributed to their sense of competence by enabling them to practice real teaching tasks such as explaining drills, managing groups, organizing activities, and providing feedback—skills that closely mirror those required in actual teaching scenarios. According to TGfU, the design of tasks from this perspective allows them to be adjusted to the level of expertise of the students, so it is likely to raise their level of competence.

C) To promote *relatedness*, it is important that students first learn to cooperate so that the group functions effectively. Although persistent teams were used in this study, grouping was based on skill level rather than personal affinity, which may have limited the development of interpersonal bonds. Reviewing grouping variables—such as affinity or shared interests—could be decisive in enhancing peer connection and engagement. Future implementations should also incorporate cooperative learning strategies that actively foster collaboration and strengthen social relationships among students.

Summarizing, educators and institutions are encouraged to adopt and adapt hybrid pedagogical models like SEM/TGfU to enhance student engagement, autonomy, and professional readiness in university sport programs.

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References

Araújo, R., Hastie, P. A., & Pereira, C. H. (2017). The evolution of student-coach's pedagogical content knowledge in a combined use of sport education and the step-game-approach model. *Physical Education and Sport Pedagogy*, *22*(5), 518–535.

Balakrishnan, M., Rengasamy, S., & Aman, M. S. (2011). Effect of teaching games for understanding approach on students' cognitive learning outcome. *ATIKAN,* 1(2), 201–214.

Benlahcene, A., Kaur, A., & Awang-Hashim, R. (2021). Basic psychological needs satisfaction and student engagement: the importance of novelty satisfaction. *Journal of Applied Research in Higher Education*, *13*(5), 1290–1304.

Chacón-Cuberos, R., Olmedo-Moreno, E. M., Lara-Sánchez, A. J., Zurita-Ortega, F., & Castro-Sánchez, M. (2021). Basic psychological needs, emotional regulation and academic stress in university students: a structural model according to branch of knowledge. *Studies in Higher Education*, *46*(7), 1421–1435. https://doi.org/10.1080/03075079.2019.1686610

Chu, T. L., & Zhang, T. (2018). Motivational processes in Sport Education programs among high school students: A systematic review. *European Physical Education Review*, *24*(3), 372–394.

Clarke, G., & Quill, M. (2003). Researching sport education in action: A case study. *European Physical Education Review*, *9*(3), 253–266.

Conde, C., Sáenz-López, P., Carmona, J., González-Cutre, D., Martínez, C., & Moreno, J.-A. (2010). Validación del Cuestionario de Percepción de Soporte de la Autonomía en el Proceso de Entrenamiento (ASCQ) en jóvenes deportistas españoles. *Estudios de Psicología*, *31*(2), 145–157.

Conroy, D. E., & Coatsworth, J. D. (2007). Assessing autonomy-supportive coaching strategies in youth sport. *Psychology of Sport and Exercise*, *8*(5), 671–684.

Cuevas, R., López, L. G., & Contreras, O. (2015). Influencia del modelo de Educación Deportiva en las necesidades psicológicas básicas. *Cuadernos de Psicología Del Deporte*, *15*(2), 155–162.

Deci, E. L., & Ryan, R. M. (2013). *Intrinsic motivation and self-determination in human behavior*. Springer Science & Business Media.

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Revista Técnico-Científica del Deporte Escolar, Educación Física y Psicomotricidad
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ISSN-e 2386-8333
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Farias, C. F., Mesquita, I. R., & Hastie, P. A. (2015). Game Performance and Understanding Within a Hybrid Sport Education Season. *Journal of Teaching in Physical Education*, *34*(3), 363–383. https://doi.org/10.1123/jtpe.2013-0149

Fernández-Río, J., Alcalá, D. H., & Perez-Pueyo, Á. (2018). Revisando los modelos pedagógicos en educación física. Ideas clave para incorporarlos al aula. *Revista Española de Educación Física y Deportes*, *423*, 57.

Fernández-Río, J., & Menéndez-Santurio, J. I. (2017). Teachers and students' perceptions of a hybrid sport education and teaching for personal and social responsibility learning unit. *Journal of Teaching in Physical Education*, *36*(2), 185–196.

Flores-Rodríguez, J., & Ramírez-Macías, G. (2021). Pedagogía no lineal en balonmano: Influencia de las limitaciones de la tarea. *Apunts. Educación Física y Deportes*, *1*(143), 73–83.

García, C. S., Bartoll, O. C., & Vivas, M. M. (2022). Análisis del clima motivacional en Educación Física a partir del empleo del modelo Teaching Games for Understanding. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, *44*, 1063–1072.

Gil-Arias, A., Claver, F., Práxedes, A., Villar, F. Del, & Harvey, S. (2020). Autonomy support, motivational climate, enjoyment, and perceived competence in physical education: Impact of a hybrid teaching games for understanding/sport education unit. *European Physical Education Review*, *26*(1), 36–53. https://doi.org/10.1177/1356336X18816997

Gil-Arias, A., Diloy-Peña, S., Sevil-Serrano, J., García-González, L., & Abós, Á. (2021). A hybrid tgfu/se volleyball teaching unit for enhancing motivation in physical education: A mixed-method approach. *International Journal of Environmental Research and Public Health*, *18*(1), 1–20. https://doi.org/10.3390/ijerph18010110

Gil-Arias, A., Harvey, S., Cárceles, A., Práxedes, A., & Del Villar, F. (2017). Impact of a hybrid TGfU-Sport Education unit on student motivation in physical education. *PloS One*, *12*(6). https://doi.org/10.1371/journal.pone.0179876

Gil-Arias, A., Harvey, S., García-Herreros, F., González-Víllora, S., Práxedes, A., & Moreno, A. (2021). Effect of a hybrid teaching games for understanding/sport education unit on elementary students' self-determined motivation in physical

Sportis
Revista Técnico-Científica del Deporte Escolar, Educación Física y Psicomotricidad
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education. *European Physical Education Review*, *27*(2), 366–383. https://doi.org/10.1177/1356336X20950174

Gómez, O. R. O., Enriquez, O. N., Luján, R. C., Longoria, R. J. N., Jurado, F. V., & Sambrano, G. S. (2023). Teaching Games for Understanding (TGfU) un método de enseñanza comprensiva en educación física: Revisión Sistemática de los últimos 5 años. *Retos: Nuevas Tendencias En Educación Física, Deporte y Recreación*, *48*, 374–379.

González-Víllora, S., Evangelio, C., Sierra-Díaz, J., & Fernández-Río, J. (2019). Hybridizing pedagogical models: A systematic review. *European Physical Education Review*, *25*(4), 1056–1074. https://doi.org/10.1177/1356336X18797363

Hardin, R., Bemiller, J., & Pate, J. (2013). Development and organization of a student-operated sport management cocurricular club: Partners in sports. *Sport Management Education Journal*, *7*(1), 43–54.

Harvey, S., & Jarrett, K. (2013). A review of the game-centred approaches to teaching and coaching literature since 2006. *Physical Education and Sport Pedagogy*, *19*(3), 278–300.

Hastie, P. A. (2013). A review of recent research on sport education: 2004 to the present. *Physical Education and Sport Pedagogy*, *18*(4), 442–464.

Hastie, P. A., & Curtner-Smith, M. D. (2006). Influence of a hybrid Sport Education—Teaching Games for Understanding unit on one teacher and his students. *Physical Education and Sport Pedagogy*, *11*(1), 1–27. https://doi.org/10.1080/17408980500466813

Hastie, P. A., & Sinelnikov, O. A. (2006). Russian students' participation in and perceptions of a season of Sport Education. *European Physical Education Review*, *12*(2), 131–150.

Hastie, P. A., & Wallhead, T. (2016). Models-based practice in physical education: The case for sport education. *Journal of Teaching in Physical Education*, *35*(4), 390–399.

Hellison, D. (2011). *Teaching Responsibility through Physical Activity* (3rd edition, Ed.). Human Kinetics.

Sportis
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Iglesias, J. C., González, L. F., & Fernandez-Rio, J. (coords.). (2017). *Aprendizaje cooperativo. Teoría y práctica en las diferentes áreas y materias del currículo*. Pirámide.

Johnson, D. W. (1994). Leading the cooperative school. *Interaction Book Company*.

Johnson, D. W. (1998). Cooperation in the classroom. *Interaction Book Company*.

Kinchin, G. (2001). A high skilled pupil's experiences with sport education. *ACHPER Healthy Lifestyles Journal*, *48*(3/4), 5–9.

Kinchin, G. D., & O'Sullivan, M. (2003). Incidences of student support for and resistance to curricular innovation in high school physical education. *Journal of Teaching in Physical Education*, *22*, 245–260.

Knowles, A., Wallhead, T., & Readdy, T. (2018). Exploring the synergy between Sport Education and in-school sport participation. *Journal of Teaching in Physical Education*, *37*(2), 113–128.

Lavega, P., Planas, A., & Ruiz, P. (2014). Juegos cooperativos e inclusión en Educación Física. *Revista Internacional de Medicina y Ciencias de La Actividad Física y El Deporte*, *14*(53), 37–51.

Layne, T., & Hastie, P. (2015). A task analysis of a sport education physical education season for fourth grade students. *Physical Education and Sport Pedagogy*, *20*(3), 314–328. https://doi.org/10.1080/17408989.2013.837437

Liu, C. (2023). A Constraint-Led Approach: Enhancing Skill Acquisition and Performance in Sport and Physical Education Pedagogy. *Studies in Sports Science and Physical Education*, *1*(1), 1–10.

MacPhail, A., Gorely, T., Kirk, D., & Kinchin, G. (2008). Children's experiences of fun and enjoyment during a season of sport education. *Research Quarterly for Exercise and Sport*, *79*(3), 344–355.

MacPhail, A., Trish, G., David, K., & and Kinchin, G. (2008). Children's Experiences of Fun and Enjoyment During a Season of Sport Education. *Research Quarterly for Exercise and Sport*, *79*(3), 344–355. https://doi.org/10.1080/02701367.2008.10599498

Sportis
Revista Técnico-Científica del Deporte Escolar, Educación Física y Psicomotricidad
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Mandigo, J., Holt, N., Anderson, A., & Sheppard, J. (2008). Children's motivational experiences following autonomy-supportive games lessons. *European Physical Education Review*, *14*(3), 407–425. https://doi.org/10.1177/1356336X08095673

Manninen, M., & Campbell, S. (2022). The effect of the Sport Education Model on basic needs, intrinsic motivation and prosocial attitudes: A systematic review and multilevel meta-analysis. *European Physical Education Review*, *28*(1), 78–99.

Manninen, M., Dishman, R., Hwang, Y., Magrum, E., Deng, Y., & Yli-Piipari, S. (2022). Self-determination theory based instructional interventions and motivational regulations in organized physical activity: A systematic review and multivariate meta-analysis. *Psychology of Sport and Exercise*, *62*. https://doi.org/10.1016/j.psychsport.2022.102248

Mazzardo, T., Ribas, S., Monteiro, G. N., Silva, W. J. B. da, Araújo, N. D., & Aburachid, L. M. C. (2020). TGfU and motor coordination: the effects of a teaching program on tactical-technical performance in handball. *Journal of Physical Education*, *31*.

Méndez-Giménez, A., Fernández-Río, J., & Méndez-Alonso, D. (2015). Sport education model versus traditional model: effects on motivation and sportsmanship. *Revista Internacional de Medicina y Ciencias de La Actividad Física y Del Deporte*, *15*(59).

Meroño, L., Calderón, A., & Hastie, P. (2015). Efecto de una intervención basada en el modelo de Educación Deportiva sobre variables psicológicas en nadadores federados. *Cuadernos de Psicología Del Deporte*, *15*(2), 35–46.

Moreno-Murcia, J. A., González-Cutre Coll, D., Chillón, M., & Parra, N. (2008). Adaptación a la educación física de la escala de las necesidades psicológicas básicas en el ejercicio. *Revista Mexicana de Psicología*, *25*(2), 295–303. https://www.redalyc.org/articulo.oa?id=243016308009

Morgan, K., Kingston, K., & Sproule, J. (2005). Effects of different teaching styles on the teacher behaviours that influence motivational climate and pupils' motivation in physical education. *European Physical Education Review*, *11*(3), 257–285. https://doi.org/10.1177/1356336X05056651

Mossman, L. H., Slemp, G. R., Lewis, K. J., Colla, R. H., & O'Halloran, P. (2022). Autonomy support in sport and exercise settings: a systematic review and meta-

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analysis. *International Review of Sport and Exercise Psychology*, *17*(1), 540–563. https://doi.org/10.1080/1750984X.2022.2031252

Moy, B., Renshaw, I., & Davids, K. (2016). The impact of nonlinear pedagogy on physical education teacher education students' intrinsic motivation. *Physical Education and Sport Pedagogy*, *21*(5), 517–538. https://doi.org/10.1080/17408989.2015.1072506

Muñoz-Llerena, A., Hernández-Hernández, E., García-de-Alcaraz, A., & Caballero-Blanco, P. (2021). Personal and Social Responsibility Development in a Volleyball Hybrid Positive Youth Development Program: A Mixed Methods Approach. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2021.675532

O'Donovan, T. M. (2003). A changing culture? Interrogating the dynamics of peer affiliations over the course of a sport education season. *European Physical Education Review*, *9*(3), 237–251.

Perlman, D. J. (2011). Examination of self-determination within the sport education model. *Asia-Pacific Journal of Health, Sport, and Physical Education*, *2*(1), 79–92.

Perlman, D. J. (2012). The influence of the sport education model on developing autonomous instruction. *Physical Education and Sport Pedagogy*, *17*(5), 493–505.

Perlman, D. J., & Goc Karp, G. (2010). A self-determined perspective of the sport education model. *Physical Education and Sport Pedagogy*, *15*(4), 401–418.

Renshaw, I., Araújo, D., Button, C., Chow, J. Y., Davids, K., & Moy, B. (2016). Why the constraints-led approach is not teaching games for understanding: A clarification. *Physical Education and Sport Pedagogy*, *21*(5), 459–480.

Renshaw, I., & Chow, J.-Y. (2019). A constraint-led approach to sport and physical education pedagogy. *Physical Education and Sport Pedagogy*, *24*(2), 103–116.

Rietveld, E., & Kiverstein, J. (2014). A rich landscape of affordances. *Ecological Psychology*, *26*(4), 325–352.

Rocamora, I., González-Víllora, S., Fernández-Río, J., & Arias-Palencia, N. M. (2019). Physical activity levels, game performance and friendship goals using two different pedagogical models: Sport Education and Direct Instruction. *Physical Education*

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and Sport Pedagogy, *24*(1), 87–102. https://doi.org/10.1080/17408989.2018.1561839

Ryan, R. M., & Deci, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*(1), 68–78. https://doi.org/10.1037/0003-066X.55.1.68

Ryan, R. M., & Deci, E. L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. Guilford publications.

Sahli, F., Hammami, R., Sahli, H., Jebabli, N., Selmi, W., Zghibi, M., & Tillaar, R. van den. (2022). The effects of combined verbal encouragement and technical instruction on technical skills and psychophysiological responses during small-sided handball games exercise in physical education. *Frontiers in Psychology*, *13*, 2932.

Siedentop, D. (1994). *Sport Education: Quality P.E. through Positive Sport Experiences*. Human Kinetics.

Sinelnikov, O. A., Hastie, P. A., & Prusak, K. A. (2007). Situational motivation during seasons of sport education. *ICHPER-SD Research Journal*, *2*(1), 43–57.

Sproule, J., Wang, C. K. J., Morgan, K., McNeill, M., & McMorris, T. (2007). Effects of motivational climate in Singaporean physical education lessons on intrinsic motivation and physical activity intention. *Personality and Individual Differences*, *43*(5), 1037–1049.

Vallerand, R. J. (2001). A hierarchical model of intrinsic and motivation in sport and exercise. In G. C. Roberts (Ed.), *Advances in Motivation in Sport and Exercise* (pp. 263–320). Human Kinetics.

Vickers, J. N. (2007). *Perception, cognition, and decision training. The quiet eye in action*. Human Kinetics.

Vlachopoulos, S. P., & Michailidou, S. (2006). Development and initial validation of a measure of autonomy, competence, and relatedness in exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science*, *10*(3), 179–201.

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Wallhead, T. L., & Ntoumanis, N. (2004). Effects of a sport education intervention on students' motivational responses in physical education. *Journal of Teaching in Physical Education*, *23*, 4–18.