Effects in Physical Education on motivation, behavioral regulation, and psychological needs: hybridizing TGfU and PSR by gender

Efectos sobre la motivación, conducta y necesidades psicológicas tras una hibridación en Educación Física con ECD y RPS por género

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Received: 28-07-202
Accepted: 17-10-2025

How to cite in APA

García-Calvo Rojo, S. (2026). Effects in Physical Education on motivation, behavioral regulation, and psychological needs: hybridizing TGfU and PSR by gender. *Retos, 74*, 151-165. https://doi.org/10.47197/retos.v74.117273

Abstract

Introduction: The integration of the Teaching Games for Understanding (TGfU) and Personal and Social Responsibility (PSR) models in Physical Education (PE) represents an innovative pedagogical approach. The hybrid PE–TGfU–PSR model fosters tactical-sport learning through modified games while fostering mutual respect, cooperation, and social skills. Grounded in Self-Determination Theory (SDT), the model emphasizes that satisfying students' basic psychological needs (BPN)—autonomy, competence, and relatedness— is crucial for sustaining intrinsic imotivation in physical activity. Objective: The purporse of this study was to examine the impact of a hybrid TGfU-PSR methodology on motivation, behavioral regulation and BPN in Primary and Secondary Education centers in the Autonomous Community of Madrid (2024–2025). Methodology: A quantitative, descriptive, and longitudinal design was used with n = 1,480 students, mean age = 12.1 ± 1.42, with two assessments throughout the school year (M1 and M2). The instruments applied were the BREQ-3 (Behavioral Regulation in Exercise Questionnaire) and the PNPE (Psychological Needs in Physical Education) scale. Discussion: Results indicated statistically significant improvements in intrinsic, integrated, and identified regulation in female students, with no notable gender differences in introjected, external regulation, or amotivation. Significant gains were also observed in autonomy, competence, and relatedness dimensions, supporting the effectiveness of the hybrid approach. Conclusion: The hybrid TGfU-PSR model positively impatcs students' motivational and socioemotional outcomes in PE, providing an effective strategy to foster inclusive, student-centered learning environments.

Keywords

Personal and social responsibility; Physical Education hybridization; self-determined motivation; teaching games for understanding.

Resumen

Introducción: La integración de los modelos de Enseñanza Comprensiva del Deporte (ECD) y de Responsabilidad Personal y Social (RPS) en Educación Física (EF) es un enfoque pedagógico innovador. La hibridación EF- ECD- RPS impulsa el aprendizaje táctico-deportivo mediante juegos modificados y promueve el respeto mutuo, la cooperación y las competencias sociales. Basado en la Teoría de la Autodeterminación (TAD), se destaca la satisfacción de las necesidades psicológicas básicas (NPB), tales como autonomía, competencia y relación, como claveparamantenerunamotivaciónintrínsecahacialaprácticafísico-deportiva. Objetivo: El propósito de estudio fue analizar el impacto de una metodología híbrida ECD-RPS sobre la motivación, la regulación conductual y las NPB en centros de Educación Primaria y Secundaria de la Comunidad Autónoma de Madrid (2024–2025). Metodología: Se utilizó un diseño cuantitativo, descriptivo y longitudinal, donde n= 1.480 y M=12.1±1.42, con dos mediciones a lo largo del curso escolar (M1 y M2). Los instrumentos aplicados fueron el cuestionario BREQ-3 (*Behavioral Regulation in Exercise Questionnaire*) y la escala PNPE (*Psychological Needs in Physical Education*). Discusión: Los resultados mostraron mejoras estadísticamente significativas en la regulación intrínseca, integrada e identificada en alumnas, sin diferencias significativas de género en la regulación introyectada, externa o en la desmotivación. También se observaron mejoras significativas en las dimensiones de autonomía, competencia y relación, respaldando la efectividad del enfoque híbrido. Conclusión: El modelo híbrido ECD-PSR impactó positivamente en los resultados motivacionales y socioemocionales de los estudiantes en EF, constituyendo una estrategia eficaz para promover entornos de aprendizaje inclusivos y centrados en el alumnado.

Palabras clave

Enseñanza comprensiva del deporte; hibridación en Educación Física; motivación autodeterminada; responsabilidad personal y social.

Introduction

Historically, Physical Education (PE) instruction has been based on traditional pedagogical approaches characterized by a transmissive methodology, in which the teacher acts as a unidirectional transmitter of knowledge and skills, while students adopt a passive role, limited to reproducing the given instructions and activities (Albán et al., 2023).

In contrast, Active Methodologies (AM) represent a set of didactic proposals focused on student-centered learning, aiming to encourage active, critical, and reflective participation in the educational process (Zapata et al., 2024). These methodologies not only promote student protagonism in knowledge construction but also grant them a participatory role in pedagogical decision-making and in self-assessment and peer-assessment processes, thereby fostering more meaningful, autonomous, and contextualized learning (Valero-Valenzuela et al., 2024).

Within the context of PE, Hastie and Curtner-Smith (2006) propose integrating sports education through the hybridization of pedagogical models. Comprehensive Sport Teaching (CST), known as Teaching Games for Understanding (TGfU), presents some distinctions: while TGfU is oriented towards general sports contexts, CST is primarily focused on curricular settings. Recent studies have shown that this hybridization favors the cognitive, social, and emotional development of students, promoting more active and engaged participation in physical activities (Fernandez-Rio et al., 2016; Zhang et al., 2024). The fundamental principles of both models place students at the center of learning by promoting tactical problem-solving, decision-making in authentic game contexts, and learning through modified and adapted games, rather than focusing on isolated technical training.

The hybridization of PE, CST, and Personal and Social Responsibility (PSR) strengthens proposals aimed at developing social competencies such as cooperative work, assertive communication, respect for roles, empathy, and conflict management. Moreover, it expands the learning dimension from purely motor skills to social and emotional domains. García-Castejón et al. (2021) highlight the integration and hybridization of CST and PSR within PE as significant pedagogical models and focusing on active student participation, improving teamwork, and fostering respect for rules and roles (Espoz et al., 2025).

The implementation of PSR in educational settings constitutes a key strategy to enhance student motivation by fostering the development of interpersonal skills, prosocial values, and collaborative work—essential aspects for comprehensive education (Manzano-Sánchez & Gómez-López, 2023). In this regard, the CST model is presented as an effective methodological resource for teaching sports disciplines through the use of modified games that stimulate tactical understanding while reducing technical demands (García-López & Gutiérrez., 2016).

The integration of CST and PSR approaches offers a valuable opportunity to strengthen student motivation by simultaneously promoting interpersonal competencies, prosocial values, and group cooperation—fundamental pillars for their holistic development (Hellison, 2011). The CST model facilitates sports practice through adapted games, promoting accessible, dynamic, and meaningful learning that enhances tactical understanding and reduces technical barriers, thus contributing to an inclusive and enriching educational experience (Simaleza et al., 2024).

Student motivation emerges as one of the most critical factors in the teaching-learning process, directly influencing both the achievement of educational objectives and the level of engagement with school tasks (Filgona et al., 2020). Within this framework, Self-Determination Theory (SDT) represents a fundamental theoretical model for analyzing motivational processes in educational and sports contexts. SDT emphasizes key constructs such as self-determination, different types of behavioral regulation, and especially the satisfaction of three basic psychological needs (BPN): autonomy, competence, and relatedness. The fulfillment of these needs fosters the development of intrinsic motivation, which in turn translates into greater commitment, persistence, and enjoyment in physical activities and the school environment overall (Ryan & Deci., 2017).

A pedagogical environment that satisfies BPN can be configured, among other strategies, through the implementation of modified games. These games, by reducing technical complexity, prioritize tactical understanding and promote social interaction, thus generating meaningful experiences for students (García-López & Gutiérrez, 2016). In this context, CST not only facilitates the acquisition of sports learning but also contributes to the development of PSR, understood as the set of skills, attitudes, and

values necessary for harmonious coexistence and cooperative participation in group settings (Ibaibarriaga & Tejero-González, 2023).

Within PE, PSR is especially reinforced when educational environments support student autonomy, strengthen their sense of competence, and promote positive interpersonal relationships. Therefore, the hybridization of PE-CST-PSR approaches, grounded in the principles of SDT, fosters comprehensive learning that transcends the physical and technical aspects of sport. This integration promotes students' personal and social development, increasing levels of self-determined motivation and facilitating adaptive behavioral regulation—key elements for transformative and meaningful education.

Self-Determination Theory: self-determined motivation, behavioral regulation, and basic psychological needs

Human beings possess a natural predisposition towards developing self-determination, and when their basic psychological needs are satisfied, they become intrinsically motivated individuals. Intrinsic motivation arises when engaging in activities that are inherently rewarding, without the need for external incentives. Multiple studies have demonstrated that this type of motivation is particularly beneficial for students' academic performance (Founaud-Cabeza et al., 2023; West et al., 2024; Wu et al., 2022).

Motivation and satisfaction are closely linked, with motivation resulting from the satisfaction of experiencing (stimulus), learning or knowing (cognitive aspect), and achieving goals (achievement). Building on the macro-theory of SDT first articulated by Deci and Ryan (1985), the authors later expanded it into several mini-theories—cognitive evaluation, organismic integration, basic needs, and causality orientations. SDT, empirically supported, conceptualizes personality as a set of internal resources that self-regulate behavior (Deci & Ryan, 2020).

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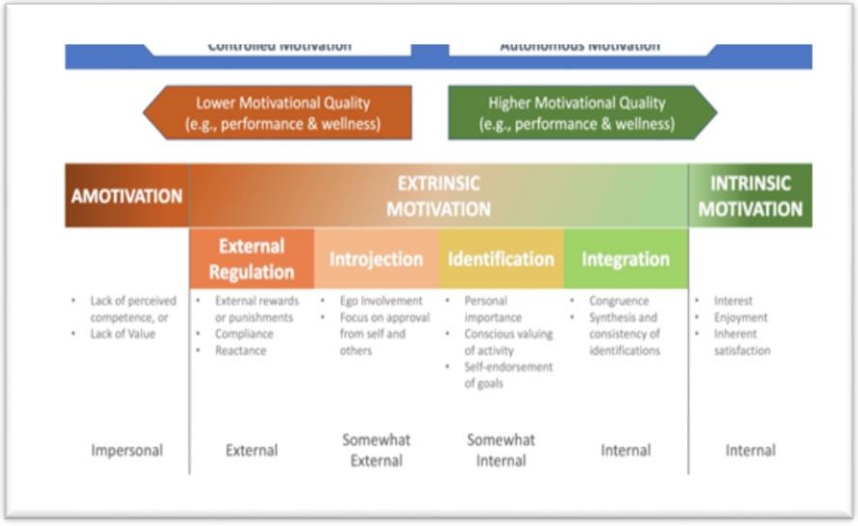
SDT posits that sports activities increase self-determined motivation based on three key factors: autonomy, competence, and relatedness, which are decisive influences in the motivational process (Ryan & Deci, 2017). These three factors are innate and universal. Autonomy involves volitional aspects that promote self-esteem; competence relates to effective action, generating confidence and successful outcomes; and relatedness concerns affective bonds, fostering social acceptance.

Self-determined motivation plays a fundamental role in individual development, vitality, and well-being, existing along a continuum of regulatory styles ranging from external to internal motivation, passing through different forms of regulation. External regulation lacks internalization; introjected regulation involves partial internalization; identified regulation reflects a greater degree without full internalization; and integrated regulation is fully autonomous but requires the task to be performed as an end in itself to be truly intrinsic. Figure 1 illustrates this continuum of self-determined motivation.

Building on the foundations of SDT, Vallerand (2012) further refines the motivational landscape by emphasizing the concept of passion as a crucial driver of motivation. According to author, passion manifests in two forms: harmonious passion, which aligns with autonomous motivation and leads to positive psychological outcomes, and obsessive passion, linked to controlled motivation and potential negative effects. In this line, Vieira et al. (2020) consider admiration for the sports as considerable motivational factor. This dualistic model complements SDT by providing a nuanced understanding of how internalization processes influence motivation quality and well-being, particularly in educational and sport contexts.

Figure 1. Continuum of Self-Determination. Source: adapted from Deci & Ryan (2000)



If students have less autonomy, their motivation will be more extrinsic, whereas greater autonomy is associated with more intrinsic motivation. Different types of motivation are related to the satisfaction or frustration of basic psychological needs (Ryan & Deci, 2020). According to Jiménez-Loaisa et al. (2021), SDT identifies three essential psychological needs for student motivation: Autonomy, understood as the ability to make one's own decisions and act in accordance with personal values, which is fostered when students actively participate in the educational process. Competence, which refers to the perception of effectiveness and improvement in tasks, and is enhanced by providing opportunities for success and meaningful learning. Relatedness, which involves feeling connected to others and being part of a group, promoted through cooperative activities and an affective and respectful classroom climate.

Gómez-López and Granero (2020) argue that self-determination and the satisfaction of these needs are key indicators for assessing motivation in educational contexts. Positive perceptions of satisfaction favor motivation to achieve goals, while dissatisfaction leads to amotivation. The link between satisfaction, self-determined motivation, and psychological well-being has been evidenced in multiple studies (Shanon et al., 2023; Wu et al., 2022).

In sports and physical education, several studies have analyzed the satisfaction of basic psychological needs (García-Calvo, 2022; García-Calvo & Nieto Moreno de Diezmas, 2022; Gómez-López et al., 2021; Shannon et al., 2023). Research in PE programs aimed at developing Social Competence has shown that teachers' interpersonal style and autonomy support enhance student motivation, intrinsic motivation, and enjoyment, while fostering interpersonal bonding and group cohesion in team sports (Galán-Arroyo et al., 2024; Moreno et al., 2009).

Comprehensive Sport Teaching and the Personal and Social Responsibility Model

Globalization has transformed the teaching and practice of sport, especially in PE teaching-learning processes. Within this context, Comprehensive Sport Teaching aims to facilitate a holistic understanding of the basic principles of sports, including structure, tactics, and required skills, while promoting the development of social, emotional, and ethical competencies where the combination of physical and mental training contributes to comprehensive development (Astuti et al., 2023). Complementarily, González-Víllora et al. (2021) argue that game-centered models enhance sport literacy by developing not only performance but also tactical understanding, decision-making, and critical reflection in sporting contexts. Thus, the goal is not only to improve sports performance but also to foster personal and social growth through sport.

This approach goes beyond traditional models focused exclusively on technical teaching and skill repetition, promoting learning based on tactical decision-making and deep game comprehension. CST,

grounded in a constructivist paradigm, uses students' prior knowledge to facilitate integrated understanding applicable in various sporting and social situations.

The adaptation of games and tactical problems fosters critical thinking and reflection, while the teaching sequence integrates technical and tactical aspects through motivating playful experiences and modified games, enhancing students' active participation and engagement. Consistently, González-Víllora et al. (2019) found that hybridizations of pedagogical models not only improve game-related skills but also strengthen psychosocial outcomes, supporting the holistic value of such approaches.

Moreover, integrating CST with PSR model, based on Hellison (2011) promotes responsibility, cooperation, and improved coexistence in sports contexts. This model enhances autonomy and mutual respect, creating educational environments where students can express themselves, share ideas, and reflect on emerging situations during sports practice.

Consequently, PE under this paradigm combines technical content with social competencies, generating comprehensive education that addresses students' athletic, emotional, and social needs. The implementation of the hybrid PE-CST-PSR model is justified by the need to address students' motivational, social, and emotional challenges in PE. Many primary and secondary school students show signs of demotivation, low engagement, and limited development of interpersonal skills during PE classes. By integrating pedagogical strategies that promote personal and social responsibility alongside comprehensive sport teaching, this intervention aims to support students' holistic development, fostering intrinsic motivation, cooperative behaviors, and inclusive learning environments. This approach not only enhances motor and tactical skills but also strengthens social competencies and group cohesion, contributing to more equitable and meaningful educational experiences.

The hybrid model has an impact on different levels of educational intervention (primary, secondary, and tertiary), which frames the scope of the proposal. Primary (prevention and promotion). Application of a hybrid model (CST-RPS) aimed at preventing demotivation and dropout from physical-sport practice by fostering a climate of respect, cooperation, and enjoyment from early school years. Secondary (early detection and correction). Detect levels of motivation and basic psychological needs among students, allowing the methodology to be adjusted for those with lower engagement or motivation. Tertiary (rehabilitation or reduction of consequences). Pedagogical interventions designed to reverse existing demotivation, enhancing autonomy, competence, and social relationships, with a positive impact on students' self-esteem and social integration.

Building on the theoretical and pedagogical framework of CST and PSR, the present study aims to examine the effects of a hybrid PE intervention on students, considering gender, by analyzing: (a) self-determined motivation, (b) behavioral regulation, and (c) the satisfaction of basic psychological needs—autonomy, competence, and relatedness. The intervention is designed to address both the social context of the classroom and participants' characteristics, fostering cooperative behaviors, prosocial values, and inclusive participation. By integrating tactical-sport learning with social and emotional development, this approach promotes not only physical and technical skills but also students' holistic personal and social growth, supporting inclusive, student-centered learning environments.

Method

The study was conducted using an empirical, descriptive, and longitudinal design with a quantitative approach. Over a full academic year, two data collections were carried out: an initial one (pre-test) in September 2024 and a final one (post-test) in June 2025. This approach allowed for a systematic evaluation of the evolution and measurement of the phenomenological development of the analyzed variables over time, thus providing a detailed view of the changes and trends that occurred throughout the academic year. During the 2024–2025 academic year, an annual PE program based on the hybrid CST-PSR model was implemented. This model combines tactical learning and decision-making through modified games CST with the development of personal and social responsibility, cooperation, and social-emotional skills PSR. Unlike traditional PE methods that focus mainly on technical skills and teacher-led instruction, this approach is student-centered, integrates cognitive, physical, and social domains, and promotes inclusive and cooperative learning environments.

Participants

The sample consisted of n = 1,488 students, M = 12.1 ± 1.42 years old, from Primary Education Schools (n = 920) and Secondary Education (n = 568) in the autonomous community of Madrid. Regarding gender, 718 male participants (12.2 ± 1.5) and 770 female participants (12 ± 1.3) were included. Muthén and Muthén (2002) stated that a sample size above 150 was adequate for psychometric studies using multidimensional Likert-type scales. Bader et al. (2022) support the selection of samples with at least 500 participants to achieve reliable estimates in bifactor models.

Procedure

In the intervention, the procedures and protocols followed the guidelines of the Declaration of Helsinki. First, contact was made with the school administrations and the PE teachers to explain the study objectives and obtain the necessary authorizations. Second, an annual PE program based on CST-PSR was implemented, divided into ten teaching units with twelve sessions each. The content was based on CST activities (invasion, net/wall, striking/fielding, target). Before the intervention, a pre-test measure (M1) was conducted, and at the end, a post-test measure (M2) was administered. Students completed the questionnaires in the presence of the researcher-teacher, considering the time required for each test (15 and 20 minutes).

Instruments

The questionnaire used to assess self-determined motivation and basic psychological needs was based on the Basic Psychological Needs Scale (Deci y Ryan, 2000). Vlachopoulos and Michailidou (2006) developed a validation of the BPN in exercise. Thereafter the scale was validated and adapted for PE (Moreno et al., 2008; Moreno et al., 2009) and ultimately confirmed by Menéndez-Santurio and Fernández-Río (2018). The Spanish version consisted of 12 items grouped into three scales: 1) autonomy (e.g., "I can choose and make decisions about my participation in class"); 2) competence (e.g., "I feel that I improve when I practice"); and 3) relatedness (e.g., "I feel accepted and supported by others in class"). The scale was a Likert-type with polytomous values ranging from 1 (strongly disagree) to 5 (strongly agree). Autonomy was evaluated with items 1, 4, 7, and 10; competence with items 2, 5, 8, and 11; and relatedness with items 3, 6, 9, and 12.

The questionnaire used to measure behavioral regulation was the BREQ-3 (Wilson et al., 2006). This scale assessed six types of motivation and behavioral regulation: 1) amotivation (e.g., "I don't know why I exercise"); 2) external regulation (e.g., "I exercise because others tell me to"); 3) introjected regulation (e.g., "I would feel guilty if I did not exercise"); 4) identified regulation (e.g., "I exercise because it is important for my health"); 5) intrinsic regulation (e.g., "I exercise because I enjoy it"); and 6) integrated regulation (e.g., "Exercising is consistent with my values and who I am"), aiming to cover the motivational continuum proposed by SDT. The model consisted of 24 items to evaluate behavioral regulation in sport across six ranges. The Likert-type scale ranged from 0 (not true at all) to 4 (completely true). Intrinsic regulation was assessed with items 4, 12, 18, and 22; integrated regulation: 5, 10, 15, and 20; identified regulation: 3, 9, 17, and 24; introjected regulation: 2, 8, 16, and 21; external regulation: 1, 7, 13, and 19; and amotivation: 6, 11, 14, and 23.

Data analysis and results

Data processing was conducted using SPSS v. 28.0. First, all basic factors were analyzed, and a normality analysis was performed. Model fit was evaluated considering different recommended indices in the literature (chi-square, chi-square/degrees of freedom ratio, normative index, general index, comparative index, adequacy index, and approximation error).

Second, the correlation matrix was analyzed, and the Kaiser-Meyer-Olkin index (KMO = .90) was obtained to assess the adequacy for factor analysis and compare the magnitude of general and partial coefficients (.05 < KMO > 1). Thus, the sample was considered appropriate for factor analysis, using the Kolmogorov-Smirnov test (K-S) to assess the stability of motivational variables, and the Mann-Whitney-Wilcoxon U test.

Third, internal consistency of all variables was analyzed using Cronbach's alpha, and descriptive statistics were calculated considering the mean, standard deviation, and significance values.

Table 1 summarizes the fit and reliability indices for both scales. The results indicate satisfactory model fit and adequate internal consistency, with all reliability coefficients exceeding the recommended threshold of .70.

Table 1. Goodness of Fit Indices and Reliability

Variables	χ2	gl	χ 2 /gl	GFI	NFI	NNFI	CFI	RMSEA	α
Basic Psychological Needs	23.53	12	2.37	.94	.94	94	.95	.05	.86
Behavioral Regulation	32.51	14	2.32	95	.93	.93	.95	.04	.82

Note. GFI = Goodness-of-Fit Index; NFI = Normed Fit Index; NNFI = Non-Normed Fit Index; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation per degree of freedom; E = Excellent; G = Good.

The values for BPN regarding Chi-square (χ^2) and χ^2/df (ratio) were: χ^2 = 23.53; χ^2/df = 2.37. For Behavioral Regulation, the values were: χ^2 = 32.51; χ^2/df = 2.13. These values indicate the degree of discrepancy between the model and the data. Lower values suggest a good fit. A χ^2/df ratio below 3 is considered indicative of a good model fit, and both models meet this criterion.

The fit indices (GFI, NFI, NNFI, CFI) all exceeded .90, indicating a very good model fit, with the CFI approaching .95, which is considered excellent. The RMSEA values were .052 for BPN and .048 for Behavioral Regulation, both below the .06 threshold, further supporting an excellent fit. Reliability analyses showed satisfactory internal consistency, with Cronbach's alpha coefficients of .86 (BPN) and .82 (Behavioral Regulation), exceeding the recommended .70. Moreover, the KMO index was .90, confirming sampling adequacy for factor analysis. Overall, the results demonstrate that both scales are psychometrically sound instruments for assessing the intended constructs.

Table 2 presents the findings from the statistical analysis on the motivational variables of basic psychological needs in relation to Self-Determination Theory. Factor analyses and non-parametric tests were applied due to the lack of normality in the data.

Table 2. Descriptive statistics of basic psychological needs in Physical Edcation: autonomy, relatedness, and competence

Factors	N	M		SD		Gender	
		M1	M2	M1	M2	M1 (p)	M2 (p)
Autonomy 1,4,7,10	1480	2.62	3.85	1.38	1.41	p> .05	p< .001**
Relatedness 3,6,9,12	1480	3.03	4.52	1.75	1.45	p> .05	p< .001**
Competence 2,5,8,11	1480	2.76	4.29	1.30	1.16	p> .05	p< .001**
BPN	1480	2.81	4.78	1.47	1.21	p> .05	p< .001**

Note: Significance is indicated by p < .001 (**). Values with p > .05 are considered non-significant (ns)

In the BPN scale, all items showed satisfactory factor loadings above .30. Factor loadings among the different items ranged between .68 and .82, all significant (p < .001), demonstrating a solid factorial structure. The chi-square value was close to zero, indicating a good model fit. Additionally, the Comparative Fit Index (CFI) and the Non-Normed Fit Index (NNFI) exceeded the .90 threshold, indicating optimal fit according to Hu and Bentler's criteria (1999) and and supported by Kline (2023). The chi-square/degrees of freedom ratio was less than 5, considered very good index. The Root Mean Square Error of Approximation (RMSEA) was below .08, confirming an acceptable model fit. Moreover, the Kaiser-Meyer-Olkin (KMO) index was .72, above the recommended minimum of .60, indicating appropriate data suitability for factorial analysis. Regarding factorial validity, the observed loadings reflect adequate internal consistency and correct structuring of items around the theoretical constructs of autonomy, competence, and relatedness. Finally, the standard deviation was slightly lower in the M2 group, suggesting greater homogeneity in the perception of psychological well-being within this group.

The overall BPN results showed a notable increase in the perception of basic psychological needs after the intervention, confirming that the M2 group was exposed to more favorable conditions for

psychological development, as reflected in their higher scores. The significant improvement in autonomy, relatedness, and competence indicated an environment that actively fosters self-determined motivation. These results were consistent with the principles of the personal and social responsibility model, which promotes comprehensive and participative learning in physical education. Furthermore, the reduced variability in M2 scores suggests a positive homogenization in the perception of psychological well-being, indicating that the intervention not only raised average levels but also strengthened group cohesion in motivational terms. Table 3 presents the findings derived from the statistical analysis conducted on behavioral regulation in relation to Self-Determination Theory. In addition, it is important to highlight that the increase in the satisfaction of psychological needs reflects not only the effectiveness of the pedagogical approach but also the capacity of the learning environment to generate meaningful and lasting motivational changes. The students in the M2 group appeared to internalize the values promoted through the intervention, demonstrating a greater sense of commitment and personal responsibility toward their participation in physical education activities. his process of internalization is fundamental within SDT, as it represents the progressive shift from externally controlled behaviors to more autonomous and self-endorsed forms of motivation.

Table 3. Statistical análisis on behavioral regulation and SDT

Factors	N	M		SD		*Gender*	
		M1	M2	M1	M2	M1 *(p)*	M2 *(p)*
Intrinsic Regulation 4, 12, 18, 22	1480	2.87	4.45	1.65	1.72	*p*> .05	*p*< .001**
Identified Regulation 3, 9, 17, 24	1480	2.41	4.02	1.53	1.60	*p*> .05	*p*< .001**
Introjected Regulation 2, 8, 16, 21	1480	1.98	2.45	1.25	1.93	*p*> .05	*p*> .001
External Regulation 1, 7, 13, 19	1480	1.02	1.23	1.42	1.61	*p*> .05	*p*> .001
Amotivation 6, 11, 14, 23.	1480	.86	.38	.81	.90	*p*> .05	*p*> .001
Integrated Regulation 5, 10, 15, 20	1480	2.85	4.05	1.42	1.54	*p*> .001	*p*< .001**

Note: Significance is indicated by $p < .001$ (**). Values with $p > .05$ are considered non-significant (ns)

In the BREQ-3 scale, the factor loadings ranged from .30 to .86. Although some lower loadings (.30) may indicate some weakness in the consistency of certain items, the higher values reinforce the structural validity of the instrument.

The comparative analysis was conducted on both scales (M1 and M2) using the Wilcoxon test to examine the two time points: M1 and M2. Regarding basic psychological needs (autonomy, relatedness, and competence), there were no significant gender differences at the M1, but there were at M2 ($p < .001$). In behavioral regulation, significant increases ($p < .001$) were observed between M1 and M2 in the more self-determined forms of regulation: intrinsic, integrated, and identified regulation. Conversely, there were no significant changes in the less self-determined forms of regulation: introjected, external, and amotivation showed no improvements, indicating that the intervention did not promote controlled regulations or demotivation. This result suggested an effective pedagogical orientation focused on strengthening autonomous motivation, consistent with the principles of SDT. Autonomy and relatedness were significantly higher in the female group compared to the male group. In competence, higher scores stood out in the male group compared to the female group. This pattern can be interpreted as a motivational differentiation by gender emerging after the intervention, where students developed different aspects of motivation based on their perception of the educational environment.

The intervention based on Comprehensive Sport Teaching and Social Competence positively influenced students' motivation by: 1) enhancing satisfaction of basic psychological needs, especially post-intervention (M2); 2) increasing self-determined motivation, reflected in greater commitment, enjoyment, and genuine participation; 3) showing no rise in controlled motivation or amotivation, thus supporting the model's suitability for fostering autonomous regulation; and 4) revealing gender differences, suggesting the need to tailor strategies in future research. Scatter plots of BPN (Figure 2) and regulatory styles (Figure 3) illustrate these outcomes.

Figure 2. Scatter Plot of Basic Psychological Needs

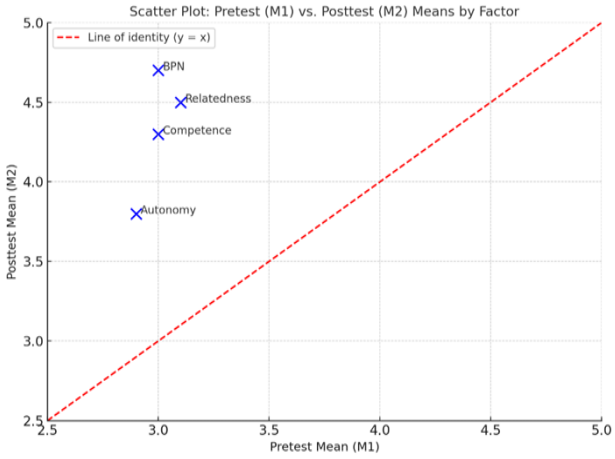
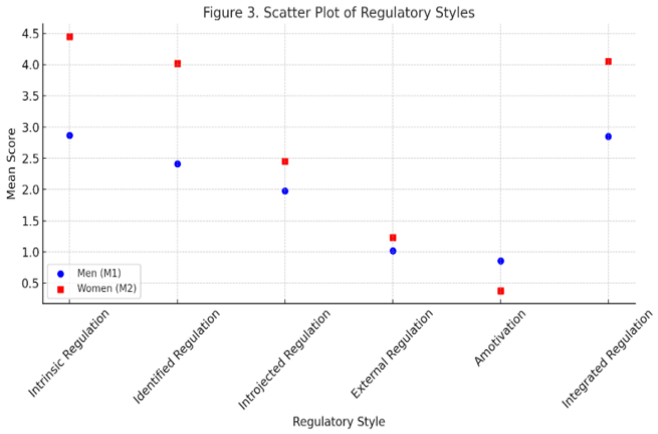


Figure 3. Scatter Plot of Regulatory Styles



Discussion

The hybrid PE-CST-PSR model exerts influence across multiple levels of educational intervention. At the primary level, it promotes motivation, autonomy, and socio-emotional skills, preventing demotivation and disengagement from physical activity. At the secondary level, systematic assessment of students' motivational regulation and basic psychological needs enables the early identification of those requiring additional support, allowing tailored pedagogical adjustments. Finally, at the tertiary level, the model facilitates the recovery and reinforcement of intrinsic motivation and social competencies, supporting students who may have experienced prior disengagement or lower participation. This multilevel approach frames the scope of the study and highlights the model's comprehensive potential to enhance both motivational and relational outcomes in physical education.

The primary objectives of this study were to analyze the influence of a hybrid PE-CST-PSR model, considering gender, on: a) self-determined motivation; b) behavioral regulation and c) the satisfaction of basic psychological needs, particularly autonomy, competence, and relatedness.

The findings indicate that: a) the hybrid model significantly enhanced students' self-determined motivation, especially intrinsic, integrated, and identified regulation, fostering active engagement through inclusive and reflective pedagogical strategies; b) it promoted more autonomous forms of behavioral regulation, while less self-determined forms remained stable, suggesting a positive shift toward internalized motivation and responsable participation and c) the intervention improved the satisfaction of students' basic psychological needs. Gender differences were observed, with female students reporting higher levels of autonomy and relatedness, while male students demonstrated greater perceived competence—findings that are consistent with previous research. These outcomes

were influenced by contextual and cultural factors, reinforcing the need for adaptive, student-centered educational approaches.

These findings are consistent with Vallerand's (2012) conceptualization of passion as a motivational construct that promotes psychological well-being when internalized autonomously. Within the field of physical education and sport, the satisfaction of athletes' psychological needs is crucial for fostering both motivation and well-being (Shannon et al., 2023). Collectively, the study underscores the effectiveness of the hybrid PE-CST-PSR model. Grounded in constructivist principles and SDT, this integrative approach has demonstrated its capacity to enhance key motivational variables while also accommodating diverse experiences, including those related to gender (Jiménez Parra et al., 2024). Furthermore, the results corroborate recent research emphasizing the pivotal role of contextual factors and reflective teaching practices in maximizing the impact of physical education (Pérez-Pueyo et al., 2021). In this regard, well-designed teacher training programs and contextually tailored strategies are essential for promoting student autonomy and supporting heterogeneous learning profiles.

Significant improvements were observed in students' perceived autonomy, relatedness, and competence following the intervention. The integration of comprehensive sport strategies with the promotion of personal and social responsibility facilitated active engagement, not only in their learning processes but also in their physical and emotional development. These findings are consistent with previous research on the PSR model and integrative sport education approaches (Dai et al., 2024; Jiménez Parra et al., 2024). Moreover, Karchynskaya et al. (2024) identified key barriers and enablers of adolescent physical activity, emphasizing the pivotal roles of motivation and social support. They highlighted that contextual factors—such as cultural background and socioeconomic status—can moderate the transfer of motivation to physical activity outside the school context. Accordingly, the authors advocate for complementary strategies that mitigate these barriers, thereby enhancing the long-term efficacy of interventions.

Furthermore, the didactic strategies inherent to CST—such as tactical representation, open-ended questioning, modified games, and cooperative problem-solving—help create an enriched motivational environment. This environment is further enhanced by the simultaneous integration of social competencies like cooperation, communication, respect, and shared decision-making. Together, these elements contribute to a more inclusive and relationally positive classroom climate (Galán-Arroyo et al., 2024; Pérez-Pueyo et al., 2021). This finding is aligned with research that supports the capacity of PE to foster students' satisfaction and their intention to engage in physical activity across different contexts (Aznar-Ballesta & Vernetta, 2023; García-Calvo & Nieto Moreno de Diezmas, 2022).

Regarding behavioral regulation, improvements were primarily found in self-determined forms of motivation (intrinsic, integrated, and identified), while less autonomous forms remained relatively unchanged. This trend confirms the model's capacity to facilitate the internalization of sport values and educational goals, extending beyond mere external compliance. Such outcomes are consistent with literature emphasizing the value of active methodologies and student-centered learning in PE, where the integration enhances the development of social and emotional competencies. (García-Castejón et al., 2021).

Gender-based differences offer deeper insight into students' experiences in physical education. Female students reported higher levels of autonomy and relatedness, whereas male students exhibited greater perceived competence. These findings align with previous research indicating that girls tend to prioritize collaboration and interpersonal connections, while boys are more motivated by technical challenges and competitive aspects of physical activity (Manzano-Sánchez & Gómez-López, 2023).

Consistently, Aznar-Ballesta and Vernetta Santana (2023) found that boys experienced higher enjoyment, whereas girls perceived greater quality, satisfaction, and service value. Notably, satisfaction emerged as a negative predictor of extrinsic motivation ($\beta = -0.122$), suggesting that although boys may find PE activities more enjoyable, girls derive a deeper sense of fulfillment and meaningful engagement from their participation. These results underscore the importance of considering gender-specific experiences when designing interventions aimed at promoting motivation and sustained participation in physical education.

The hybrid model based on PSR and social competence proved effective in supporting both cognitive and social development by combining tactical skill-building with cooperative tasks. This design helped

reduce physical disparities and foster equitable participation (Jiménez Parra et al., 2024). In line with this, González-Víllora et al. (2019) highlighted that hybrid pedagogical models are especially valuable because they integrate benefits across motor, cognitive, and psychosocial domains. García-Calvo & Nieto Moreno de Diezmas (2022) also noted that girls tend to be more intrinsically motivated—driven by personal interest and learning satisfaction—while boys are more responsive to extrinsic rewards and competition. These insights further contextualize the gender-based findings of the present study. Additionally, Hernandez-Martinez et al. (2023) emphasized the relevance of physical activity in fulfilling basic psychological needs, particularly relatedness.

Nonetheless, it is important to recognize that gender alone does not fully explain motivational differences. Frikha et al. (2024) reported that girls showed higher levels of autonomy, competence, and intrinsic motivation, and lower levels of amotivation compared to boys. This suggests that environmental variables—such as teaching format (in-person vs. virtual), feedback quality, and cultural context—play a significant role in shaping motivational outcomes.

Finally, the results underscore the importance of designing educational programs that integrate technical-tactical, social, and psycho-emotional components. These approaches not only promote holistic student development but also contribute to more inclusive and emotionally supportive learning environments. Recent research shows that such models enhance engagement, enjoyment, cooperation, and a sense of belonging—especially among female students (Galán-Arroyo et al., 2024).

In conclusion, current evidence affirms that PE, when grounded in social competence and comprehensive pedagogical frameworks, serves as a powerful context for fostering intrinsic motivation and overall well-being. Hybrid pedagogical models, when thoughtfully adapted to students' emotional and social needs, effectively promote autonomy, engagement, and foster both personal and interpersonal growth across diverse educational settings.

Conclusions

The implemented intervention produced a significant increase in the more self-determined forms of motivation, specifically intrinsic, identified, and integrated regulation. In contrast, the less autonomous forms of motivation, such as introjected regulation, external regulation, and amotivation, showed no significant changes. These results suggest that the program fostered a more internal and personal motivation toward physical activity, which is generally associated with greater student engagement and well-being.

This study supports the effectiveness of the methodological hybridization between Comprehensive Sport Teaching and personal and social responsibility, grounded in SDT, applied in the context of PE. This strategy promotes students' self-determined motivation and generates more equitable and meaningful educational experiences. Furthermore, the inclusion of gender as a moderating variable emerged as a key factor in designing future interventions aimed at enhancing the comprehensive development and well-being of all students within an inclusive, reflective, and socially competent framework.

The design and implementation of didactic strategies in physical education must comprehensively address all basic psychological needs to encourage lasting and meaningful adherence to sports practice. Motor action goes beyond the physical aspect, integrating perceptual, cognitive, emotional, biomechanical, neurophysiological, and crucially, social components. In this regard, social and emotional factors are decisive for student motivation and engagement, since group interaction, a sense of belonging, and the development of emotional skills—such as empathy and self-regulation—are essential elements for consolidating meaningful learning and promoting sustainable sports habits. The integration of these components in pedagogical practice enriches not only the motor experience but also the student's holistic development, contributing to their personal and social well-being.

As a strength, the hybrid pedagogical strategy (PE-CST-PSR) demonstrated in this study presents itself as a versatile and effective tool for addressing the diverse motivational and relational profiles of compulsory education students, both in primary and secondary levels. This methodology facilitates equitable and meaningful participation and contributes to reducing the gender gap in the educational

context by offering adapted experiences that enhance both technical skills and social abilities, regardless of gender.

Based on these findings, the need to continue investigating the adaptation of didactic interventions to different gender sensitivities under an inclusive and equitable approach is emphasized. It is essential to develop studies that delve deeper into the effects of hybrid pedagogical models similar to the present one, aiming to understand their influence on students' motivation, participation, and perception from a gender perspective. Likewise, conducting comparative research and replications in diverse educational and cultural contexts will allow validation and contrast of the results obtained, as well as identification of possible variations linked to sociocultural factors, age, or educational level.

The theoretical framework of Deci & Ryan (2020) and Vallerand (2012) aligns with the empirical findings of this study. The relative stability of less self-determined motivation forms indicates that the intervention fostered autonomous regulation through supportive, student-centered practices rather than controlling strategies. This supports the idea that educational settings can enhance motivation quality by promoting students' basic psychological needs, as proposed by these authors.

In summary, the intervention promoted a positive, cohesive, and autonomous motivational environment, consistent with the principles of Self-Determination Theory and educational models focused on personal and social responsibility.

Acknowledgements

The author would also like to acknowledge the colleagues and research centers whose participation and contributions were essential to the development of this project.

Financing

This research was supported by the Atlántico Medio University (UNAM).

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