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Autonomy support and peer-controlling style: impact on physical activity practice

Apoyo a la autonomía y estilo controlador entre iguales: influencia en la práctica de actividad física

Gabriel Gastélum Cuadras[1]*; Carla Mariela Salazar Ayala[1]; Elisa Huéscar Hernández[2]; Juan Antonio Moreno-Murcia[3]

[1]Faculty of Science of Physical Culture, Autonomous University of Chihuahua, México;
[2]Health Psychology Department, Universidad Miguel Hernández de Elche, España;
[3]Department of Sport Sciences, Universidad Miguel Hernández de Elche, España.

Correspondence to: gastelum@uach.mx

ABSTRACT

Grounded in Self-Determination Theory, this study examined how peer autonomy-supportive and controlling interaction styles predict physical activity through basic psychological needs, motivation, and intention. A cross-sectional design with structural equation modeling was applied to data from 1,104 Mexican primary school students (mean age = 10.51 years). Results showed that peer autonomy support positively predicted autonomy, competence, and relatedness satisfaction, which in turn enhanced autonomous motivation and intention to engage in physical activity, ultimately increasing actual practice. In contrast, controlling peer style negatively affected autonomy and competence and showed minimal indirect effects on motivation and behavior. Competence emerged as the strongest predictor of autonomous motivation, while controlled motivation did not significantly predict intention. Findings highlight the central role of peer-driven autonomy support in fostering high-quality motivation and sustained physical activity engagement. These results underscore the importance of implementing autonomy-supportive, peer-based educational strategies in physical education contexts.

Keywords: Self-Determination Theory; Peer Influence; Structural Equation Modeling; Autonomous Motivation; Physical Activity; Psychological Needs; Preadolescents

RESUMEN

Basado en la Teoría de la Autodeterminación, este estudio analizó cómo los estilos de interacción entre iguales, de apoyo a la autonomía y controlador, predicen la actividad física a través de las necesidades psicológicas básicas, la motivación y la intención. Se utilizó un diseño transversal con modelización de ecuaciones estructurales en una muestra de 1.104 estudiantes de educación primaria en México (edad media = 10,51 años). Los resultados evidenciaron que el apoyo a la autonomía entre iguales predice positivamente la satisfacción de autonomía, competencia y relación, lo que incrementa la motivación autónoma y la intención de práctica, favoreciendo la actividad física real. En contraste, el estilo controlador afectó negativamente la autonomía y la competencia, mostrando efectos indirectos limitados sobre la motivación y la conducta. La competencia emergió como el principal predictor de la motivación autónoma, mientras que la motivación controlada no predijo significativamente la intención. Los hallazgos resaltan el papel clave del apoyo a la autonomía entre iguales en el desarrollo de motivación de calidad y en la adherencia a la actividad física, subrayando la necesidad de estrategias educativas centradas en el estudiante y basadas en la interacción cooperativa.

Palabras Clave: Teoría de la Autodeterminación; Influencia de Pares; Modelos de Ecuaciones Estructurales; Motivación Autónoma; Actividad Física; Necesidades Psicológicas; Preadolescentes

INTRODUCTION

The last ten years have shown rising rates of childhood obesity and physical inactivity among Mexican children (Chávez et al., 2018). Research about educational settings has focused on teachers as main influencers of student motivational experiences but recent studies show peers play an equally important role in physical activity motivation and school experiences (Huéscar et al., 2020; Kalajas-Tilga et al., 2020). The influence of peers becomes more important during preadolescence because children at this stage place higher value on their peer relationships than they did before (Leisterer & Paschold, 2022; Wuyts et al., 2018).

Research shows that peers function as motivational forces which produce results that equal those achieved through teacher influence. Research shows that basic psychological needs fulfillment in environments leads to better motivation and well-being regardless of support origin (Howard et al.,2025). Research shows that students need their autonomy and competence, and relatedness needs to be met simultaneously for optimal motivational outcomes (Yang et al., 2025).

Self-Determination Theory (SDT) establishes autonomy support as its fundamental principle because this method allows people to make decisions and actively participate

in important choices (Deci & Ryan, 2000). Research shows that this communication approach leads to positive results when healthcare facilities and other settings implement it and exercise programs and workplace environments and educational settings (Ng et al., 2012; Standage & Ryan, 2012; Deci et al., 2017; Sun et al., 2017). Research indicates that people develop self-determined motivation and achieve their best performance when their environments meet their needs for autonomy and competence and relatedness (Olafsen et al., 2025).

Controlling interpersonal style uses external pressures through rewards and punishments and manipulation to control others (Pelletier et al., 2001). The implementation of these practices results in psychological frustration and anxiety which produces maladaptive behaviors and negative physical education experiences (Cheon & Reeve, 2015; Cheon et al., 2018; Leisterer & Paschold, 2022).

The three fundamental psychological needs of autonomy and competence and relatedness form the foundation for human motivation and well-being according to Deci and Ryan (2000). People tend to stick with physical activity when their basic needs bring them satisfaction according to Moreno et al. (2009) and Moreno-Murcia & Huéscar (2013) and Moreno-Murcia & Sánchez-Latorre (2016). The frustration of these needs results in negative outcomes according to Sanchez-Oliva et al. (2014) and van Aart et al. (2017) and Wanwan & Khairani (2025). Research evidence from meta-analyses shows that need satisfaction enables students to develop autonomous motivation when they are in educational environments (Howard et al., 2025) and this relationship holds true for individual and collective sport environments (Van Yperen, 2025).

The research investigates motivational agents who affect students through pathways which reach beyond their regular classroom teachers. Students believe their peers have a significant impact on how they behave in their classroom and school environment (Kaur, 2017). Research shows that peer relationships form the base which enables children to build their autonomy and relatedness (Yang et al., 2025) and peer support enhances physical activity motivation through self-efficacy development (Guzmán-Habinger et al., 2025).

SDT identifies two types of motivation which include autonomous motivation (intrinsic motivation and integrated regulation and identified regulation) and controlled motivation (introjected regulation and external regulation and amotivation) (Weman-Josefsson et al., 2015). Research evidence supports the motivational continuum model because studies show that basic psychological need satisfaction leads to higher autonomous motivation (Howard et al., 2025).

People who demonstrate more autonomous motivation tend to maintain stronger physical activity intentions and continue their physical activities for longer periods (Fernández-Ozcorta et al., 2015; Farholm et al., 2017). Students who get structured planning and autonomy support from their teachers develop stronger intentions to participate in physical

activity (Meng & Keng, 2016). Research shows that people who exercise independently while getting social backing to develop their self-efficacy skills will keep exercising better (Guzmán-Habinger et al., 2025) and need satisfaction explains how autonomous motivation changes between different sport environments (Van Yperen, 2025).

The Mexican population shows high levels of sedentary behavior according to research (Barriguete et al.,2017). Students in Chihuahua state report low physical activity motivation and interest according to research conducted by Muñoz-Daw et al. (2016). The way teachers interact with students determines how satisfied students become with physical education and their motivation to participate in physical activities (Zueck et al., 2020).

Physical activity during adolescence provides adolescents with physical health advantages and psychological advantages and social advantages (Grgic et al., 2018; Janssen & LeBlanc, 2010). The study by Sebire et al., (2013) found that children who fulfill their basic needs develop intrinsic motivation according to Deci and Ryan (2013) will develop intrinsic motivation which leads them to participate in vigorous-to-moderate physical activity.

The influence of peers becomes more powerful during adolescence according to Zurita-Ortega et al. (2019). Research studies have investigated how teachers and parents and friends affect adolescents to join physical activities (Sicilia et al., 2020; Tilga et al., 2021; Zou et al., 2023) but few studies have focused on how peers affect physical education classroom motivation. Research requires motivational models to expand their scope because peer influence affects physical activity behaviors according to Howard et al. (2025); Yang et al. (2025); Van Yperen (2025).

The development of peer-dynamics programs for physical education remains limited despite existing teacher-focused intervention programs for autonomy-supportive practices (Paap et al., 2025). Scientists use peer motivational pattern research to study how students develop their fundamental needs, satisfaction and physical activity behaviors.

The research investigates how students' peer support styles affect their physical activity levels through a Self-Determination Theory-based model that links basic psychological need satisfaction to autonomous and controlled motivation and physical activity intentions. The research predicts that students who receive autonomy support from their peers will develop better need satisfaction and autonomous motivation and physical activity levels but students who experience controlling peer behavior will show decreased need satisfaction and reduced physical activity intentions. The research design follows current studies which demonstrate that social environments affect how people motivate themselves and stay committed to their actions (Olafsen et al., 2025; Guzmán-Habinger et al., 2025).

METHODOLOGY

Participants

The research study included 1,104 participants who were selected through convenience sampling from existing groups (552 boys and 552 girls) enrolled in fifth (n = 537) and sixth (n = 567) grade classes across 17 public primary schools in Chihuahua, Mexico. The students ranged in age from 10 to 13 years, with an average age of 10.51 years (SD = 0.66). The participating schools served communities characterized by low to middle socioeconomic status, reflecting the demographic composition of the surrounding neighborhoods.

Inclusion criteria required that students were enrolled in regular physical education classes, were able to read and understand the questionnaire items in Spanish and provided parental or guardian consent as well as their own assent. Students were excluded if they presented cognitive, visual, or auditory limitations that prevented them from completing the survey reliably, or if they were absent on the day of data collection. All participants attended school regularly and demonstrated the ability to respond independently to the self-report instruments.

Instruments

The research study employed validated Spanish versions of instruments which were developed in Spain. The research team administered all measures in Mexican Spanish without needing any linguistic or cultural modifications because the items remained fully understandable for the study participants (Table 1).

Table 1

Summary of instruments used in the study.

Instrument	Construct measured	Items, response scale	Reliability (α / Ω)	CFA Fit (Summary)
Student Controlling Style Scale (Huéscar et al., 2017)	Controlling style among peers	8 items. 1–5 (Strongly disagree–Strongly agree)	α = .82 / Ω = .82	CFI = .97; RMSEA = .05
Student Autonomy Support Scale (Huéscar & Moreno-Murcia, 2017)	Peer autonomy support	10 items. 1–5	α = .75 / Ω = .75	CFI = .98; RMSEA = .02

Instrument	Construct measured	Items, response scale	Reliability (α / Ω)	CFA Fit (Summary)
Basic Psychological Needs in Exercise Scale (Moreno-Murcia et al., 2008)	Autonomy, competence, relatedness	12 items (4 per factor). 1–5	Autonomy α = .62; Competence α = .62; Relatedness α = .70	CFI = .90; RMSEA = .07
PLOC-2 (Ferriz et al., 2015)	Motivational regulations	24 items (4 per factor). 1–7	α range = .64–.76	CFI = .90; RMSEA = .05
IPPA (Moreno & Llamas, 2007)	Intention to be physically active	5 items. 1–5	α = .70 / Ω = .71	CFI = .95; RMSEA = .08
PAQ-A (Martínez-Gómez et al., 2009)	Moderate–vigorous physical activity (last 7 days)	9 items. 1–5	---	Validated in Spanish adolescents

Note. PLOC-2 = Perceived Locus of Causality Scale in Physical Education. IPPA = Intention to practice physical activity. PAQ-A = Physical Activity Questionnaire for Adolescents.

Design and Procedure

The research design follows a cross-sectional correlational model which uses structural equation modeling (SEM) for data analysis. The model depicts the theoretical connections between peer autonomy support and controlling behavior and their effects on physical activity through psychological mediators and motivational factors. The research design uses quantitative methods to analyze social elements which affect physical activity behaviors (Alvarez & Dicovskiy, 2022).

The research project received approval from the Autonomous University of Chihuahua (Record No. 02052019-100) before starting. The research team received direct authorization from the Secretaría de Educación del Estado de Chihuahua (SEECH) and obtained written consent from schools and teachers and parents/guardians who received study information. The survey team administered paper-based questionnaires to participants while maintaining their privacy and confidentiality. The survey period spanned 25 to 35 minutes while researchers conducted the survey at predetermined times during physical education classes.

Data analysis

The research team conducted descriptive statistics and bivariate correlation analysis on all study variables (Table 2). The research team used Cronbach's alpha (α) and McDonald's omega (Ω) to evaluate internal consistency. The research applies α for SDT studies but Ω produces superior results when working with ordinal-scale data and complex constructs (Dunn et al., 2014; Ventura-León & Caycho-Rodríguez, 2017). The research team established coefficient values between .70 and .90 but they acknowledged that values above .65 could function in particular cases (Campo-Arias & Oviedo, 2008; Katz, 2006).

The large number of items in the PLOC-2 (24) and BPNES (12) made it impractical to perform a full item-level CFA analysis. The research team avoided using item parceling as a method. The research used subscale scores to represent motivational regulations and two highest-loading items to represent each basic psychological need. The method decreases model complexity while maintaining theoretical accuracy and enhancing estimation precision (Little et al., 2002; Marsh et al., 2013). The figure shows only the latent constructs to enhance understanding of the model.

The research team performed confirmatory factor analysis (CFA) with maximum likelihood estimation to assess the measurement model. The research team evaluated model fit through three metrics: Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA) with its 90% confidence interval. The research team accepted models with CFI/TLI values above .90 and RMSEA values below .08 (Byrne, 2016).

The research used structural equation modeling (SEM) to verify the proposed relationships by studying how peer autonomy support and controlling behavior affect physical activity through basic psychological needs and motivation and intention. The research team performed all statistical analyses using SPSS 25.0 and AMOS 25.0.

RESULTS

Descriptive and correlation analyses of all variables

Students' autonomy-supportive style showed a higher average than the controlling style. The ratings showed that BPNs achieved their highest scores for relatedness followed by competence and autonomy. The average level of autonomous motivation exceeded controlled motivation. The average rating for physical activity practice intention reached 3.95 but students actually practiced physical activity at 2.81. All variables demonstrated positive and significant relationships with each other except for the controlling style which showed negative correlations with relatedness and autonomous motivation and intention to practice PA (Table 2).

Table 2

Means, standard deviations, and correlations among variables.

	M	SD	α	Ω	1	2	3	4	5	6	7	8	9
SCS	2.21	.85	.82	.82	-	.07*	.20**	.07*	-.04	.46**	-.03	.01	.09**
SAS	3.66	.62	.75	.75	-	-	.33**	.44**	.37**	.18**	.43**	.36**	.28**
BPN Autonomy	3.41	.83	.62	.71	-	-	-	.51**	.34**	.26**	.42**	.28**	.22**
BPN Competence	3.78	.74	.62	.72	-	-	-	-	.46**	.20**	.56**	.43**	.31**
BPN Relatedness	3.95	.82	.70	.81	-	-	-	-	-	.12**	.49**	.36**	.18**
Controlled motivation	3.98	1.29	.83	.88	-	-	-	-	-	-	.24**	.16**	.15**
Autonomous motivation	5.57	1.09	.87	.89	-	-	-	-	-	-	-	.58**	.32**

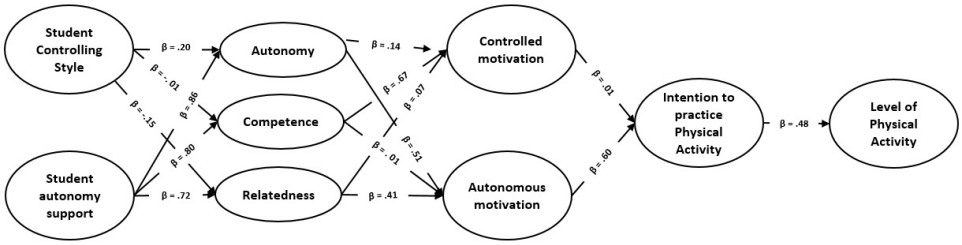
Structural Equation Modeling

The model received maximum likelihood with bootstrapping estimation which produced the following fit indices: $\chi^2 = 628.86$; df = 133; $\chi^2/df = 4.72$; p = .000; CFI = .94; TLI = .92; IFI = .94; RMSEA = .05 [.054, .063] which indicates an acceptable overall fit.

The Figure 1 structural equation model presents standardized parameter values for every connection between variables. The support students receive from their peers leads to higher perceived autonomy ($\beta = .32$, $p < .001$) and competence ($\beta = .50$, $p < .001$) and relatedness ($\beta = .72$, $p < .001$). People who participate in decision-making processes will fulfill their fundamental psychological needs according to the Self-Determination theory. The peer controlling style produced negative effects on autonomy ($\beta = –.20$, $p < .001$) and competence ($\beta = –.05$, $p < .05$) but did not affect relatedness. Research indicates that controlling actions in relationships results in more harm to autonomy and competence than they do to social connection perceptions.

Figure 1

Structural Equation Model.



Note: p<.001

The motivational cascade demonstrates that perceived competence directly affects autonomous motivation (β = .41, p < .001) yet autonomy shows a smaller effect on motivation (β = .25, p < .001). The research shows that feeling capable serves as the primary factor which enables people to internalize and drive their actions through self-motivation. The research found no significant relationship between controlled motivation and physical activity practice intention because the beta value was .04 and the p value was not significant. The research results show that people begin exercising because they need to rather than because of external rules or responsibilities. The model shows that autonomous motivation strongly influences physical activity practice intentions (β = .50, p < .001) and these intentions directly affect physical activity participation (β = .48, p < .001). The research confirms that people need internal motivation to maintain their physical activity practice because external control does not work for health behavior maintenance (Figure 1).

Direct, Indirect, and Total Effects (SEM Model)

The SEM model shows how peer interactions affect students' motivational processes and their physical activity participation through the Self-Determination Theory-based motivational sequence (Table 3).

Table 3.
Standardized direct, indirect, and total effects in the SEM model.

Predictor → Outcome	Direct (β)	Indirect (β)	Via	Total (β)
AA → Autonomy	.97	—	—	.97
AA → Competence	1.01	—	—	1.01
AA → Relatedness	.72	—	—	.72
AA → Autonomous motivation	—	–.47	Autonomy, Competence, Relatedness	–.47
AA → Intention PA	—	–.41	Autonomous motivation	–.41
AA → Physical activity	—	–.20	Intention PA	–.20
EC → Autonomy	–.01	—	—	–.01
EC → Competence	.13	—	—	.13
EC → Relatedness	–.02	—	—	–.02
EC → Autonomous motivation	—	+.07	Autonomy, Competence, Relatedness	+.07
EC → Intention PA	—	+.06	Autonomous motivation	+.06
EC → Physical activity	—	+.03	Intention PA	+.03
Autonomy → Autonomous motivation	–1.23	—	—	–1.23
Competence → Autonomous motivation	.51	—	—	.51
Relatedness → Autonomous motivation	.29	—	—	.29
Autonomy → Intention PA	—	–1.08	Autonomous motivation	–1.08
Competence → Intention PA	—	.45	Autonomous motivation	.45
Relatedness → Intention PA	—	.26	Autonomous motivation	.26
Autonomous motivation → Intention PA	.88	—	—	.88
Autonomous motivation → Physical activity	—	.42	Intention PA	.42
Controlled motivation → Intention PA	.02	—	—	.02
Intention PA → Physical activity	.48	—	—	.48

Note. AA = Autonomy Support. EC = Controlling Style. PA = Physical activity.

The three basic psychological needs received direct positive effects from peer autonomy support which included autonomy (β = .97) and competence (β = 1.01) and relatedness (β = .72). The needs functioned as connectors which established a relationship between autonomy support and autonomous motivation and physical activity practice. The total indirect effect of autonomy support on autonomous motivation became negative (β = –.47) because autonomy need strongly negatively affected autonomous motivation (β = –1.23). The model produces an unexpected result because studying needs as a complete system reveals their complex interconnections. The support students receive from their peers leads to significant effects on their intention to practice physical activity (β = –.41) and their actual physical activity levels (β = –.20). The effects on physical activity practice emerged through autonomous motivation and intention which demonstrates that intention serves as the primary factor influencing physical activity behavior (Table 3).

The controlling style of peers produced minimal direct effects on need satisfaction through its weak associations (βs between –.02 and .13). The controlling behavior produced small positive effects on autonomous motivation (β = .07) and physical activity practice (β = .03) through the needs and autonomous motivation. The research indicates that controlling behaviors have limited impact which creates indirect changes in motivational sequences through need satisfaction and autonomous motivation (Table 3).

The three needs of competence and relatedness directly increased autonomous motivation, but autonomy directly decreased it. The three needs of competence and relatedness and autonomy produced substantial effects on intention through autonomous motivation (competence β = .45; relatedness β = .26; autonomy β = –1.08). The research confirms that autonomous motivation functions as the main factor which links needs to physical activity intentions (Table 3).

The model shows that autonomous motivation serves as the primary factor which determines physical activity practice intentions (β = .88) and subsequently affects physical activity participation (β = .42). The research supports SDT because controlled motivation fails to accurately predict how people will behave according to their intentions. The level of physical activity depends on intention at a moderate level (β = .48) which shows that intention stands as the leading factor for behavior prediction (Table 3).

DISCUSSION

The research findings demonstrate that peer interactions function as powerful motivational factors which support the predictions made by Self-Determination Theory (SDT). Students who received higher autonomy support from their peers showed better satisfaction of autonomy and competence and relatedness needs which led to higher autonomous motivation and physical activity participation (Howard et al., 2025). The study shows that

students both respond to teacher actions and process the social interactions which occur between their peers. Research indicates that peers gain more influence over children during the late childhood through early adolescence period (Yang et al., 2025; Zurita-Ortega et al., 2019).

A pattern that clearly emerges from the findings is that peer autonomy support directly affects student need satisfaction because it strongly impacts their relatedness and competence needs. The research findings confirm theoretical predictions because peer-based settings enable members to build social bonds and work together which produces more powerful relatedness effects (Van Yperen, 2025). The study shows that peer validation and social acceptance serve as essential developmental needs for this age group so autonomy-supportive peer interactions create essential conditions for students to develop their psychological experiences in physical education.

Another relevant point that stands out in the results is that peer controlling actions produce negative outcomes which mainly harm students' feelings of self-direction and their self-assessed abilities. The study confirms previous research which demonstrates that controlling actions reduce people's feelings of control and their self-efficacy more than their social relationships (Leisterer & Paschold, 2022). Students continue to interact with their peers through social activities at school because they need to maintain their preadolescent social bonds. Research needs to study this phenomenon because it could prove that peer control does not negatively affect peer relationships.

More specifically, the study demonstrates that competence stands as the leading factor which drives students toward autonomous motivation. The research supports previous findings which demonstrate competence stands as the fundamental requirement for internalization to occur during active learning activities (Olafsen et al., 2025). The study supports previous research which shows that students who feel effective in their activities tend to maintain long-term physical activity participation (Guzmán-Habinger et al., 2025). The research validated existing SDT principles through its findings which demonstrated that autonomous motivation drives people to intend physical activity and actually perform it.

The study found no significant link between controlled motivation and students' intentions to practice physical activity. Research based on Self-Determination Theory (SDT) shows that controlled regulation sometimes leads to short-term engagement but its predictive power remains inconsistent and weak (Howard et al., 2025). The research shows that controlled motivation does not create stable behavioral intentions in children, so autonomous motivation stands as their essential developmental factor.

In practical terms, findings show that students develop mentally and physically through their social relationships with their classmates. The research confirms through scientific evidence that student relationships determine their mental development and physical activity participation while proving SDT-based interventions work through peer-based methods.

Taken together, the study shows that preadolescents achieve better psychological need satisfaction and autonomous motivation and physical activity participation through supportive peer relationships. The research shows that students who experience controlling peer actions will develop lower autonomy and competence which results in negative motivational experiences.

The research shows that peers together with teachers should be recognized as essential social influencers for SDT-based motivation models in school physical education. The research shows that peer autonomy support functions as a vital factor for physical activity motivation because it affects how people fulfill their psychological needs and develop autonomous motivation.

From an applied perspective, the findings suggest that teachers should implement educational strategies that promote peer cooperation, shared decision-making, and empathy-based social interactions. Physical education programs may also benefit from peer-led approaches that foster student autonomy while reducing controlling behaviors during group activities and physical exercises.

The current investigation establishes new investigation paths because it reveals the insufficient study of peer controlling behaviors. Research on peer controlling dynamics and their modification methods enables developers to build motivational environments which support people in maintaining their physical activity long-term.

Limitations and Future Directions

Multiple elements need evaluation when studying the research results from this investigation. The study design uses a cross-sectional approach which prevents researchers from determining the exact sequence between peer motivational styles and their effects on psychological need satisfaction and motivation and physical activity behavior. Scientists can study these processes through time using longitudinal designs and experimental methods to determine if peer interaction style changes lead to significant behavioral effects.

Second, it depends on self-reported data which might produce biased results because participants might distort their answers or forget their actual behaviors and perceptions. Research in the future needs to implement various assessment techniques which combine teacher assessments with peer evaluations and observational data collection and physical activity tracking through devices to achieve higher measurement precision.

Third, the research data comes from preadolescent students who attend schools in one Mexican state which restricts the study's ability to generalize its findings to different cultural settings and educational environments. The research needs to be replicated across different geographical areas and educational systems and age groups to achieve better external validity.

Finally, the research investigated two peer motivational styles, but it did not assess other social elements which affect student motivation including friendship quality and group norms and classroom environment. Future studies need to assess peer-based interventions which focus on teaching autonomy support and reducing controlling behavior in physical education environments. And research peer motivational strategies' impact on student motivation through their effects on core psychological needs and their physical activity behaviors. The research supports SDT-based intervention growth through peer-mediated approaches because it shows how peer relationships shape student mental growth and their physical exercise involvement.

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