

RESEARCH

Open Access



The association between perceived bullying in physical education classes and school satisfaction among middle school students: the mediating roles of physical activity enjoyment and physical education class happiness

Mehmet Güllü^{1,4*} , Mehmet Akarsu¹ , Hasret Tan¹ , Ecesu Karakaş² , Gül Polat Günata³ and Serpil Akçınar¹

Abstract

Background Bullying is an important child and adolescent health concern associated with psychosocial adjustment, school well-being, and school satisfaction. Physical education (PE) classes may represent a particularly sensitive context because they involve body visibility, peer comparison, physical performance, and intensive peer interaction. This study examined the association between perceived bullying in PE classes and school satisfaction among middle school students and tested whether physical activity enjoyment and PE class happiness statistically mediated this association.

Methods This cross-sectional correlational study included 616 middle school students from Malatya, Türkiye. Data were collected using validated measures of perceived bullying in PE classes, physical activity enjoyment, PE class happiness, and school satisfaction. A four-factor latent measurement model and the hypothesized structural mediation model were estimated using robust maximum likelihood. Measurement validity and reliability were evaluated using confirmatory factor analysis, composite reliability, average variance extracted, and the heterotrait–monotrait ratio.

Results The four-factor measurement model demonstrated acceptable fit to the data ($\chi^2/df=2.22$, CFI=0.922, TLI=0.916, RMSEA=0.045, SRMR=0.044), and HTMT values supported discriminant validity. Perceived bullying in PE classes was negatively associated with physical activity enjoyment ($\beta=-0.157$, $p<.001$), PE class happiness ($\beta=-0.181$, $p<.001$), and school satisfaction ($\beta=-0.096$, $p=.042$). Physical activity enjoyment ($\beta=0.237$, $p<.001$) and PE class happiness ($\beta=0.201$, $p<.001$) were positively associated with school satisfaction. Both indirect associations were statistically significant but small in magnitude ($\beta=-0.037$, $p=.006$; $\beta=-0.036$, $p=.010$), and the direct association

*Correspondence:
Mehmet Güllü
mehmet.gullu@inonu.edu.tr

Full list of author information is available at the end of the article



© The Author(s) 2026. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

between perceived bullying and school satisfaction was also small ($\beta = -0.096$, $p = .042$). The model explained 16.9% of the variance in school satisfaction, whereas perceived bullying explained 2.3% and 3.1% of the variance in physical activity enjoyment and PE class happiness, respectively, indicating modest practical explanatory power.

Conclusions Perceived bullying in PE classes was associated with lower school satisfaction both directly and indirectly through lower physical activity enjoyment and lower PE class happiness. However, these associations were modest and should not be interpreted as causal because of the cross-sectional design. The findings support efforts to promote psychologically safe and inclusive PE environments as part of school health and bullying prevention strategies.

Keywords Physical education, Peer bullying, School satisfaction, Physical activity enjoyment, Physical education class happiness

Introduction

School is one of the most important developmental contexts during childhood and adolescence, shaping not only academic learning but also social, emotional, and psychological development. Experiences within the school environment including daily interactions with teachers and peers, opportunities for social participation, and supportive or adverse experiences play an important role in children's mental health, well-being, and healthy developmental processes [1–3]. The World Health Organization recognizes schools as key settings for promoting child and adolescent mental health and emphasizes the importance of a positive school climate for healthy psychosocial development [4, 5]. From a broader contextual perspective, school climate and ecological approaches to child development also emphasize that students' well-being is closely related to the quality of their interactions and experiences within proximal school and peer environments. Conversely, negative school experiences have been associated with poorer emotional adjustment, reduced school engagement, and lower subjective well-being [6, 7].

Within this context, school satisfaction is considered an important indicator of children's psychosocial adjustment and school well-being. School satisfaction refers to students' cognitive and affective evaluations of their school experiences and reflects the extent to which they perceive school as a positive, supportive, and satisfying environment [8–10]. School satisfaction is not merely an academic outcome; it has been closely associated with psychological well-being, school engagement, academic adjustment, school attendance, and overall quality of life [6, 7, 11–15]. Therefore, identifying the factors that promote or undermine school satisfaction is important from both educational and pediatric health perspectives.

From the perspective of positive psychology, positive emotional experiences within the school environment contribute to children's well-being through positive emotions, supportive social relationships, and psychological resilience [7, 14, 15]. Accordingly, school satisfaction is shaped not only by academic achievement but also by

supportive interpersonal relationships and emotionally positive learning environments. Identifying school contexts that foster positive emotions may provide valuable insights for promoting children's psychosocial health.

Among different learning environments within schools, physical education (PE) classes occupy a unique position because they simultaneously involve physical activity, peer interaction, public performance, and social comparison. Unlike most classroom-based subjects, PE classes make students' physical competence and body characteristics visible to their peers, thereby increasing the salience of competence, social acceptance, and social evaluation [16, 17]. Consequently, PE classes may provide opportunities for positive psychosocial development while also representing contexts in which students may experience embarrassment, social exclusion, or peer victimization [18, 19].

When students perceive PE classes as enjoyable, supportive, and emotionally positive experiences, these experiences may extend beyond the lesson itself and influence their broader evaluations of school life. Previous studies have shown that physical activity enjoyment and positive emotional experiences during PE classes are associated with greater school engagement, life satisfaction, school connectedness, and school satisfaction [20–26]. Students who enjoy participating in physical activity may also develop more positive attitudes toward school and report higher levels of overall well-being [22–25]. These findings suggest that positive emotional experiences in PE classes may represent an important pathway through which students develop more favorable perceptions of their overall school environment.

At the motivational and affective level, the relationship between positive PE experiences and school satisfaction can be interpreted within the framework of Self-Determination Theory (SDT) [27]. According to SDT, supportive social environments facilitate the satisfaction of three basic psychological needs: autonomy, competence, and relatedness, which, in turn, promote intrinsic motivation, positive affect, and psychological well-being [27, 28]. PE classes may contribute to the fulfillment of these needs by

providing opportunities for skill development, peer interaction, and meaningful participation in physical activity. Previous research has demonstrated that perceived competence, autonomy support, basic psychological need satisfaction, and a supportive motivational climate are positively associated with enjoyment and intrinsic motivation in PE settings [26, 29–31]. Accordingly, students who perceive PE as enjoyable and emotionally rewarding may also evaluate their overall school experiences more positively.

In contrast, bullying represents one of the most important risk factors threatening children's psychosocial well-being within the school environment. Owing to its high prevalence and its associations with anxiety, depression, psychosomatic complaints, impaired social functioning, reduced school participation, and diminished quality of life among children and adolescents, bullying is widely recognized as a major public health concern [4, 32–34]. Large international studies have consistently shown that students who experience bullying report lower subjective well-being, poorer school adjustment, weaker school belonging, and lower school satisfaction than their non-victimised peers [35–39]. These associations can also be considered from a school climate perspective, as bullying may reflect adverse peer relationships and reduced perceptions of safety and social support within the school environment. Similarly, an ecological perspective suggests that repeated negative interactions within proximal peer and school contexts may be associated with children's broader evaluations of their school experiences.

Bullying may be particularly relevant in PE classes because these lessons involve body visibility, public performance, competitive activities, and intensive peer interaction. Systematic reviews have shown that physical appearance, motor competence, athletic performance, and peer comparison are common contexts in which bullying behaviors emerge during PE classes [18, 19]. Experiences such as teasing, exclusion, verbal harassment, or repeated peer aggression may undermine students' feelings of competence, relatedness, and psychological safety during PE [16, 17]. Recent evidence has also suggested that PE-based anti-bullying interventions may improve social relationships and school well-being, highlighting the importance of PE not only for physical skill development but also as a strategic context for promoting school health [40].

These relationships are also theoretically consistent with Self-Determination Theory. Experiences of bullying may frustrate students' needs for competence and relatedness and may therefore be associated with lower physical activity enjoyment and less positive emotional experiences during PE classes. Lower enjoyment and lower PE class happiness may, in turn, be associated with less favorable evaluations of students' broader school

experiences. However, the existing literature has largely examined different components of this proposed pathway in separate lines of research. Studies of bullying and school adjustment have consistently documented negative associations between victimization and school well-being, school belonging, life satisfaction, and school satisfaction [35–39, 41]. In contrast, research specifically focused on bullying in PE has primarily identified the characteristics and correlates of bullying within this distinctive context, including body visibility, physical appearance, motor competence, athletic performance, and peer comparison [18, 19].

A separate body of PE research has focused on positive motivational and affective experiences. Physical activity enjoyment, perceived competence, basic psychological need satisfaction, autonomy support, and supportive motivational climates have been associated with intrinsic motivation, positive affect, school engagement, and broader indicators of well-being [22–26, 29–31, 42]. Taken together, these findings provide evidence for individual links among bullying, PE experiences, and school-related well-being; however, they do not clearly establish how PE-specific bullying, physical activity enjoyment, PE class happiness, and school satisfaction are statistically related when considered simultaneously. In particular, limited attention has been given to whether physical activity enjoyment and PE class happiness represent distinct indirect pathways linking perceived bullying in PE with students' broader evaluations of school. The present study addresses this gap by integrating a negative PE-specific peer experience and two conceptually related but empirically distinct positive affective constructs within a single latent structural equation model. This approach extends previous research by moving beyond the examination of isolated bivariate associations and evaluating the direct and indirect associations among these constructs simultaneously.

Accordingly, the aim of the present study was to examine the association between perceived bullying in PE classes and school satisfaction among middle school students and to test whether physical activity enjoyment and PE class happiness statistically mediate this association. Drawing primarily on Self-Determination Theory, while also considering the broader contextual perspectives outlined above, it was hypothesized that perceived bullying would be negatively associated with school satisfaction both directly and indirectly through lower physical activity enjoyment and lower PE class happiness. By integrating bullying as a negative psychosocial experience together with enjoyment and happiness as positive affective experiences within a single latent structural equation model, this study seeks to extend current knowledge regarding the psychosocial mechanisms underlying children's school satisfaction and to provide evidence

that may inform school health and bullying prevention strategies.

Hypotheses

Bullying experiences are consistently associated with poorer school adjustment, weaker school belonging, and lower school satisfaction [35–39, 41]. In PE settings, where peer evaluation, physical visibility, and social comparison are particularly salient, perceived bullying may also be associated with students' broader evaluations of school. Therefore, the following hypothesis was proposed:

H1. Perceived bullying in physical education classes (PECPB) is expected to be negatively associated with school satisfaction (SSC).

From an SDT perspective, bullying may frustrate students' needs for competence and relatedness and may reduce the positive motivational and emotional qualities of PE experiences [27, 28]. Previous research has also linked perceived competence, peer support, and supportive motivational climates with greater enjoyment and positive affect in PE [26, 29–31]. Accordingly, negative peer experiences during PE may be associated with both lower physical activity enjoyment and lower PE class happiness. Thus:

H2. PECPB is expected to be negatively associated with physical activity enjoyment (PACES).

H3. PECPB is expected to be negatively associated with physical education class happiness (PECHL).

Positive experiences in PE and physical activity have been associated with school engagement, school connectedness, subjective well-being, and school satisfaction [20–26, 42]. Enjoyment and positive emotional experiences may therefore be associated with more favorable evaluations of students' broader school experiences. Based on this evidence:

H4. PACES is expected to be positively associated with SSC.

H5. PECHL is expected to be positively associated with SSC.

Taken together, the literature suggests that bullying in PE is negatively associated with positive motivational and affective experiences, whereas enjoyment and PE-related happiness are positively associated with broader school well-being [22–26, 35–42]. From an SDT perspective, the frustration of competence and relatedness in adverse peer contexts may be associated with less positive experiences in PE, which may, in turn, correspond to

less favorable evaluations of school. Accordingly, physical activity enjoyment and PE class happiness were examined as distinct statistical pathways through which perceived bullying in PE may be indirectly associated with school satisfaction. Therefore:

H6. PACES is expected to account for a statistically significant indirect association between PECPB and SSC.

H7. PECHL is expected to account for a statistically significant indirect association between PECPB and SSC.

Method

Research design

This study employed a cross-sectional correlational design to examine the association between perceived bullying in physical education classes and school satisfaction among middle school students and to test whether physical activity enjoyment and physical education class happiness statistically mediated this association. In the hypothesized model, perceived bullying in physical education classes was specified as the independent variable, school satisfaction as the outcome variable, and physical activity enjoyment and physical education class happiness as parallel mediating variables.

The hypothesized model was informed by Self-Determination Theory (SDT), which proposes that supportive social environments promote the satisfaction of the basic psychological needs for autonomy, competence, and relatedness, thereby fostering positive emotional experiences and well-being [27, 28]. Consistent with this framework, previous studies have shown that bullying experiences in physical education are associated with poorer psychosocial adjustment, reduced school well-being, and lower school satisfaction [18, 33, 35–39, 41], whereas enjoyment of physical activity and positive emotional experiences during physical education are positively associated with school satisfaction, school engagement, and subjective well-being [22–25, 42]. Accordingly, the present model was developed to examine whether physical activity enjoyment and physical education class happiness statistically mediate the association between perceived bullying in physical education classes and school satisfaction within a theory-informed framework.

Participants

The participants consisted of 616 middle school students studying in various schools in Malatya, Türkiye. A convenience sampling method was employed. Students were eligible for inclusion if they were actively attending school, volunteered to participate in the study, and were capable of independently completing the measurement

instruments. All participants were full-time students enrolled in formal educational institutions.

The final sample comprised 616 participants. The four-factor latent measurement model included 33 observed indicators, four latent constructs, and 72 freely estimated parameters. Model estimation using robust maximum likelihood (MLR) converged successfully, and the stability of the model estimates was evaluated with reference to model complexity, successful convergence, and the acceptable global fit indices reported in the Results section. These estimation characteristics supported the adequacy of the analytic sample for the specified latent variable model.

Students who had cognitive or physical limitations that could prevent them from completing the measurement instruments independently and reliably, those who did not complete the data collection process, and those who provided incomplete or invalid responses that could compromise the validity of the scales were excluded from the study. Because all participants were under the age of 18, written informed consent was obtained from their parents or legal guardians, and written assent was obtained from the students themselves.

Ethical approval for the study was obtained from the İnönü University Social and Human Sciences Research and Publication Ethics Committee (Approval No. 32; Date: November 20, 2025). The research process was conducted in accordance with the Declaration of Helsinki and relevant ethical standards, and all personal data were protected in accordance with confidentiality principles. Demographic information about the participants is presented in Table 1.

According to Table 1, a total of 616 students participated in the study. Of the participants, 51.9% were male ($n=320$) and 48.1% were female ($n=296$). In terms of grade level, 26.1% of the students were in the 5th grade, 26.8% in the 6th grade, 21.6% in the 7th grade, and 25.5% in the 8th grade. The mean age of the students was 11.78 years ($SD=1.16$), with ages ranging from 9 to 15.

Table 1 Demographic characteristics of the participants ($n=616$)

Variable		<i>n</i>	%		
Gender	Male	320	51.9		
	Female	296	48.1		
Grade Level	5th grade	161	26.1		
	6th grade	165	26.8		
	7th grade	133	21.6		
	8th grade	157	25.5		
Age	M	SD	Min.	Max.	
	11.78	1.16	9	15	

Data collection instruments

The data collection instruments were administered in the same standardized sequence to all participants. In the first stage, a Demographic Information Form was administered to obtain basic demographic information such as gender, age, and grade level. In the second stage, the Physical Activity Enjoyment Scale was administered to determine the extent to which students generally perceived physical activities as enjoyable and satisfying. In the third stage, the School Satisfaction Scale for Children was used to assess the extent to which students were generally satisfied with the school environment, courses, and the learning process. Subsequently, the Physical Education Class Happiness Level Scale was administered to measure students' happiness, enjoyment, and well-being specifically related to physical education and sports classes. Finally, the Perceived Bullying in Physical Education Classes Scale was used to determine the frequency of bullying behaviors that students experienced or witnessed during physical education classes.

Demographic information form

The Demographic Information Form was used to collect basic demographic data regarding participants' gender, age, and grade level.

Physical activity enjoyment scale

The Physical Activity Enjoyment Scale, originally developed by Mullen et al. [43] and adapted into Turkish by Özkurt et al. [44], was used to determine the extent to which students perceived physical activities as enjoyable and satisfying. The scale consists of 8 items and has a single-factor structure. Items are rated on a 7-point Likert scale. Higher scores indicate higher levels of enjoyment derived from physical activity. The internal consistency coefficient in the present study was high (Cronbach's $\alpha=0.893$).

Physical education class happiness level scale

The Physical Education Class Happiness Level Scale, developed by Uğraş & Serbes [45], was used to measure students' happiness, enjoyment, and well-being specifically related to physical education and sports classes. The scale consists of 9 items and has a single-factor structure. It uses a 5-point Likert-type response format (1 = Never, 5 = Always). Higher scores indicate higher levels of happiness in physical education classes. The internal consistency coefficient was 0.918.

Perceived bullying in physical education classes scale

The Perceived Bullying in Physical Education Classes Scale, developed by Uğraş et al. [41], was used to determine the frequency of bullying behaviors that students experienced or witnessed during physical education

Table 2 Fit indices of the four-factor measurement model

χ^2	df	χ^2/df	CFI	TLI	RMSEA (90% CI)	SRMR
1087.00	489	2.22	0.922	0.916	0.045 (0.042–0.047)	0.044

Table 3 Standardized factor loadings of the latent constructs

Construct	Item	Standardized factor loading (λ)
PACES	PAE1	0.753
	PAE2	0.820
	PAE3	0.771
	PAE4	0.717
	PAE5	0.666
	PAE6	0.782
	PAE7	0.599
	PAE8	0.669
SSC	SSC1	0.767
	SSC2	0.689
	SSC3	0.758
	SSC4	0.659
	SSC5	0.751
	SSC6	0.812
PECHL	PECHL1	0.799
	PECHL2	0.816
	PECHL3	0.753
	PECHL4	0.803
	PECHL5	0.748
	PECHL6	0.756
	PECHL7	0.653
	PECHL8	0.729
	PECHL9	0.668
PECPB	PECPB1	0.754
	PECPB2	0.795
	PECPB3	0.813
	PECPB4	0.791
	PECPB5	0.855
	PECPB6	0.629
	PECPB7	0.772
	PECPB8	0.742
	PECPB9	0.764
	PECPB10	0.775

PACES Physical Activity Enjoyment Scale, SSC School Satisfaction Scale for Children, PECHL Physical Education Class Happiness Level Scale, PECPB Perceived Bullying in Physical Education Classes

All standardized factor loadings were statistically significant ($p < .001$)

classes. The scale consists of 10 items and has a single-factor structure. It uses a 5-point Likert-type response format (1 = Never, 5 = Always). Higher scores indicate higher levels of perceived bullying in physical education classes. In the present study, the scale demonstrated excellent internal consistency (Cronbach's $\alpha = 0.940$).

School satisfaction scale for children

The School Satisfaction Scale for Children, originally developed by Randolph et al. [46] and adapted into Turkish by Telef [47], was used to determine the extent to

Table 4 Convergent and discriminant validity of the latent constructs

Construct	CR	McDon-ald's ω	AVE	Max HTMT with other constructs
PACES	0.898	0.893	0.513	0.581
SSC	0.879	0.877	0.542	0.358
PECHL	0.920	0.918	0.617	0.581
PECPB	0.936	0.940	0.601	0.181

PACES Physical Activity Enjoyment Scale, SSC School Satisfaction Scale for Children, PECHL Physical Education Class Happiness Level Scale, PECPB Physical Education Classes Perceived Bullying, CR Composite Reliability, AVE Average Variance Extracted, HTMT Heterotrait–Monotrait ratio

The maximum HTMT value for each construct represents its highest HTMT ratio with any other construct

which students were generally satisfied with the school environment, courses, and the learning process. The scale consists of 6 items and has a single-factor structure. A 5-point Likert-type scale is used (1 = Never, 5 = Always). Higher scores indicate higher levels of school satisfaction. The internal consistency coefficient was 0.877.

Measurement model evaluation

Prior to testing the structural model, the four-factor measurement model was evaluated using confirmatory factor analysis (CFA). Model fit was assessed using χ^2/df , CFI, TLI, RMSEA, and SRMR. Internal consistency reliability was evaluated using Composite Reliability (CR) and McDonald's omega coefficients. Convergent validity was assessed using Average Variance Extracted (AVE), whereas discriminant validity was examined using the Heterotrait–Monotrait ratio (HTMT). The results of the measurement model evaluation, including global fit indices, standardized factor loadings, and validity/reliability coefficients, are presented in Tables 2, 3 and 4.

Data collection procedure

Data were collected between 8 and 12 December 2025 in classroom settings at middle schools in Malatya, Türkiye, under the supervision of researchers experienced in conducting field studies with middle school students. Data collection was conducted during class hours and outside examination periods. Because all participants were under 18 years of age, written parental or legal guardian consent and student assent were obtained before participation. Students were informed that participation was voluntary, responses would be used solely for scientific purposes, and all data would be treated confidentially and anonymously. The demographic information form and measurement instruments were administered in a

standardized sequence, and completion took approximately 15 min. To minimize missing data, completed forms were checked for unanswered items and students were asked to review incomplete responses when necessary. Given that all study variables were assessed using self-report measures at the same time point, procedural precautions were used to reduce potential common method bias, including assurances of anonymity and confidentiality, standardized administration conditions, and emphasizing that there were no right or wrong answers. Common method variance was additionally evaluated using Harman's single-factor test.

Data analysis

The data were analyzed using JASP (version 0.18.3.0; University of Amsterdam, Amsterdam, the Netherlands) and R (version 4.6.1 GUI 1.83 High Sierra build; R Foundation for Statistical Computing, Vienna, Austria, 2025). Descriptive statistics, Pearson correlations, and preliminary assumption checks were conducted in JASP, whereas SEM-specific and supplementary psychometric analyses were conducted in R. The distributional characteristics of the data were evaluated using skewness and kurtosis coefficients [48–50]. Because the perceived bullying variable exhibited evidence of non-normality, confirmatory factor analysis (CFA) and structural equation modeling (SEM) were estimated using the robust maximum likelihood (MLR) estimator, which provides robust standard errors and model fit statistics under non-normal data conditions. In addition, multivariate normality was examined using Mardia's coefficient. The results indicated evidence of multivariate non-normality, further supporting the use of the MLR estimator in the CFA and SEM analyses. Pearson correlation analysis was conducted to examine the bivariate associations among the study variables. Before estimating the structural model, multicollinearity was evaluated using tolerance and variance inflation factor (VIF) values. Tolerance values greater than 0.20 and VIF values below 5 indicated that multicollinearity was not a concern [51]. The hypothesized structural model was subsequently tested using SEM. Perceived bullying in physical education classes was specified as the exogenous latent construct, school satisfaction as the endogenous latent construct, and physical activity enjoyment together with physical education class happiness as parallel latent mediators. The covariance between the two mediating latent constructs was freely estimated and is represented by the curved double-headed arrow in Fig. 1; this connection does not represent a directional structural path. Direct and indirect associations were estimated simultaneously. The significance of indirect effects was evaluated using bias-corrected bootstrap confidence intervals based on 5,000 bootstrap resamples. Indirect effects were considered statistically significant when the 95%

confidence intervals did not include zero [52]. Statistical significance was set at $p < .05$ for all analyses. Common method variance was preliminarily assessed using Harman's single-factor test. An unrotated exploratory factor analysis including all measurement items revealed that the first unrotated factor accounted for 27.1% of the total variance, below the commonly used 50% threshold. This finding did not indicate a dominant single-factor structure; however, Harman's single-factor test provides only a limited assessment of common method bias and cannot rule out potential method-related effects.

Results

The findings obtained within the scope of the study are presented below through tables and figures. Preliminary distributional analyses indicated non-normality in the perceived bullying variable and evidence of multivariate non-normality based on Mardia's coefficient. Therefore, the CFA and SEM results reported below were estimated using robust maximum likelihood.

According to Table 2, the fit indices of the four-factor measurement model demonstrated an acceptable fit to the data. The χ^2/df ratio was below the recommended threshold of 3.00, the CFI and TLI values exceeded 0.90, and the RMSEA and SRMR values indicated good model fit.

As shown in Table 3, all observed indicators loaded significantly on their respective latent constructs, with standardized factor loadings ranging from 0.599 to 0.855. All loadings exceeded the recommended threshold of 0.50, supporting the adequacy of the measurement model and indicator reliability.

As shown in Table 4, Composite Reliability (CR) values ranged from 0.879 to 0.936, indicating good internal consistency for all latent constructs. Similarly, McDonald's omega coefficients ranged from 0.877 to 0.940, further supporting reliability. AVE values ranged from 0.513 to 0.617, exceeding the recommended threshold of 0.50 and supporting convergent validity. In addition, the maximum HTMT values ranged from 0.181 to 0.581, all of which were below the recommended cutoff value of 0.85, providing evidence of adequate discriminant validity among the constructs.

According to Table 5, the mean score for physical activity enjoyment was 5.99 (SD = 1.23), whereas the mean scores were 4.28 (SD = 0.83) for school satisfaction, 4.43 (SD = 0.77) for physical education class happiness, and 1.57 (SD = 0.93) for perceived bullying in physical education classes. Pearson correlation analysis revealed that physical activity enjoyment was positively associated with school satisfaction ($r = .358, p < .001$) and physical education class happiness ($r = .529, p < .001$), whereas it was negatively associated with perceived bullying ($r = -.157, p < .001$). School satisfaction was positively associated with

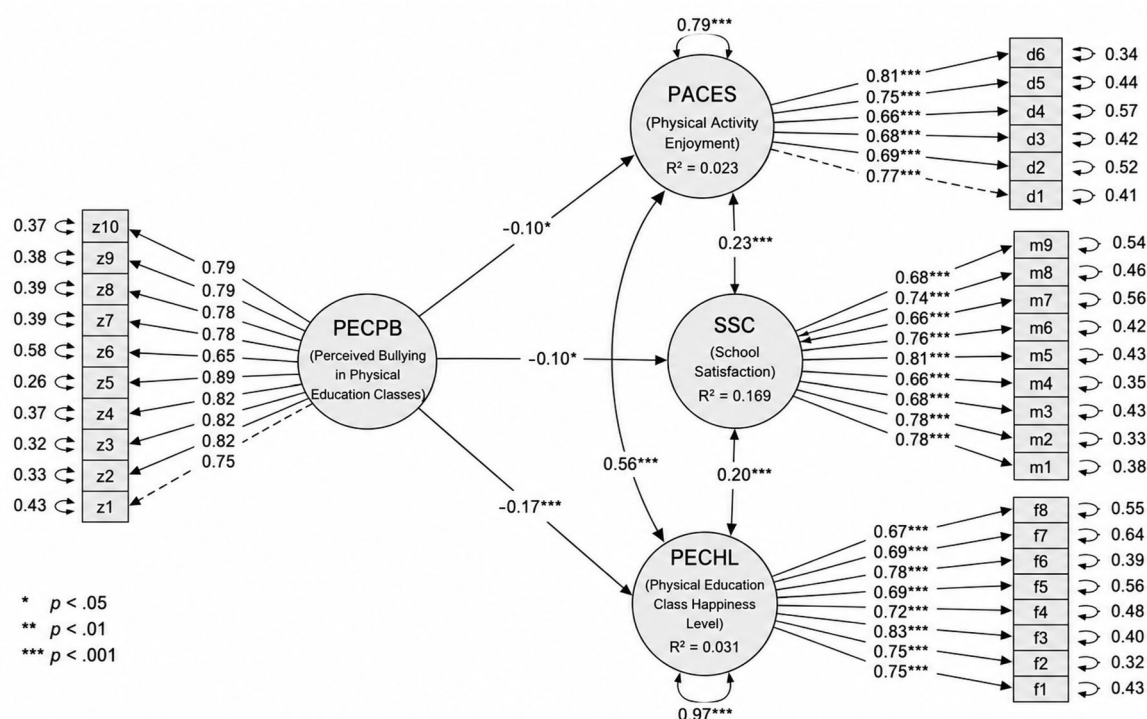


Fig. 1 Structural equation model of the associations among PECPB, PACES, PECHL, and SSC. Note. Standardized parameter estimates are presented. Circles represent latent constructs and rectangles represent observed indicators. Solid single-headed arrows indicate standardized structural regression paths, whereas the curved double-headed arrow represents the freely estimated covariance between the two parallel mediating latent constructs (PACES and PECHL) and does not indicate a directional structural relationship. The values displayed inside the endogenous latent constructs indicate the proportion of explained variance (R^2). Statistical significance levels for the structural path coefficients are indicated as follows: $p < .05$, $p < .01$, and $p < .001$. PECPB = Perceived Bullying in Physical Education Classes; PACES = Physical Activity Enjoyment Scale; PECHL = Physical Education Class Happiness Level Scale; SSC = School Satisfaction Scale for Children

Table 5 Descriptive statistics, Pearson correlation coefficients, and multicollinearity diagnostics for the study variables

Variables	PACES	SSC	PECHL	PECPB	M	SD	Tolerance	VIF
PACES	-	0.358**	0.529**	-0.157**	5.99	1.23	0.683	1.463
SSC	-	-	0.343**	-0.169**	4.28	0.83	0.830	1.205
PECHL	-	-	-	-0.181**	4.43	0.77	0.687	1.456
PECPB	-	-	-	-	1.57	0.93	0.952	1.050

PACES Physical Activity Enjoyment Scale, SSC School Satisfaction Scale for Children, PECHL Physical Education Class Happiness Level Scale, PECPB Perceived Bullying in Physical Education Classes

** $p < .001$

physical education class happiness ($r = .343$, $p < .001$) and negatively associated with perceived bullying ($r = -.169$, $p < .001$). Likewise, physical education class happiness was negatively associated with perceived bullying ($r = -.181$, $p < .001$). Furthermore, tolerance values ranged from 0.683 to 0.952 and VIF values ranged from 1.050 to 1.463, indicating that multicollinearity was not a concern.

Table 6 presents the standardized direct, indirect, and total associations estimated in the structural equation model. Perceived bullying in physical education classes was negatively associated with physical activity enjoyment ($\beta = -0.157$, $SE = 0.048$, $z = -3.311$, $p < .001$, 95% CI $[-0.252, -0.071]$) and physical education class happiness ($\beta = -0.181$, $SE = 0.046$, $z = -3.911$, $p < .001$, 95% CI

$[-0.275, -0.096]$). In turn, both physical activity enjoyment ($\beta = 0.237$, $SE = 0.063$, $z = 3.790$, $p < .001$, 95% CI $[0.116, 0.359]$) and physical education class happiness ($\beta = 0.201$, $SE = 0.056$, $z = 3.585$, $p < .001$, 95% CI $[0.095, 0.314]$) were positively associated with school satisfaction. A small but statistically significant negative direct association was also observed between perceived bullying and school satisfaction ($\beta = -0.096$, $SE = 0.047$, $z = -2.030$, $p = .042$, 95% CI $[-0.192, -0.007]$).

The indirect associations were statistically significant for both mediating pathways. The indirect association between perceived bullying and school satisfaction through physical activity enjoyment was significant ($\beta = -0.037$, $SE = 0.014$, $z = -2.758$, $p = .006$, 95% CI $[-0.070,$

Table 6 Structural model estimates

Direct effects					
Path	Standardized β	SE	z	p	95% CI
PECPB $\rightarrow$ PACES	-0.157	0.048	-3.311	< 0.001	-0.252 to -0.071
PECPB $\rightarrow$ PECHL	-0.181	0.046	-3.911	< 0.001	-0.275 to -0.096
PECPB $\rightarrow$ SSC	-0.096	0.047	-2.030	0.042	-0.192 to -0.007
PACES $\rightarrow$ SSC	0.237	0.063	3.790	< 0.001	0.116 to 0.359
PECHL $\rightarrow$ SSC	0.201	0.056	3.585	< 0.001	0.095 to 0.314
Indirect effects					
Path	Standardized β	SE	z	p	95% CI
PECPB $\rightarrow$ PACES $\rightarrow$ SSC	-0.037	0.014	-2.758	0.006	-0.070 to -0.016
PECPB $\rightarrow$ PECHL $\rightarrow$ SSC	-0.036	0.014	-2.560	0.010	-0.073 to -0.015
Total effect					
Path	Standardized β	SE	z	p	95% CI
PECPB $\rightarrow$ SSC	-0.169	0.050	-3.416	< 0.001	-0.268 to -0.075
Explained variance					
Endogenous latent construct	R^2				
SSC	0.169				
PACES	0.023				
PECHL	0.031				

PACES Physical Activity Enjoyment Scale, SSC School Satisfaction Scale for Children, PECHL Physical Education Class Happiness Level Scale, PECPB Perceived Bullying in Physical Education Classes

-0.016)), as was the indirect association through physical education class happiness ($\beta = -0.036$, $SE = 0.014$, $z = -2.560$, $p = .010$, 95% CI [-0.073, -0.015]). The total association between perceived bullying and school satisfaction was also statistically significant ($\beta = -0.169$, $SE = 0.050$, $z = -3.416$, $p < .001$, 95% CI [-0.268, -0.075]).

The structural model explained 16.9% of the variance in school satisfaction ($R^2 = 0.169$), whereas perceived bullying accounted for 2.3% of the variance in physical activity enjoyment ($R^2 = 0.023$) and 3.1% of the variance in physical education class happiness ($R^2 = 0.031$). These findings indicate that although the estimated associations reached statistical significance, the explained variance for the mediating variables was relatively small.

Figure 1 illustrates the final structural equation model with standardized parameter estimates. All hypothesized structural paths were statistically significant and were consistent with the results presented in Table 6.

Discussion

This study examined the associations between perceived bullying in physical education classes and school satisfaction among middle school students, with physical activity enjoyment and physical education class happiness tested as parallel latent mediators. The findings indicated that perceived bullying was negatively associated with school satisfaction both directly and indirectly through lower physical activity enjoyment and lower physical education class happiness. However, the magnitude of these associations was modest. The model explained 16.9% of the variance in school satisfaction, whereas perceived bullying accounted for only 2.3% of the variance in physical activity enjoyment and 3.1% of the variance in physical education class happiness. Accordingly, these findings should be interpreted as statistically significant but practically modest associations rather than as evidence of strong or causal effects.

The negative association between perceived bullying in physical education classes and school satisfaction is consistent with previous studies demonstrating that bullying victimization is associated with lower school well-being, weaker school belonging, and lower life and school satisfaction [35, 36, 38, 44, 53]. From a pediatric health perspective, this finding is important because bullying represents not only an educational or disciplinary concern but also a significant risk factor for child and adolescent health. Previous research has consistently linked bullying to psychological distress, anxiety, depressive symptoms, somatic complaints, sleep disturbances, and broader impairments in psychosocial functioning [4, 5, 32–34, 54, 55]. Within this context, physical education classes constitute a distinctive learning environment in which peer evaluation, body visibility, physical performance, and social comparison are particularly salient [16, 17]. Consequently, experiences such as exclusion, teasing, humiliation, or peer aggression may undermine students' perceptions of safety, competence, peer acceptance, and belonging [18, 19]. These findings suggest that bullying in physical education should not be viewed solely as a classroom management issue but also as an important component of school health policies and pediatric prevention strategies aimed at promoting children's psychosocial well-being.

The findings further indicated that perceived bullying was negatively associated with physical activity enjoyment. This association is consistent with Self-Determination Theory, which proposes that supportive social environments facilitate the satisfaction of the basic psychological needs for competence, autonomy, and relatedness, thereby promoting positive motivation and well-being [27, 28]. Bullying may threaten these psychological needs by causing students to feel socially rejected, physically inadequate, or unsafe during movement-based

activities. Under such circumstances, students may perceive physical activity as a context characterized by embarrassment or threat rather than enjoyment. This interpretation is consistent with previous research demonstrating that perceived competence, peer support, motivational climate, and positive social experiences are important correlates of enjoyment in physical education and physical activity [29–31, 56].

Nevertheless, the proportion of variance explained in physical activity enjoyment was relatively small. Perceived bullying accounted for only 2.3% of the variance in physical activity enjoyment, indicating that although bullying was statistically associated with enjoyment, most of the variability in enjoyment is likely explained by other factors, including perceived competence, teacher support, activity type, autonomy-supportive teaching, peer climate, previous sport experiences, body image, and individual interests. Therefore, perceived bullying should not be regarded as the primary determinant of students' enjoyment of physical activity but rather as one of several potential risk factors associated with this outcome.

Perceived bullying was also negatively associated with physical education class happiness. This association was slightly stronger than that observed for physical activity enjoyment, suggesting that bullying may be more closely related to the emotional climate of physical education classes than to enjoyment of physical activity in general. Physical education class happiness may reflect a more immediate and context-specific emotional experience, encompassing the extent to which students feel comfortable, accepted, and emotionally safe during class [57]. From a pediatric health perspective, such emotional experiences are important because repeated negative emotional experiences at school may contribute over time to stress-related symptoms, avoidance behaviors, and poorer psychosocial adjustment.

Nevertheless, the proportion of variance explained in physical education class happiness was also small. Perceived bullying accounted for only 3.1% of the variance in this construct. Accordingly, although bullying was statistically associated with physical education class happiness, its practical effect size was modest. Students' happiness during physical education classes is likely influenced by numerous factors, including teacher behaviors, classroom climate, inclusive pedagogical practices, peer support, experiences of success, perceived autonomy, and physical competence [58, 59].

Both physical activity enjoyment and physical education class happiness were positively associated with school satisfaction. These findings are consistent with previous studies showing that positive experiences in physical education and physical activity are associated with greater school engagement, subjective well-being, and school satisfaction [22–26, 42]. The results suggest

that positive emotional experiences during physical education may be reflected in students' broader evaluations of their school experience. However, given the cross-sectional design of the study, these findings should not be interpreted as indicating that enjoyment or class happiness causes greater school satisfaction. It is equally plausible that students who are generally more satisfied with school perceive physical education experiences more positively.

The mediation analyses indicated that perceived bullying was indirectly associated with school satisfaction through both physical activity enjoyment and physical education class happiness. Although both indirect associations were statistically significant, their magnitudes were small. These findings suggest that the association between perceived bullying and school satisfaction may be partially related to reductions in positive emotional and motivational experiences within the physical education context. However, the small magnitude of the indirect associations indicates that these mediating pathways explain only a limited proportion of the overall association.

These findings are partially consistent with Self-Determination Theory. Bullying may undermine the satisfaction of the basic psychological needs for relatedness and competence, which in turn may be associated with lower physical activity enjoyment and lower physical education class happiness. However, because basic psychological need satisfaction was not directly measured in the present study, Self-Determination Theory should be regarded as the theoretical framework guiding the interpretation of the findings rather than as a directly tested explanatory mechanism.

The findings also highlight the importance of distinguishing statistical significance from clinical or practical significance. Although all structural paths were statistically significant, the low proportion of explained variance for the mediating variables ($R^2 = 0.023\text{--}0.031$) indicates that the practical magnitude of these associations is modest. Accordingly, the findings should be interpreted with caution, recognizing that perceived bullying is likely only one of many individual-, family-, school-, and peer-related factors associated with physical activity enjoyment and physical education class happiness.

From a pediatric and school health perspective, even modest associations may have meaningful implications at the population level because bullying is both common and preventable and is associated with multiple dimensions of child and adolescent health [4, 5, 32–34, 55]. Physical education classes may represent a particularly strategic setting for prevention, as they combine physical activity, peer interaction, body visibility, and teacher-supervised group activities [40]. Accordingly, school-based anti-bullying policies should explicitly

include physical education settings rather than focusing solely on classrooms, hallways, or online environments. Physical education teachers, school nurses, school counselors, and school administrators may benefit from coordinated protocols to identify bullying, support affected students, and promote an inclusive and psychologically safe learning environment.

From a practical perspective, the findings suggest that physical education programs should prioritize not only motor skill development and physical fitness but also psychological safety, inclusive teaching practices, and mutual respect among peers. Teachers should avoid instructional practices that publicly compare students, expose them to embarrassment, or increase the likelihood of social exclusion. Examples include highly visible elimination games, publicly ranking students according to performance, or consistently allowing peers to select teams. Accordingly, pedagogical strategies that emphasize cooperation, differentiated achievement, autonomy support, and positive peer interactions may be relevant to fostering more inclusive and psychologically safe physical education environments, although the present findings do not establish their causal effects. These recommendations are consistent with a school health perspective that views physical education not only as a context for physical development but also as an important setting for promoting psychosocial well-being.

Nevertheless, the findings should not be overinterpreted. The proposed model explained only a limited proportion of the variance in school satisfaction, and several important variables were not included in the model. School satisfaction is likely influenced by a broader range of factors, including teacher support, school climate, family support, socioeconomic background, academic achievement, school belonging, perceived competence, psychological safety, and peer acceptance [38, 53, 60–62]. The modest explanatory power of the present model suggests that future research should evaluate more comprehensive models incorporating individual, interpersonal, and institutional determinants simultaneously.

Overall, this study demonstrated that perceived bullying in physical education classes was associated with lower school satisfaction and that this association was partially explained by lower physical activity enjoyment and lower physical education class happiness. The study extends previous research by examining these associations within a latent structural equation modeling framework and by providing evidence of adequate discriminant validity between the two affective constructs. Nevertheless, the findings should be interpreted with caution. Although all structural paths reached statistical significance, the modest proportion of explained variance for the mediating variables ($R^2 = 0.023$ – 0.031) indicates that perceived bullying is only one of many factors associated

with children's affective experiences during physical education classes. Moreover, the cross-sectional design precludes causal inference, and school satisfaction is likely associated with numerous additional influences operating at the individual, family, peer, teacher, and school levels.

Limitations

Several limitations should be considered when interpreting the findings of this study. First, the study employed a cross-sectional correlational design, which precludes establishing temporal ordering or causal relationships. Although perceived bullying was specified as the exogenous construct based on the theoretical framework, alternative directional explanations are also plausible. For example, students with lower school satisfaction or poorer well-being may perceive the physical education environment more negatively or may be more sensitive to peer interactions. Longitudinal and experimental studies are needed to clarify the directionality of these associations. Second, all variables were measured simultaneously using self-report questionnaires completed by the same participants. This design may increase the risk of common method variance and perceptual bias. Although procedural remedies were implemented and Harman's single-factor test did not indicate a dominant single-factor structure, the test provides only a limited assessment of common method bias and cannot rule out potential method-related effects. Therefore, shared measurement method or respondent characteristics may have contributed to the observed associations. Future studies should incorporate multi-informant data, such as teacher reports, peer nominations, parent reports, school records, or observational measures, and consider more rigorous approaches to assessing method effects. Third, participants were recruited using convenience sampling and were limited to middle school students from Malatya, Türkiye. Because the sample was not selected using a probability-based sampling strategy and was drawn from a single geographical setting, it should not be considered representative of the broader middle school student population in Türkiye. Regional differences in socioeconomic conditions, school characteristics, educational environments, and peer cultures may influence students' experiences of bullying, physical education, and school satisfaction. Consequently, the generalizability of the present findings to middle school students across Türkiye, as well as to students from different countries, age groups, or educational systems, is limited. Future studies should use probability-based or stratified sampling strategies and recruit larger samples from multiple geographical regions and diverse school contexts in Türkiye. Fourth, the observed associations were modest. Although several structural paths reached statistical

significance, perceived bullying explained only a small proportion of the variance in physical activity enjoyment and physical education class happiness. The relatively large sample size may have contributed to the statistical significance of associations with small practical effect sizes. Accordingly, the findings should not be interpreted as indicating strong clinical or practical effects. Fifth, several potentially important variables were not included in the proposed model. Teacher support, school climate, peer belonging, academic achievement, socioeconomic status, family support, perceived competence, body image, and psychological safety may all influence both school satisfaction and students' experiences in physical education. The omission of these variables increases the possibility of residual confounding and omitted-variable bias. Finally, although physical activity enjoyment and physical education class happiness demonstrated adequate discriminant validity in the present study, they remain conceptually related constructs. Future research should further examine the stability and distinctiveness of these constructs across different samples and cultural contexts to determine whether they consistently function as separate mediating variables.

Conclusion

This study examined the associations between perceived bullying in physical education classes and school satisfaction among middle school students, with physical activity enjoyment and physical education class happiness tested as parallel latent mediators. The findings indicated that perceived bullying was negatively associated with school satisfaction and that this association was partially explained by lower physical activity enjoyment and lower physical education class happiness. However, the observed effects, particularly those involving the mediating variables, were modest.

The findings suggest that bullying in physical education should be regarded not only as an educational concern but also as an important issue for child health and school health. Physical education classes constitute socially visible and emotionally salient settings in which peer aggression may be associated with students' sense of safety, enjoyment, happiness, and broader school well-being. Nevertheless, because of the cross-sectional design, no causal inferences can be drawn. Longitudinal and multi-informant studies are needed to clarify the direction of these associations and to better establish their clinical and practical significance.

From a practical perspective, the findings underscore the relevance of anti-bullying strategies, inclusive teaching practices, and psychologically safe physical education environments within school health and physical education contexts; however, the cross-sectional design does not permit conclusions regarding the causal effects of

such strategies on school satisfaction. These findings suggest that PE settings may warrant consideration within broader school-based bullying prevention initiatives and that collaboration among PE teachers, school counselors, school administrators, families, and child health professionals may be relevant to promoting psychologically safe school environments.

Abbreviations

PACES	Physical Activity Enjoyment Scale
SSC	School Satisfaction Scale for Children
PECHL	Physical Education Class Happiness Level Scale
PECPB	Perceived Bullying in Physical Education Classes
CI	Confidence Interval
M	Mean
SD	Standard Deviation
χ^2	Chi-square
df	Degree of Freedom
CFI	Comparative Fit Index
TLI	Tucker–Lewis Index
NFI	Bentler–Bonett Normed Fit Index
IFI	Bollen's Incremental Fit Index
RMSEA	Root Mean Square Error of Approximation
SRMR	Standardized Root Mean Square Residual
B	Beta coefficient

Authors' contributions

MG and MA conceptualized the study. MG, MA, HT, GPG, EK and SA contributed to data collection. MA and HT conducted the statistical analyses and interpreted the data. MG and MA led the writing of the manuscript. GPG, EK and SA critically revised the manuscript for important intellectual content. All authors read and approved the final manuscript.

Funding

The authors would like to thank the Scientific Research Projects Coordination Unit (BAP) of İnönü University for supporting this research. This study was funded by İnönü University BAP under Project No. SBA-2026-4820.

Data availability

The datasets used and/or analysed during the present study are available from the corresponding author upon reasonable request.

Declarations

Ethics approval and consent to participate

This study received ethical approval by the decision of İnönü University Social and Human Sciences Scientific Research and Publication Ethics Committee dated November 20, 2025, and numbered 32. In addition, written informed consent was obtained from each school and each student's parent or legal guardian before data collection. All methods were performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

Author details

¹İnönü University, Malatya, Türkiye, Turkey

²Munzur University, Tunceli, Türkiye, Turkey

³Malatya Turgut Özal University, Malatya, Türkiye, Turkey

⁴Faculty of Sport Sciences, Department of Physical Education and Sports Teaching, İnönü University, Malatya, Türkiye, Turkey

Received: 17 June 2026 / Accepted: 17 July 2026

Published online: 29 July 2026

References

- Guhn M, Gadermann AM, Almas A, Schonert-Reichl KA, Hertzman C. Associations of teacher-rated social, emotional, and cognitive development in kindergarten to self-reported wellbeing, peer relations, and academic test scores in middle childhood. *Early Child Res Q*. 2016;35:76–84. <https://doi.org/10.1016/j.jecresq.2015.12.027>.
- Iskandar Y. The impact of emotional intelligence, teacher–student relationships, parental involvement, and classroom climate on preschoolers' social-emotional development. *Proyeksi: Jurnal Psikologi*. 2024;19(1):26–38. <https://doi.org/10.30659/jp.19.1.26-38>.
- Duran NS, Lleras CL. Neighborhood disadvantage, peer acceptance, and sense of belonging among middle school students. *Child Indic Res*. 2025;18(4):1905–26. <https://doi.org/10.1007/s12187-025-10264-4>.
- World Health Organization. Mental health of adolescents. Geneva: World Health Organization; 2025 Sep 1 [cited 2026 Jul 1]. Available from: <https://www.who.int/news-room/fact-sheets/detail/adolescent-mental-health>.
- World Health Organization Regional Office for Europe. Health Behaviour in School-aged Children (HBSC) study: Highlights. Copenhagen: WHO Regional Office for Europe; 2024 [cited 2026 Jul 1]. Available from: [https://www.who.int/europe/initiatives/health-behaviour-in-school-aged-children-\(hbsc\)-study/highlights](https://www.who.int/europe/initiatives/health-behaviour-in-school-aged-children-(hbsc)-study/highlights).
- Cavioni V, Grazzani I, Ornaghi V, Agliati A, Pepe A. Adolescents' mental health at school: The mediating role of life satisfaction. *Front Psychol*. 2021;12:720628. <https://doi.org/10.3389/fpsyg.2021.720628>.
- Carvalho M, Branquinho C, Moraes B, Cerqueira A, Tomé G, Noronha C, et al. Positive youth development, mental stress and life satisfaction in middle school and high school students in Portugal: Outcomes on stress, anxiety and depression. *Children*. 2024;11(6):681. <https://doi.org/10.3390/children11060681>.
- Simonsen IE, Rundmo T. The role of school identification and self-efficacy in school satisfaction among Norwegian high-school students. *Soc Psychol Educ*. 2020;23(6):1565–86. <https://doi.org/10.1007/s11218-020-09595-7>.
- Gómez-Baya D, García-Moro FJ, Muñoz-Silva A, Martín-Romero N. School satisfaction and happiness in 10-year-old children from seven European countries. *Children*. 2021;8(5):370. <https://doi.org/10.3390/children8050370>.
- Obermeier R, Hagenauer G, Gläser-Zikuda M. Who feels good in school? Exploring profiles of scholastic well-being in secondary-school students and the effect on achievement. *Int J Educational Res Open*. 2021;2:100061. <https://doi.org/10.1016/j.jiedro.2021.100061>.
- Wu YJ, Becker M. Association between school contexts and the development of subjective well-being during adolescence: A context-sensitive longitudinal study of life satisfaction and school satisfaction. *J Youth Adolesc*. 2023;52(5):1039–57. <https://doi.org/10.1007/s10964-022-01727-w>.
- Ayllón-Salas P, Fernández-Martín FD. The role of social and emotional skills on adolescents' life satisfaction and academic performance. *Psychol Soc Educ*. 2024;16(1):49–56. <https://doi.org/10.21071/pse.v16i1.16625>.
- Pedditz ML. School satisfaction and self-efficacy in adolescents and intention to drop out of school. *Int J Environ Res Public Health*. 2024;21(1):111. <https://doi.org/10.3390/ijerph21010111>.
- Telef BB, Arslan G, Mert A, Kalafat S. The mediation effect of school satisfaction in the relationship between teacher support, positive affect and life satisfaction in adolescents. *Educational Res Reviews*. 2015;10(12):1633–40. <https://doi.org/10.5897/ERR2015.2282>.
- Azpiazu Izaguirre L, Rodríguez Fernández A, Fernández Zabala A. Perceived academic performance explained by school climate, positive variables and life satisfaction. *Br J Educ Psychol*. 2022;98:318–32. <https://doi.org/10.1111/bjep.12557>.
- Åsebø EKS, Løvøll HS, Krumsvik RJ. Students' perceptions of visibility in physical education. *Eur Phys Educ Rev*. 2022;28(1):151–68. <https://doi.org/10.1177/1356336X211025874>.
- Barker D, Varea V, Bergentoft H, Schubring A. Body image in physical education: a narrative review. *Sport Educ Soc*. 2023;28(7):824–41. <https://doi.org/10.1080/13573322.2022.2076665>.
- Zhou Z, Zhou X, Shen G, Khairani AZ, Saibon J. Correlates of bullying behavior among children and adolescents in physical education: A systematic review. *Psychol Res Behav Manage*. 2023;16:5041–51. <https://doi.org/10.2147/PRBM.S441619>.
- Wei M, Graber KC. Bullying and physical education: a scoping review. *Kinesiol Rev*. 2023;12(3):217–34. <https://doi.org/10.1123/kr.2022-0031>.
- Gómez-Paniagua S, Castillo-Paredes A, Galán-Arroyo C, Rojo-Ramos J. Life satisfaction among Spanish children and adolescents participating in physical education. *Front Public Health*. 2024;12:1370118. <https://doi.org/10.3389/fpuh.2024.1370118>.
- Yurdakul HÖ. Investigation of the relationship between secondary school students' physical activity attitudes and school life satisfaction. *Educational Policy Anal Strategic Res*. 2020;15(3):426–37. <https://doi.org/10.29329/epasr.2020.270.20>.
- Gray S, García Bengoechea E, Lorenzino L. Not academic enough? Enjoyment of physical education and the arts and school engagement in early and middle adolescence. *Retos*. 2019;35:301–9.
- Berki T, Csányi T, Tóth L. Associations of physical activity and physical education enjoyment with self-concept domains among Hungarian adolescents. *BMC Psychol*. 2024;12(1):449. <https://doi.org/10.1186/s40359-024-01953-w>.
- Rojo-Ramos J, González-Becerra MJ, Gómez-Paniagua S, Adsuar JC. Satisfaction with physical activity among students in the last cycle of primary education in Extremadura. *Int J Environ Res Public Health*. 2022;19(11):6702. <https://doi.org/10.3390/ijerph19116702>.
- Frikha M, Chaâri N, Mezghanni N, Hassan AK, Alhumaid MM, Alibrahim MS. Enhancing institutional integration and enjoyment among Saudi female physical education students: Exploring the mediation of motivation and psychological needs satisfaction. *Front Educ*. 2024;9:1391716. <https://doi.org/10.3389/educ.2024.1391716>.
- Leisterer S, Gramlich L. Having a positive relationship to physical activity: Basic psychological need satisfaction and age as predictors for students' enjoyment in physical education. *Sports*. 2021;9(7):90. <https://doi.org/10.3390/sports9070909>.
- Ryan RM, Deci EL. Self-determination theory. *Encyclopedia of Quality of Life and Well-Being Research*. Cham: Springer; 2024. pp. 6229–35.
- Fernández-Espinola C, Almagro BJ, Tamayo-Fajardo JA, Sáenz-López P. Complementing the self-determination theory with the need for novelty: Motivation and intention to be physically active in physical education students. *Front Psychol*. 2020;11:1535. <https://doi.org/10.3389/fpsyg.2020.01535>.
- Navarro-Patón R, Rodríguez-Negro J, Muño-Piñero M, Mecías-Calvo M. Gender and educational stage differences in motivation, basic psychological needs and enjoyment: Evidence from physical education classes. *Children*. 2024;11(12):1503. <https://doi.org/10.3390/children11121503>.
- Huhtiniemi M, Sääkslahti A, Tolvanen A, Watt A, Jaakkola T. The relationships among motivational climate, perceived competence, physical performance, and affects during physical education fitness testing lessons. *Eur Phys Educ Rev*. 2022;28(3):594–612. <https://doi.org/10.1177/1356336X211063568>.
- Kruse F, Büchel S, Brühwiler C. Longitudinal effects of basic psychological need support on the development of intrinsic motivation and perceived competence in physical education. A multilevel study. *Front Psychol*. 2024;15:1393966. <https://doi.org/10.3389/fpsyg.2024.1393966>.
- Menesini E, Salmivalli C. Bullying in schools: The state of knowledge and effective interventions. *Psychol Health Med*. 2017;22(sup1):240–53. <https://doi.org/10.1080/13548506.2017.1279740>.
- Han ZY, Ye ZY, Zhong BL. School bullying and mental health among adolescents: A narrative review. *Translational Pediatr*. 2025;14(3):463–72. <https://doi.org/10.21037/tp-2024-512>.
- Centers for Disease Control and Prevention. Bullying. Atlanta (GA): Centers for Disease Control and Prevention. 2024 Oct 28 [cited 2026 Jul 1]. Available from: <https://www.cdc.gov/youth-violence/about/about-bullying.html>.
- Katsantonis I, Barrado B, McLellan R, Gimenez G. Subjective well-being and bullying victimisation: A cross-national study of adolescents in 64 countries and economies. *Child Indic Res*. 2024;17(4):1563–85. <https://doi.org/10.1007/s12187-024-10147-0>.
- Yang Y, Zheng C, Xie M, Yuan S, Zeng Y, Zhou M, et al. Bullying victimization and life satisfaction among rural left-behind children in China: A cross-sectional study. *Front Pediatr*. 2021;9:671543. <https://doi.org/10.3389/fped.2021.671543>.
- Oriol X, Miranda R, Amutio A. Correlates of bullying victimization and sexual harassment: Implications for life satisfaction in late adolescents. *J Sch Nurs*. 2021;37(3):202–8. <https://doi.org/10.1177/1059840519863845>.
- Seon Y, Smith-Adcock S. School belonging, self-efficacy, and meaning in life as mediators of bullying victimization and subjective well-being in adolescents. *Psychol Sch*. 2021;58(9):1753–67. <https://doi.org/10.1002/pits.22534>.
- Doumas DM, Midgett A. Sense of school belonging as a mediator of the relationship between witnessing bullying and internalizing symptoms. *Int J Environ Res Public Health*. 2024;21(7):873. <https://doi.org/10.3390/ijerph21070873>.
- Rico-González M, Martínez-Merino N, Ardigo LP, Smaland Goth U. Using physical education interventions to prevent bullying at school: a systematic

- review. *J Res Child Educ.* 2025;39(1):128–50. <https://doi.org/10.1080/02568543.2024.2369138>.
41. Uğraş S, Sağın AE, Yücekaya MA, Temel C, Mergan B, Couto N, et al. Perceived bullying in physical education classes, school burnout, and satisfaction: A contribution to understanding children's school well-being. *Healthcare.* 2025;13(11):1285. <https://doi.org/10.3390/healthcare13111285>.
 42. Uğraş S, Güllü M. Investigation of the relationship between middle school students' happiness levels in physical education classes and life satisfaction: A structural equation model. *J History School.* 2020;44:583–99. <https://doi.org/10.29228/Joh40276>.
 43. Mullen SP, Olson EA, Phillips SM, Szabo AN, Wójcicki TR, Mailey EL, et al. Measuring enjoyment of physical activity in older adults: Invariance of the physical activity enjoyment scale (PACES) across groups and time. *Int J Behav Nutr Phys Activity.* 2011;8(1):103. <https://doi.org/10.1186/1479-5868-8-103>.
 44. Özkurt B, Küçükbiş HF, Eskiler E. Fiziksel Aktivitelerden Keyif Alma Ölçeği (FAKÖ): Türk kültürüne uyarılma, geçerlik ve güvenilirlik çalışması. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi.* 2022;10(1):21–37. <https://doi.org/10.18506/anemon.976300>.
 45. Uğraş S, Serbes Ş. Beden eğitimi dersi mutluluk düzeyi ölçeği geçerlik ve güvenilirlik çalışması. *J Global Sport Educ Res.* 2019;2(2):1–10.
 46. Randolph JJ, Kangas M, Ruokamo H. The preliminary development of the Children's Overall Satisfaction with Schooling Scale (COSSS). *Child Indic Res.* 2009;2(1):79–93. <https://doi.org/10.1007/s12187-008-9027-1>.
 47. Telef B. Turkish adaptation study of Overall School Satisfaction Scale for Children / Çocuklar İçin Kapsamlı Okul Doyumu Ölçeği'nin Türkçeye uyarılma çalışması. *Eğitimde Kuram ve Uygulama.* 2014;10(2):478–90. <https://doi.org/10.17244/eku.43152>.
 48. Kim HY. Statistical notes for clinical researchers: Assessing normal distribution (2) using skewness and kurtosis. *Restor Dentistry Endodontics.* 2013;38(1):52–4. <https://doi.org/10.5395/rde.2013.38.1.52>.
 49. Mishra P, Pandey CM, Singh U, Gupta A, Sahu C, Keshri A. Descriptive statistics and normality tests for statistical data. *Ann Card Anaesth.* 2019;22(1):67–72. https://doi.org/10.4103/aca.ACA_157_18.
 50. Tabachnick BG, Fidell LS. Using multivariate statistics. 7th ed. Boston, MA: Allyn & Bacon; 2019.
 51. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis. 7th ed. Upper Saddle River, NJ: Pearson Education; 2014.
 52. Preacher KJ, Hayes AF. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behav Res Methods.* 2008;40(3):879–91. <https://doi.org/10.3758/BRM.40.3.879>.
 53. Lázaro-Visa S, Palomera R, Briones E, Fernández-Fuertes AA, Fernández-Rouco N. Bullied adolescent's life satisfaction: Personal competencies and school climate as protective factors. *Front Psychol.* 2019;10:1691. <https://doi.org/10.3389/fpsyg.2019.01691>.
 54. Ferrara P, Franceschini G, Namazova-Baranova L, Vural M, Mestrovic J, Nigri L, et al. Lifelong negative influence of school violence on children. *J Pediatr.* 2019;215:287–8. <https://doi.org/10.1016/j.jpeds.2019.09.075>.
 55. Haile G, Arockiaraj B, Zablotsky B, Ng AE. Bullying Victimization Among Teenagers: United States, July 2021–December 2023. *NCHS Data Brief.* 2024;514CS354553. <https://doi.org/10.15620/cdc/168510>.
 56. Domville M, Watson PM, Richardson D, Graves LEF. Children's perceptions of factors that influence PE enjoyment: A qualitative investigation. *Phys Educ Sport Pedagogy.* 2019;24(3):207–19. <https://doi.org/10.1080/17408989.2018.1561836>.
 57. Mo W, Saibon JB, Li Y, Li J, He Y. Effects of game-based physical education program on enjoyment in children and adolescents: a systematic review and meta-analysis. *BMC Public Health.* 2024;24:517. <https://doi.org/10.1186/s12889-024-18043-6>.
 58. Adank AM, Van Kann DH, Borghouts LB, Kremers SP, Vos SB. That's what I like! Fostering enjoyment in primary physical education. *Eur Phys Educ Rev.* 2024;30(2):283–301. <https://doi.org/10.1177/1356336X231205686>.
 59. Behzadnia B, Adachi PJC, Deci EL. Are physical education teachers' autonomy-supportive behaviors related to high-school students' actual game-play performance? *Phys Educ Sport Pedagogy.* 2025;1–16. <https://doi.org/10.1080/17408989.2025.2456702>.
 60. Hagenauer G, Wallner-Paschon C, Kuhn C. Austrian students' experiences of supportive relationships with teachers, peers, and parents and the mediating effect of school belonging in the context of their academic and non-academic outcomes. *Z Bildungsforsch.* 2021;11(1):93–116. <https://doi.org/10.1007/s35834-021-00300-y>.
 61. Xu Z, Fang C. The relationship between school bullying and subjective well-being: the mediating effect of school belonging. *Front Psychol.* 2021;12:725542. <https://doi.org/10.3389/fpsyg.2021.725542>.
 62. Zullig KJ, Huebner ES, Patton JM. Relationships among school climate domains and school satisfaction. *Psychol Sch.* 2011;48(2):133–45. <https://doi.org/10.1002/pits.20532>.

Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.