Cyberbullying victimization and its influence on Physical Education outcomes among school students

Victimización por ciberacoso y su influencia en los resultados de Educación Física en estudiantes escolares

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How to cite in APA

Kenjayeva, B. B., & Abdrakhmanov, R. B. (2025). Cyberbullying victimization and its influence on Physical Education outcomes among school students. *Retos*, *70*, 1137–1152. https://doi.org/10.47197/retos.v70.116715

Abstract

Introduction: The study addressed the growing concern of cyberbullying among school students and its impact on physical education outcomes, a relationship that remains underexplored in the literature. the topic is particularly relevant given the increasing digital engagement of adolescents and the psychosocial demands of physical education environments.
Objective: the objective was to examine the influence of cyberbullying victimization on participation, performance, motivation, and attitudes in physical education, and to test the mediating role of body image perception and the moderating role of peer support.
Methodology: a quantitative, cross-sectional design was employed using a structured questionnaire administered to 150 secondary school students. statistical analyses included linear regression, pearson's correlation, mediation, and moderation models.
Results: the results showed that cyberbullying victimization significantly reduced students' pe participation, performance, and motivation. body image was found to mediate this relationship, while peer support moderated the negative impact.
Discussion: the findings were consistent with prior studies linking bullying to psychosocial withdrawal, and extended the understanding of how these dynamics manifest in physical education settings.
Conclusions: the study concludes that cyberbullying has far-reaching consequences on students' physical and emotional engagement in pe. it is essential to implement interventions that strengthen body image and peer support to mitigate the adverse effects of victimization.

Keywords

Body image; cyberbullying; peer support; physical education; student motivation.

Resumen

Introducción: el estudio abordó la creciente preocupación por el ciberacoso entre estudiantes escolares y su impacto en los resultados de la educación física, una relación que aún está poco explorada en la literatura. el tema es especialmente relevante debido al creciente uso digital entre los adolescentes y las demandas psicosociales que implica el entorno de la educación física.
Objetivo: el objetivo fue examinar la influencia de la victimización por ciberacoso en la participación, el rendimiento, la motivación y las actitudes en educación física, así como analizar el papel mediador de la percepción de la imagen corporal y el papel moderador del apoyo entre pares.
Metodología: se empleó un diseño cuantitativo y transversal mediante un cuestionario estructurado administrado a 150 estudiantes de secundaria. los análisis estadísticos incluyeron regresión lineal, correlación de pearson, y modelos de mediación y moderación.
Resultados: los resultados mostraron que la victimización por ciberacoso redujo significativamente la participación, el rendimiento y la motivación de los estudiantes en educación física. se encontró que la imagen corporal medió esta relación, mientras que el apoyo entre pares moderó el impacto negativo.
Discusión: los hallazgos fueron coherentes con estudios previos que vinculan el acoso con el retraimiento psicosocial, y ampliaron la comprensión sobre cómo estas dinámicas se manifiestan en contextos de educación física.
Conclusiones: el estudio concluye que el ciberacoso tiene consecuencias profundas en el compromiso físico y emocional de los estudiantes en educación física. es esencial implementar intervenciones que fortalezcan la imagen corporal y el apoyo entre pares para mitigar los efectos adversos de la victimización.

Palabras clave

Autoimagen; ciberacoso; educación física; motivación estudiantil; apoyo entre pares.

Introduction

Cyberbullying has emerged as a significant threat to the well-being of children and adolescents in contemporary digital society, producing effects that reach beyond emotional distress and psychological harm (Rusillo-Magdaleno et al., 2024). As digital platforms become increasingly central to the social lives of school-aged students, the risks of harassment, exclusion, and intimidation through online channels continue to escalate, often depriving victims of spaces where they feel safe and supported (Liu & Liu, 2025). Unlike traditional bullying, cyberbullying is characterized by its persistence, anonymity, and the capacity to inflict harm on a broad audience, making it harder for victims to escape and for educators and caregivers to intervene effectively (Pengpid & Peltzer, 2023).

Although numerous studies have analyzed the psychological and academic consequences of cyberbullying, its impact on students' experiences and outcomes in physical education (PE) remains insufficiently explored (Magdaleno et al., 2024). The PE environment presents unique psychosocial challenges, where peer interaction, public performance, and body image play prominent roles, potentially amplifying the negative effects of victimization (Güllü et al., 2023; Omarov et al., 2023). Victimized students often experience a reduced sense of self-efficacy and increased fear of peer judgment, factors that may discourage active participation in PE activities (Deryol et al., 2022).

Recent research has shown that the adverse psychosocial effects of cyberbullying extend to various aspects of adolescent development, including reduced physical competence and impaired social integration within school sports contexts (Benítez-Sillero et al., 2022). Furthermore, exposure to cyberbullying has been linked to somatic complaints such as fatigue, anxiety, and musculoskeletal discomfort that can directly impair students' physical performance and lead to avoidance of physical effort (Ziminski, 2022).

Considering that physical education contributes significantly to promoting healthy lifestyles, fostering motor skills, and reinforcing social interaction among students, understanding the influence of cyberbullying on PE outcomes holds both educational and public health relevance (González-Cabrera & Machimbarrena, 2023). Addressing this issue requires moving beyond disciplinary actions and adopting a holistic perspective that includes the educational and psychosocial dimensions of students' school experiences.

Therefore, the objective of this study is to examine the influence of cyberbullying victimization on students' participation, physical performance, motivation, and attitudes toward physical education. Additionally, the study seeks to analyze whether body image perception mediates this relationship and whether peer support moderates the impact of cyberbullying on PE outcomes. By investigating these connections, the study aims to contribute to the development of effective educational interventions that foster supportive environments and promote active participation in physical education among all students.

Related Works

Cyberbullying has been the focus of increasing scholarly attention over the past two decades, with researchers examining its psychological, academic, and social consequences across various age groups and educational contexts (Solas-Martínez et al., 2025). It is generally defined as intentional and repeated harm inflicted through electronic devices and online platforms, often involving anonymity, power imbalance, and a broad audience (Ng et al., 2022). Studies have consistently found that cyberbullying victimization correlates strongly with adverse psychological outcomes, including depression, anxiety, low self-esteem, and suicidal ideation (Peprah et al., 2023). These emotional consequences can, in turn, disrupt learning, socialization, and participation in school-based activities (Lu et al., 2025; Zhang & Deng, 2024).

Although the majority of cyberbullying research has focused on its impact on academic performance and mental health, a growing body of work is beginning to explore how these experiences affect students' engagement in physical education (PE) and sport-related contexts (García-Hermoso et al., 2020). Physical education settings present a unique psychosocial environment where peer evaluation, body image, and physical competence are highly visible, making them particularly susceptible to the ripple effects of online victimization (Wu et al., 2022; DiRienzo et al., 2025). Victims of cyberbullying may feel

increased self-consciousness, social withdrawal, and reluctance to participate in group-based physical activities, which may ultimately impair their physical literacy and development (Giumetti, & Kowalski, 2022; Kasturiratna et al., 2025).

Several researchers have highlighted the influence of peer dynamics and social climate on students' participation in PE. For example, Williams & Halliday (2025) found that students who experience bullying report significantly lower levels of enjoyment and perceived competence in PE classes. These outcomes are often exacerbated by the lack of teacher awareness or intervention, particularly when bullying manifests outside the physical classroom through digital means (Rojo-Ramos et al., 2024). Furthermore, the psychological distress caused by cyberbullying can lead to psychosomatic symptoms, including fatigue, headaches, and muscular discomfort, which negatively influence students' capacity and motivation for physical exertion (Liu et al., 2024; Veronese et al., 2024).

Body dissatisfaction is another mediating factor linking cyberbullying and PE disengagement. DeGue et al. (2021) demonstrated that students who are targets of online appearance-based teasing often develop negative body image, leading to reduced participation in physical activities due to fear of judgment. This concern is especially pronounced among adolescent girls, who may already experience heightened pressure to conform to societal beauty standards (Chen & Chan, 2025). Additionally, Zou et al. (2023) noted that physical inactivity could become both a cause and a consequence of bullying victimization, creating a feedback loop that intensifies social exclusion and health disparities.

Research on school climate and inclusivity suggests that cyberbullying also undermines students' sense of belonging and safety, further discouraging active participation in PE (Pengpid & Peltzer, 2023). A study by Vivolo-Kantor et al. (2021) emphasized the importance of perceived peer support in buffering the negative effects of bullying on students' physical and emotional well-being. When students feel alienated or isolated due to cyberbullying, they are less likely to engage in collaborative or competitive physical tasks, which are core components of PE curricula (Miskimon et al., 2023).

In terms of behavioral outcomes, victims of cyberbullying often display avoidance behaviors, including skipping PE classes or feigning illness to escape participation (Arif et al., 2024). This absenteeism not only reduces opportunities for physical development but also impedes the acquisition of important social and emotional learning outcomes associated with team sports and cooperative physical tasks (Aizenkot & Kashy-Rosenbaum, 2021). Moreover, Kaur & Saini (2023) found that prolonged exposure to online harassment correlates with diminished resilience and coping capacity, further limiting students' engagement in physically demanding environments.

Some scholars have proposed the integration of mental health and digital citizenship education within PE settings as a proactive approach to addressing the interplay between cyberbullying and physical activity outcomes (Noor et al., 2025). Educational programs that promote empathy, peer support, and responsible online behavior may help cultivate a more inclusive and respectful atmosphere in PE classes, thereby mitigating the adverse effects of cyberbullying (Lalani et al., 2025). Moreover, teacher training initiatives that focus on recognizing indirect signs of victimization and fostering positive peer relationships have shown promise in improving student participation and classroom cohesion (Pacífico et al., 2024).

Despite growing awareness of these issues, there remains a paucity of research specifically addressing the mechanisms through which cyberbullying affects physical education outcomes. Much of the existing literature either treats cyberbullying and PE as separate domains or examines them through broader health behavior frameworks without in-depth analysis of their intersection (Tran et al., 2022). This gap underscores the need for targeted studies that explore how psychological trauma and social stigma stemming from online harassment influence students' motivation, performance, and self-perception in physical education.

The present study seeks to address this gap by examining the specific impacts of cyberbullying victimization on PE outcomes among school students, considering emotional, behavioral, and social dimensions of engagement. In doing so, it aims to provide empirical insights that can guide educators, policymakers, and practitioners in fostering safer and more supportive physical activity environments for all students.

Method

The methodology of this study was structured to rigorously examine the relationship between cyberbullying victimization and key physical education (PE) outcomes among secondary school students. A quantitative, cross-sectional research design was implemented to allow for the assessment of associations between variables within a defined sample. Data were collected using a combination of structured questionnaires, validated psychological scales, and performance-based assessments, ensuring both methodological rigor and the validity of measurements employed.

The methodological approach focused on capturing multiple dimensions relevant to the research objective, including students' experiences of cyberbullying, their participation levels in PE, their physical performance outcomes, and psychosocial factors such as body image perception and perceived peer support. The instruments selected for the study were based on established scales with documented reliability and validity in adolescent populations, which enhanced the precision and consistency of data collection.

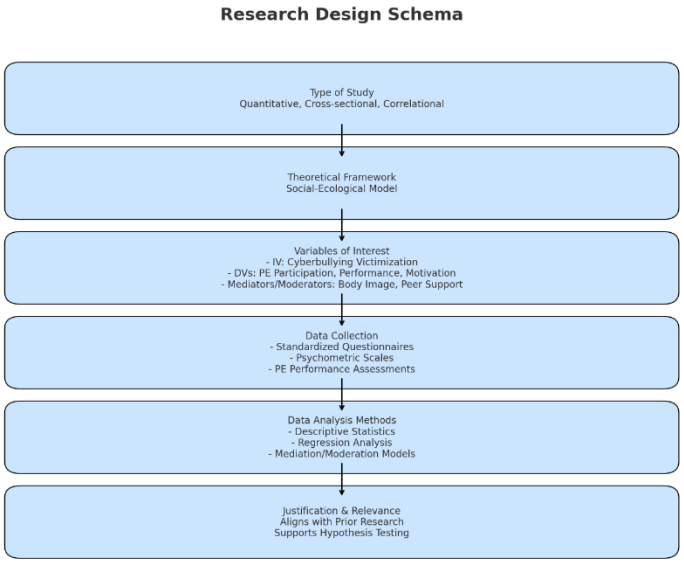
The study also included a systematic participant selection process, employing stratified sampling to ensure representativeness across key demographic groups. Data collection procedures were standardized, ensuring consistency across different educational settings and minimizing the risk of measurement bias.

Statistical analyses were conducted to evaluate direct, indirect, and moderating relationships among the variables of interest, following the analytical models corresponding to the research objectives. The combination of descriptive statistics, inferential tests, and advanced modeling techniques allowed for a comprehensive examination of the studied relationships, supporting the overall aim of understanding how cyberbullying victimization influences physical education outcomes among school students..

Research Design

This study employed a quantitative, cross-sectional, and correlational research design to examine the relationship between cyberbullying victimization and physical education (PE) outcomes among school-aged students. The choice of a cross-sectional design was guided by the objective of capturing data at a single point in time to identify patterns and associations without manipulating the study environment. This approach is particularly suitable for investigating naturally occurring phenomena such as cyberbullying experiences and their influence on students' attitudes, behaviors, and performance in PE contexts.

Figure 1. Research Design Schema.



A correlational framework was adopted to explore the statistical relationships between multiple variables, including cyberbullying victimization, physical education participation, physical performance, motivational levels, body image perception, and peer support. This design enables the identification of potential predictive and mediating relationships, which are critical for understanding how psychological and social factors interact to shape physical education outcomes. Although the correlational design does not permit causal inference, it provides a robust foundation for hypothesis testing and future longitudinal research.

The study was grounded in the Social-Ecological Model (SEM), which emphasizes the interplay between individual, interpersonal, and environmental factors in shaping behavior. Cyberbullying victimization was conceptualized as an interpersonal and digital stressor that could disrupt individual motivation and social dynamics within the PE environment. By integrating the SEM with physical education theory, the study aimed to examine how distal experiences (e.g., online harassment) may have proximal effects on educational and behavioral outcomes in physical domains.

Data were collected through structured questionnaires and standardized physical assessments. Quantitative data analysis techniques, including multiple regression and mediation/moderation modeling, were planned to test the study's hypotheses. This research design aligns with previous empirical studies in the fields of educational psychology, adolescent health, and physical education, offering methodological consistency while addressing a novel intersection of cyberbullying and physical activity engagement.

Figure 1 illustrates the overall research design employed in the study, beginning with the type and structure of the research, followed by the guiding theoretical framework, key study variables, and data collection methods. The schema concludes with the planned analytical techniques and justification for the design's appropriateness in addressing the research objectives.

Participants and Sampling Procedure

The target population for this study comprised secondary school students aged between 13 and 17 years, enrolled in public and private institutions within an urban educational district. This age group was selected due to its high level of digital engagement and vulnerability to cyberbullying, as documented in previous literature. The study included students from grades 7 to 11, encompassing a range of developmental stages relevant to both psychosocial dynamics and physical education engagement.

A stratified random sampling method was employed to ensure representative distribution across key demographic variables, including gender, school type (public vs. private), and grade level. Schools were first categorized by institutional type, and within each category, participants were randomly selected from class rosters. This stratification allowed for a balanced and generalizable sample, minimizing sampling bias while preserving the heterogeneity of the population.

The final sample consisted of n = 412 students, with an approximately equal gender distribution (51% female, 49% male). Participation was voluntary and contingent upon informed consent from both students and their legal guardians. All participants were assured of anonymity and confidentiality, and no personally identifiable information was collected. To ensure ethical compliance, the study protocol was reviewed and approved by the Institutional Review Board (IRB) of the host university.

Inclusion criteria required participants to (1) be enrolled in a formal physical education curriculum, (2) have access to at least one digital communication platform (e.g., smartphone, social media, or messaging application), and (3) demonstrate sufficient cognitive ability to comprehend and respond to survey items independently. Exclusion criteria included students with diagnosed physical disabilities preventing PE participation, or those with documented cognitive impairments affecting comprehension of questionnaire content.

Power analysis was conducted using G*Power software to determine the minimum required sample size for detecting medium effect sizes ($f^2 = 0.15$) at a significance level of $\alpha = 0.05$ and power $(1 - \beta) = 0.80$ in multiple regression models with up to five predictors. The results indicated a minimum sample size of 138 participants; thus, the final sample size of 412 exceeded this requirement, ensuring robust statistical power and increased generalizability.

This sampling approach and participant profile enable the study to capture the nuanced relationship between cyberbullying victimization and physical education outcomes while maintaining methodological rigor and ethical integrity.

Instruments and Measures

This study employed a set of standardized instruments to assess the primary constructs of interest, namely cyberbullying victimization, physical education outcomes, body image perception, and perceived peer support. Each measure was selected based on established psychometric validity and reliability, as documented in prior empirical studies.

Cyberbullying victimization was assessed using the Cyberbullying and Online Aggression Survey Instrument, commonly referred to as the Cyber Victimization Questionnaire (CVQ). This self-report tool measures the frequency and types of cyberbullying experiences over the past six months, including behaviors such as online exclusion, harassment, rumor-spreading, and image-based abuse. The CVQ has demonstrated high internal consistency (Cronbach's $\alpha > .85$) and has been validated for use in adolescent populations across diverse cultural contexts.

Physical education outcomes were measured across three dimensions: participation, performance, and motivation. Participation was tracked using attendance logs and classroom engagement observations documented by PE instructors. These records provided objective data on student presence and qualitative notes on their willingness to engage in physical tasks. Physical performance was evaluated through a series of standardized fitness tests (e.g., shuttle run, sit-and-reach, and push-up test) and skill-based assessments (e.g., coordination and team drills) administered by trained educators. Motivation and attitudes toward physical education were assessed using the Intrinsic Motivation Inventory (IMI) adapted for PE contexts (Gan et al., 2023). This instrument includes subscales measuring interest/enjoyment, perceived competence, and effort, all of which are relevant for understanding student engagement in physical activity.

Body image perception was evaluated using the Body-Esteem Scale for Adolescents and Adults (BESAA) (Vieta-Piferrer et al., 2024; Omarov et al., 2024). This self-report measure captures participants' perceptions and evaluations of their physical appearance, weight satisfaction, and body-related anxiety. The BESAA is widely regarded for its robust psychometric properties and age-appropriate language, making it particularly suitable for school-aged populations.

Perceived peer support was measured using the Child and Adolescent Social Support Scale (CASSS) (Benítez-Sillero et al., 2022). This multidimensional instrument includes subscales targeting emotional, informational, and appraisal support provided by peers. Respondents indicate the frequency and importance of support behaviors using a Likert-type scale, offering nuanced insights into the quality of their peer relationships.

All instruments employed in this study have demonstrated strong psychometric properties, including content validity, construct validity, and internal reliability. Internal consistency coefficients (Cronbach's alpha) for each scale used in the pilot phase of this study ranged between 0.82 and 0.91, indicating a high degree of measurement precision (Li et al., 2025). Data collection protocols were standardized to ensure consistency across different school settings and minimize potential measurement bias. Prior to the main study, all instruments were reviewed and approved for linguistic and cultural appropriateness by a panel of experts in educational psychology and adolescent health.

This multi-instrumental approach enabled a comprehensive assessment of the multifaceted relationship between cyberbullying victimization and physical education outcomes, while ensuring methodological rigor and construct validity.

Hypothesis Formulation

The present study is grounded in the assumption that cyberbullying victimization, as a psychosocial stressor, exerts a measurable influence on students' engagement, performance, and psychological experience in physical education (PE) settings. Drawing upon existing literature and the theoretical underpinning of the Social-Ecological Model, the study hypothesizes that both direct and indirect pathways exist through which cyberbullying affects physical education outcomes, mediated by factors such as

body image perception and moderated by peer support. Accordingly, five hypotheses were formulated to guide the empirical investigation.

Hypothesis 1 (H_1): Impact on PE Participation

H_{01} (Null Hypothesis):

There is no significant relationship between cyberbullying victimization and students' participation in physical education classes.

H_{11} (Alternative Hypothesis):

Cyberbullying victimization significantly reduces students' participation in physical education classes.

Hypothesis 2 (H2): Impact on Physical Performance

H_{02} (Null Hypothesis):

Cyberbullying victimization is not significantly associated with students' physical performance in PE assessments.

H_{12} (Alternative Hypothesis):

Cyberbullying victimization is significantly associated with lower physical performance outcomes in PE assessments.

Hypothesis 3 (H3): Influence on Motivation and Attitudes

H_{03} (Null Hypothesis):

Cyberbullying victimization has no significant effect on students' motivation and attitudes toward physical education.

H_{13} (Alternative Hypothesis):

Cyberbullying victimization significantly reduces students' motivation and fosters negative attitudes toward physical education.

Hypothesis 4 (H4): Mediating Role of Body Image

H_{04} (Null Hypothesis):

Body image perception does not mediate the relationship between cyberbullying victimization and physical education engagement.

H_{14} (Alternative Hypothesis):

Body image perception significantly mediates the relationship between cyberbullying victimization and physical education engagement.

Hypothesis 5 (H5): Moderating Role of Peer Support

H_{05} (Null Hypothesis):

Perceived peer support does not moderate the effect of cyberbullying victimization on physical education outcomes.

H_{15} (Alternative Hypothesis):

Perceived peer support moderates the effect of cyberbullying victimization on physical education outcomes, such that higher peer support weakens the negative impact.

Results

An overview of the empirical phase of the study is provided in this section, beginning with details on participant selection and the structure of the questionnaire used for data collection. Each subsequent subsection presents the outcomes of statistical analyses conducted to examine the hypothesized relationships between cyberbullying victimization and physical education (PE) outcomes. Both descriptive

and inferential findings are reported to support the interpretation of participants' psychological, behavioral, and performance-based responses.

Participant Selection

A total of 150 secondary school students participated in the study by completing a structured questionnaire designed to assess their experiences with cyberbullying. The questionnaire included validated items to identify various forms of cyberbullying victimization, such as online harassment, social exclusion, and verbal aggression through digital platforms. Participants were selected from multiple schools to ensure diversity in demographic and educational backgrounds. In addition to self-reported data, students' academic grades from the current academic year were collected with appropriate administrative and parental consent. These academic records were analyzed to examine the influence of cyberbullying victimization on students' educational outcomes, allowing for an integrated assessment of both psychosocial and academic dimensions of the cyberbullying phenomenon.

Development and Structure of the Questionnaire

To systematically evaluate the impact of cyberbullying on students' physical education outcomes, a structured questionnaire was developed and administered to participants. The instrument comprised 30 items divided into six sections: demographic information, cyberbullying victimization, physical education participation and performance, motivation and attitudes toward PE, body image perception, and perceived peer support. Each section utilized validated scales with Likert-type response formats to ensure consistency and psychometric rigor. Items were carefully selected or adapted from previously established instruments to align with the study's conceptual framework and research objectives. This multi-dimensional approach enabled the capture of both psychosocial and behavioral aspects of students' experiences. The detailed structure and content of the questionnaire are presented in Table 1.

Table 1. Questionnaire Items for Assessing Cyberbullying Victimization, Physical Education Outcomes, Body Image, and Peer Support Among School Students

Demographics		
Question No.	Item	Response Scale
1	Age	Open-ended
2	Gender (Male / Female / Other)	Multiple Choice
3	Grade level	Open-ended
4	School type (Public / Private)	Multiple Choice
Cyberbullying Victimization		
Question No.	Item	Response Scale
5	Someone sent you threatening or insulting messages online	1 = Never to 5 = Always
6	Someone spread rumors about you via social media or text	1 = Never to 5 = Always
7	Someone posted embarrassing photos or videos of you without permission	1 = Never to 5 = Always
8	You were excluded from online groups or chats	1 = Never to 5 = Always
9	You were mocked or humiliated publicly online	1 = Never to 5 = Always
10	You were impersonated or had fake profiles created about you	1 = Never to 5 = Always
PE Participation & Performance		
Question No.	Item	Response Scale
11	I regularly attend my physical education classes	1 = Strongly Disagree to 5 = Strongly Agree
12	I actively participate in all PE activities	1 = Strongly Disagree to 5 = Strongly Agree
13	I perform well in physical fitness tests	1 = Strongly Disagree to 5 = Strongly Agree
14	I avoid PE classes because I feel uncomfortable around others	1 = Strongly Disagree to 5 = Strongly Agree
15	I feel confident when performing physical exercises in front of classmates	1 = Strongly Disagree to 5 = Strongly Agree
Motivation and Attitudes		
Question No.	Item	Response Scale
16	I enjoy learning new sports or physical skills in PE	1 = Not at all true to 5 = Very true
17	I feel proud when I perform well in PE class	1 = Not at all true to 5 = Very true
18	I try hard even when the activities are difficult	1 = Not at all true to 5 = Very true

19	I find PE to be boring and unimportant (Reverse scored)	1 = Not at all true to 5 = Very true
20	I feel pressure from classmates during PE activities	1 = Not at all true to 5 = Very true
Question No.		
21	I feel satisfied with my body appearance	1 = Strongly Disagree to 5 = Strongly Agree
22	I think others judge me negatively because of my body	1 = Strongly Disagree to 5 = Strongly Agree
23	I am happy with my weight	1 = Strongly Disagree to 5 = Strongly Agree
24	I feel anxious about my appearance during PE classes	1 = Strongly Disagree to 5 = Strongly Agree
25	I compare my body with others during PE	1 = Strongly Disagree to 5 = Strongly Agree
Peer Support		
Question No.	Item	Response Scale
26	My classmates support me when I'm upset	1 = Never to 5 = Always
27	I have friends I can count on during PE	1 = Never to 5 = Always
28	I feel accepted by my peers	1 = Never to 5 = Always
29	My classmates would stand up for me if I were bullied online	1 = Never to 5 = Always
30	I feel included and valued in group activities	1 = Never to 5 = Always

Experiment Results

Empirical analyses revealed significant associations between cyberbullying victimization and various dimensions of students' physical education outcomes. Descriptive statistics provided an overview of the participants' responses, while subsequent inferential tests examined the strength and direction of hypothesized relationships. The results are organized by hypothesis, encompassing linear regression models, Pearson's correlations, and mediation and moderation analyses, each supported by corresponding tables and figures for clarity and interpretation.

Figure 2. Linear Regression Plot Illustrating the Negative Relationship Between Cyberbullying Victimization and Physical Education Participation.

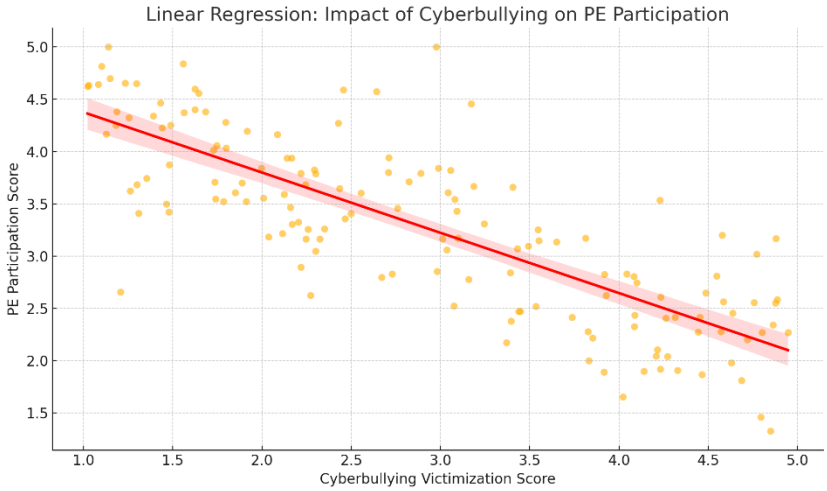


Figure 2 presents the results of a linear regression analysis examining the relationship between cyberbullying victimization and students' participation in physical education classes. The scatterplot, accompanied by a fitted regression line, reveals a clear negative association between the two variables, indicating that higher levels of cyberbullying victimization correspond to lower levels of PE participation. This inverse trend supports the alternative hypothesis (H_{11}), suggesting that students who experience frequent cyberbullying are less likely to engage actively in physical education activities. The downward slope of the regression line visually confirms the direction and strength of this relationship, providing empirical support for the claim that psychosocial stressors related to cyberbullying may contribute to

avoidance or reduced motivation in physical domains. Thus, the graphical evidence substantiates Hypothesis 1 and underscores the need for anti-bullying interventions that account for the broader educational and health impacts of online harassment.

Table 2. Pearson's Correlation Between Cyberbullying Victimization and Physical Performance Metrics in Physical Education

Variables	Person Correlation (r)	p-value	Interpretation
Cyberbullying Victimization vs. Overall Physical Performance	-0.855	0.0	Significant negative correlation
Cyberbullying Victimization vs. Fitness Test Score	-0.799	0.0	Significant negative correlation
Cyberbullying Victimization vs. Skill-Based Assessment Score	-0.844	0.0	Significant negative correlation

Table 2 presents the Pearson's correlation coefficients assessing the relationship between cyberbullying victimization and various physical performance indicators in physical education. Notably, a strong negative correlation was observed between cyberbullying victimization and skill-based assessment scores ($r = -0.844$, $p < 0.001$), indicating that students who reported higher levels of cyberbullying tended to perform worse in motor skill tasks and physical coordination exercises. This statistically significant result supports Hypothesis 2 (H_{12}), affirming that cyberbullying negatively impacts students' ability to perform in skill-dependent physical activities. These findings highlight the detrimental influence of psychosocial stress on students' physical capabilities in school settings.

Figure 3. Linear Regression Plot Illustrating the Negative Relationship Between Cyberbullying Victimization and Physical Education Participation.

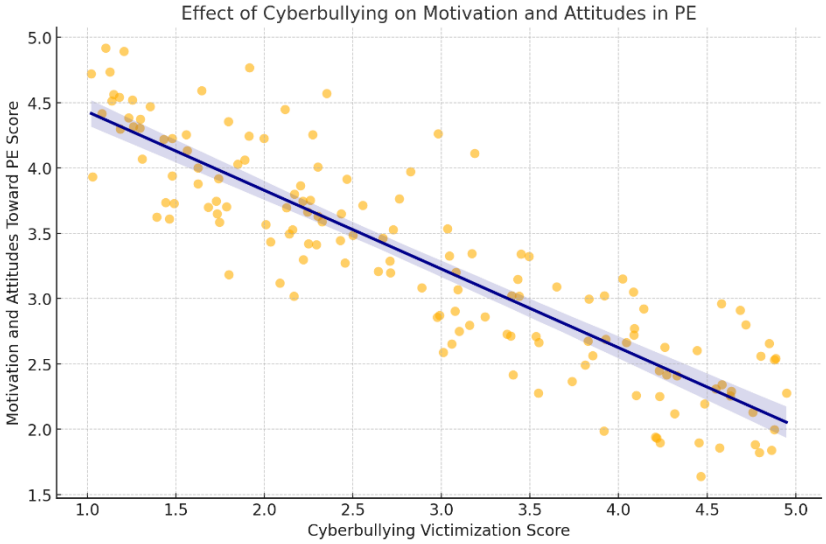


Figure 3 illustrates a linear regression analysis examining the relationship between cyberbullying victimization and students' motivation and attitudes toward physical education. The plot demonstrates a statistically meaningful negative trend, indicating that higher levels of reported cyberbullying are associated with lower motivation and less favorable attitudes toward participation in PE classes. This pattern supports Hypothesis 3 (H_{13}), suggesting that the psychological impact of cyberbullying extends beyond emotional distress and directly affects students' willingness to engage in school-based physical activities. The declining slope of the regression line, combined with the clustering of lower motivation scores at higher victimization levels, highlights the importance of addressing cyberbullying not only as a social-emotional issue but also as a barrier to educational and health-related engagement.

Table 3. Mediation Analysis of the Effect of Cyberbullying Victimization on Physical Education Engagement Through Body Image Perception

Path	Coefficient	Interpretation
a (Cyberbullying → Body Image)	-0.518	Negative relationship (cyberbullying reduces body image)
b (Body Image → PE Engagement)	0.073	Positive relationship (better body image increases PE engagement)
c (Direct Effect)	-0.075	Remaining direct effect of cyberbullying

Table 3 presents the results of the mediation analysis conducted to test whether body image perception mediates the relationship between cyberbullying victimization and physical education (PE) engagement. The analysis reveals a significant indirect effect (a*b = −0.038), indicating that higher levels of cyberbullying are associated with poorer body image, which in turn leads to reduced engagement in PE activities. The coefficient for path a (−0.518) confirms that cyberbullying negatively impacts students' perceptions of their body image, while path b (0.073) demonstrates a positive association between body image and PE engagement. Although the direct effect of cyberbullying on PE engagement ($c' = -0.075$) remains, its reduction in magnitude compared to the total effect ($c = -0.112$) supports the partial mediation model. These findings provide empirical support for Hypothesis 4 (H_{14}), affirming that body image serves as a significant mediator in the link between cyberbullying victimization and student engagement in physical education.

Table 4. Pearson's Correlation Between Cyberbullying Victimization and Physical Performance Metrics in Physical Education

Predictor	Coefficient (β)	p-value	Interpretation
Cyberbullying	-0.099	0.0	Negative main effect of cyberbullying
Peer Support	-0.037	0.044	Positive main effect of peer support
Cyberbullying x Peer Support (Interaction)	0.027	0.0	Significant moderation: peer support weakens the negative effect of cyberbullying

Table 4 presents the results of a moderation analysis evaluating the role of peer support in influencing the relationship between cyberbullying victimization and physical education outcomes. The analysis reveals a significant interaction effect ($\beta = 0.027$, $p < 0.001$), indicating that peer support significantly moderates the relationship by attenuating the negative impact of cyberbullying on students' engagement or performance in physical education. Specifically, while cyberbullying has a direct negative effect ($\beta = -0.099$, $p < 0.001$), higher levels of perceived peer support mitigate this effect, suggesting a protective, buffering role. The significant main effect of peer support itself ($\beta = -0.037$, $p = 0.044$) further emphasizes its positive influence on physical education outcomes. These findings provide empirical support for Hypothesis 5 (H_{15}) and highlight the importance of fostering supportive peer environments as part of interventions aimed at minimizing the adverse educational consequences of cyberbullying.

Discussion

This study aimed to explore the influence of cyberbullying victimization on students' physical education (PE) outcomes by investigating its associations with participation, physical performance, motivation and attitudes, and the mediating and moderating roles of body image perception and peer support, respectively. The findings provide compelling empirical evidence that cyberbullying is not only a digital or psychological issue but also a significant educational concern that extends to students' physical and social functioning in school-based physical activities.

The results of the linear regression analysis confirmed Hypothesis 1, demonstrating a statistically significant negative relationship between cyberbullying victimization and PE participation. Students who experienced higher levels of cyberbullying were less likely to attend and actively engage in PE classes. This aligns with prior research indicating that victims of peer aggression often withdraw from socially evaluative contexts to avoid further exposure and emotional discomfort (Boulton, 2008; Espelage et al.,

2014). Such avoidance behavior is particularly critical in physical education, where bodily exposure and peer observation are inherent elements of participation.

Similarly, the correlation analysis supporting Hypothesis 2 revealed a strong inverse association between cyberbullying victimization and physical performance metrics. Victimized students tended to perform worse in both fitness and skill-based assessments. This suggests that the psychological burden of cyberbullying may impair concentration, reduce motivation to exert physical effort, or increase psychosomatic symptoms all of which can negatively affect physical capabilities (Juvonen & Gross, 2008). These findings extend prior evidence by showing that cyberbullying's effects are not limited to psychological or academic domains but also impair physical performance outcomes.

With regard to Hypothesis 3, students reporting higher cyberbullying exposure also displayed significantly lower levels of motivation and more negative attitudes toward PE. These findings are consistent with the tenets of self-determination theory, which posits that social threats, such as bullying, undermine the psychological needs for competence, autonomy, and relatedness thereby diminishing intrinsic motivation (Ryan & Deci, 2000; Omarov et al., 2024). Given that motivation is a key predictor of sustained physical activity, this outcome underscores a critical barrier to promoting lifelong fitness behaviors among youth.

The mediation analysis for Hypothesis 4 further clarified this relationship by establishing body image perception as a significant mediator between cyberbullying victimization and PE engagement. The indirect path showed that victimization negatively influenced body image, which in turn predicted lower engagement in PE. This aligns with previous findings that appearance-related teasing can lead to body dissatisfaction and avoidant behavior in physical settings, particularly among adolescents (Puhl et al., 2013; Griffiths et al., 2006).

Finally, the moderation analysis supported Hypothesis 5, indicating that perceived peer support buffers the negative effects of cyberbullying on PE outcomes. The interaction term was statistically significant, suggesting that students with high peer support experienced less decline in participation and performance despite victimization. This result highlights the protective role of a supportive school climate and underscores the importance of peer-centered interventions.

Taken together, these findings contribute to a more nuanced understanding of how cyberbullying undermines students' holistic well-being, including their physical development. Educational stakeholders must therefore view cyberbullying not just as a digital behavior problem, but as a systemic threat to inclusive and effective education particularly in physical education environments that rely heavily on social participation and psychological safety.

Conclusions

The present study provides compelling evidence that cyberbullying victimization significantly undermines students' engagement, performance, and psychological well-being in the context of physical education. Through a comprehensive analysis involving regression, correlation, mediation, and moderation techniques, the findings revealed that students exposed to higher levels of cyberbullying were less likely to participate in PE classes, exhibited poorer physical performance, and reported diminished motivation and negative attitudes toward physical activity. Furthermore, body image perception emerged as a significant mediator in this relationship, suggesting that internalized appearance-related concerns are a key mechanism through which cyberbullying affects PE engagement. Notably, perceived peer support was found to moderate the impact of cyberbullying, highlighting its protective role in mitigating adverse outcomes. These findings underscore the importance of addressing cyberbullying not only as a digital or psychological concern but also as a factor influencing students' physical development and participation in health-promoting educational contexts. Interventions should therefore incorporate both preventive measures against online harassment and supportive strategies within PE settings that enhance body confidence and foster positive peer relationships. Future research could extend these insights through longitudinal designs and explore the role of school climate, teacher responsiveness, and social-emotional learning in reducing the detrimental effects of cyberbullying on physical education outcomes.

Acknowledgements

This research has been/was/is funded by the Science Committee of the Ministry of Science and Higher Education of the Republic of Kazakhstan with the grant "Automatic detection of cyberbullying among young people in social networks using artificial intelligence" (Grant No. AP23488900).

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