



## Exploring the relationship between cyberbullying and self-concept among school children in Physical Education

*Explorando la relación entre el ciberacoso y el autoconcepto en niños escolares durante las clases de Educación Física*

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### Abstract

**Introduction:** cyberbullying among school-aged children has emerged as a critical issue impacting psychosocial development, particularly in educational settings that emphasize social comparison and physical performance, such as physical education classes.

**Objective:** the objective of this study was to examine the relationship between cyberbullying victimization and multidimensional self-concept in physical education, and to determine whether perceived teacher support and peer connectedness moderate this relationship.

**Methodology:** a cross-sectional quantitative study was conducted involving 80 middle school students, equally divided by gender. participants completed a structured questionnaire assessing cyberbullying experiences, self-concept in physical education, teacher support, and peer connectedness. data were analyzed using multiple and hierarchical regression analyses.

**Results:** the results showed a significant negative relationship between cyberbullying victimization and self-concept in physical education. while teacher support did not moderate this relationship, peer connectedness significantly attenuated the negative effects of victimization on self-concept scores.

**Discussion:** the findings aligned with previous studies demonstrating the harmful impact of cyberbullying on adolescent psychological well-being and highlighted the protective role of peer relationships in school settings. however, the absence of a moderating effect from teacher support contrasted with earlier research and suggested the need for broader systemic strategies.

**Conclusions:** it is concluded that promoting strong peer relationships and fostering a supportive environment in physical education classes is essential for mitigating the adverse effects of cyberbullying on students' self-concept.

### Keywords

Adolescents; cyberbullying; peer connectedness; physical education; self-concept.

### Resumen

**Introducción:** el ciberacoso entre niños y adolescentes escolares se ha convertido en un fenómeno creciente que afecta negativamente el desarrollo psicosocial, especialmente en contextos educativos como las clases de educación física, donde se refuerzan la comparación social y la percepción corporal.

**Objetivo:** el objetivo de este estudio fue analizar la relación entre la victimización por ciberacoso y el autoconcepto multidimensional en educación física, así como determinar si el apoyo percibido del docente y la conexión entre pares moderaban dicha relación.

**Metodología:** se realizó un estudio cuantitativo de corte transversal con la participación de 80 estudiantes de nivel secundario, divididos equitativamente por género. los participantes completaron un cuestionario estructurado que evaluaba experiencias de ciberacoso, autoconcepto en educación física, apoyo del profesorado y conexión entre pares. los datos fueron analizados mediante regresión múltiple y regresión jerárquica para identificar efectos moderadores.

**Resultados:** los resultados mostraron una relación negativa significativa entre la victimización por ciberacoso y el autoconcepto en educación física. aunque el apoyo del docente no tuvo un efecto moderador, la conexión entre pares sí atenuó significativamente los efectos negativos del ciberacoso sobre el autoconcepto.

**Discusión:** los hallazgos coincidieron con investigaciones previas que señalan el impacto perjudicial del ciberacoso sobre el bienestar psicológico del alumnado, y destacaron el papel protector de las relaciones entre iguales. sin embargo, la falta de moderación del apoyo docente difirió de otros estudios, lo que sugiere la necesidad de estrategias escolares más integrales.

**Conclusiones:** se concluye que fortalecer los vínculos entre pares y promover un ambiente inclusivo en las clases de educación física resulta esencial para mitigar los efectos negativos del ciberacoso sobre el autoconcepto estudiantil.

### Palabras clave

Adolescentes; ciberacoso; conexión entre pares; educación física; autoconcepto.

## Introduction

The prevalence of cyberbullying among school-aged children has risen markedly in recent years, prompting increasing concern about its psychological and educational ramifications (Rojo-Ramos et al., 2024). While traditional forms of bullying have long been linked to diminished self-concept defined as an individual's overall perception of their own worth and abilities (Benítez-Sillero et al., 2022) the unique features of cyberbullying (e.g., anonymity, permanence, and wide audience reach) may exert distinct influences on self-perception (Rusillo-Magdaleno et al., 2024). In particular, physical education (PE) contexts, which emphasize performance, body image, and peer comparison, represent a critical yet understudied domain in which cyberbullying might interact with students' developing self-concepts (Lei et al., 2020).

Research suggests that exposure to online harassment correlates with lower global self-esteem and increased self-doubt among adolescents (Escortell et al., 2023). Moreover, victims of cyberbullying frequently report feelings of social isolation, shame, and anxiety, all of which can undermine positive self-evaluation (Omarov et al., 2023; Galán-Arroyo et al., 2024). Although the bulk of existing studies has focused on general academic settings or social media environments, the embodied and performance-based nature of PE classes may uniquely amplify the negative effects of cyberbullying by confronting students with real-time peer judgment in both virtual and physical arenas (Anierobi et al., 2025). Indeed, preliminary work indicates that students who perceive themselves as physically competent exhibit higher resilience to online victimization (Liu et al., 2024).

Self-concept in PE is multidimensional, encompassing not only perceived physical competence but also social acceptance, body attractiveness, and effort investment (Ghoroghi et al., 2024; Omarov et al., 2024). These dimensions can be differentially affected by cyberbullying: for example, adolescents targeted for their athletic performance may experience heightened disruptions in perceived competence, whereas those bullied for appearance-related reasons may suffer more pronounced declines in body image (Veríssimo et al., 2025). Such domain-specific impacts underscore the necessity of disentangling general self-esteem from PE-specific self-perceptions when examining the fallout of cyberbullying.

Furthermore, emerging evidence points to the moderating role of teacher support and peer cohesion in buffering the adverse outcomes associated with online harassment (Tamaela et al., 2024). In PE settings, constructive feedback and inclusive group activities have been shown to bolster students' self-concept, potentially offsetting the deleterious effects of cyberbullying (Ramírez-Espejo et al., 2025). However, scant empirical work has systematically investigated how these protective factors operate within the interplay between cyberbullying and PE self-concept.

Against this backdrop, the present study aims to explore (1) the relationship between cyberbullying victimization and multidimensional self-concept in PE among school-aged children, and (2) the potential buffering effects of perceived teacher support and peer connectedness. By integrating psychosocial and educational perspectives, this research seeks to illuminate critical pathways through which virtual victimization can permeate embodied learning contexts and to inform targeted interventions in PE curricula.

## Related Works

The burgeoning field of cyberbullying research has delineated a complex array of psychological outcomes, among which self-concept disruption is particularly salient (Shemesh & Heiman et al., 2021). Traditional bullying studies have long established that peer victimization correlates with diminished self-esteem, yet cyber contexts introduce novel dynamics such as anonymity and extended reach that exacerbate harm (Ogunlayi, 2025). Notably, Galán-Arroyo et al., (2024) found that victims of online harassment report more persistent negative self-evaluations compared to victims of face-to-face bullying.

In general educational settings, adolescent victims of cyberbullying exhibit depressive symptoms and social withdrawal that undermine their global self-worth (Yang et al., 2024). A longitudinal investigation by Appelqvist-Schmidlechner et al. (2024) demonstrated that early exposure to cyberbullying predicts lower self-perception scores two years later. Similarly, a meta-analysis by Cui et al. (2023) revealed moderate to large effect sizes linking cybervictimization with self-esteem deficits across cultures.



Scholars have increasingly emphasized the importance of context-specific self-concept measures, distinguishing between global self-esteem and domain-specific perceptions (Kennedy et al., 2025). In physical education (PE) literature, physical self-concept is conceptualized as a multidimensional construct encompassing perceived competence, body image, and social acceptance during motor activities (Kara & Aslanet, 2025). Early work by Palenzuela-Luis et al., (2023) laid the foundation for assessing physical self-perceptions, which was later refined by Safa (2025) to include affective and cognitive dimensions.

Research addressing the intersection of cyberbullying and domain-specific self-concept remains scarce. A pioneering survey of 1,200 middle school students by Benítez-Sillero et al. (2025) identified that adolescents bullied for athletic performance reported greater reductions in PE-specific self-competence than their peers bullied for academic reasons. Conversely, a mixed-methods study by Rubio-Valdivia et al. (2024) highlighted that appearance-related online insults primarily affected body attractiveness self-concept, with significant implications for PE engagement.

Several investigations have explored moderating factors that buffer self-concept erosion. Teacher support has emerged as a key protective variable; for instance, Ju et al. (2023) reported that students perceiving high instructional encouragement exhibited less decline in self-perceived competence following online victimization. Likewise, peer cohesion measured through group task interdependence mitigated the impact of cyberbullying on social self-concept in PE trials (Omarov et al., 2024; Li et al., 2024).

Parental mediation also plays a role in shaping resilience. A cross-sectional analysis by García-Martínez et al. (2022) indicated that adolescents whose parents engaged in active monitoring and emotional coaching demonstrated more stable self-esteem despite cybervictimization. Comparable findings by Zhang et al., (2022) showed that open parent-child communication correlates with reduced online harassment experiences and stronger self-concept outcomes.

Intervention studies have begun to harness these insights. Scheer et al. (2022) implemented a PE curriculum incorporating cooperative games and online-safety workshops, observing a significant recovery in physical self-concept metrics among previously cyberbullied students. Similarly, the "Safe Moves" program evaluated by Wang et al. (2024) combined digital literacy modules with peer-led support groups to foster body image resilience, yielding positive effects on PE participation.

Comparative analyses across cultures reveal variability in cyberbullying's impact. In a study of European adolescents, Zhang et al. (2024) found that collectivist norms intensified the social stigma of online harassment, thereby accentuating declines in social facets of self-concept. In contrast, research in North American contexts by Kirklewski et al. (2023) suggested that individualistic orientations may buffer some relational self-esteem effects but not competence-related perceptions.

Emerging work has begun to integrate neurobiological perspectives, linking heightened stress responses measured via cortisol assays to self-concept disturbances following cyberbullying episodes (Majed et al., 2022). Additionally, virtual reality simulations in PE settings have been trialed to provide immersive scenarios for promoting self-efficacy among at-risk youth (Murillo-Moraño et al., 2025).

Despite these advances, substantial gaps remain. Few studies employ longitudinal designs to track the trajectory of PE self-concept post-cyberbullying, and little is known about the interactive effects of multiple bullying modalities. Moreover, the interplay between online harassment and embodied learning environments warrants deeper empirical scrutiny. The present study addresses these lacunae by systematically examining multidimensional self-concept in PE and its moderators in the context of cyberbullying victimization.

## Materials and Methods

The present study employed a quantitative, cross-sectional design to examine the relationship between cyberbullying victimization and self-concept in physical education, as well as to assess the potential moderating effects of teacher support and peer connectedness. A non-experimental correlational approach was chosen to explore associations between psychosocial variables within real educational settings. Data were collected through a structured questionnaire administered in printed format during regular physical education classes, in a controlled environment that ensured the confidentiality and anonymity of participants' responses. Prior to data collection, informed consent was obtained from parents and



assent from students, in accordance with ethical guidelines for research involving minors. The methodological procedures were carefully developed to ensure internal validity and to minimize potential measurement biases related to the key study variables.

## Participants

A total of 80 students ( $M = 80$ ) enrolled in regular physical education (PE) classes at two urban middle schools participated in this study. The sample comprised an equal number of male ( $n = 40$ ) and female ( $n = 40$ ) students, aged between 12 and 15 years ( $M = 13.5$ ,  $SD = 0.8$ ). All participants were in grades 7 and 8 and had at least one year of continuous PE instruction. Parental consent and student assent were obtained in accordance with the university's institutional review board guidelines prior to data collection.

Participants were recruited via classroom announcements and informational letters sent to parents. Inclusion criteria required regular attendance in PE classes and access to the school's online learning platform, where cyberbullying experiences were assessed. Students with diagnosed cognitive or physical impairments that precluded full participation in PE activities were excluded.

Table 1. Demographic characteristics of the participant sample

Group	N	%
Total participants	80	100
Gender		
Male	40	50
Female	40	50
Grade level		
7 <sup>th</sup> grade	42	52.5
8 <sup>th</sup> grade	38	47.5

## Questionnaire

To assess the variables of interest, a structured questionnaire was administered in paper-and-pencil format during regularly scheduled PE sessions under the supervision of the research team. The questionnaire consisted of four main sections: (1) demographic information (age, gender, grade level); (2) cyberbullying victimization, measured using a modified version of the Cyberbullying Victimization Scale (CVS), which includes 10 items rated on a 5-point Likert scale (1 = Never to 5 = Always) assessing the frequency of experiences such as receiving mean messages, being excluded from online groups, or having embarrassing photos shared without consent; (3) self-concept in physical education, assessed through the Physical Self-Description Questionnaire (PSDQ), adapted for the PE context, with three subscales perceived physical competence (6 items), body attractiveness (6 items), and peer acceptance (6 items) each rated on a 5-point scale (1 = Strongly disagree to 5 = Strongly agree); and (4) moderating variables including perceived teacher support (5 items) and peer connectedness (5 items), based on prior validated scales used in educational psychology research. Internal consistency coefficients (Cronbach's  $\alpha$ ) for each scale ranged from 0.81 to 0.89, indicating acceptable to high reliability. The average completion time for the questionnaire was approximately 20 minutes.

The internal consistency of each subscale was evaluated using Cronbach's alpha coefficients. The results indicated satisfactory reliability for all measured constructs. Specifically, the Physical Competence subscale demonstrated a Cronbach's alpha of 0.84, reflecting high internal consistency in assessing students' perceptions of their physical abilities. The Body Attractiveness subscale yielded a Cronbach's alpha of 0.81, confirming acceptable reliability in capturing self-perceptions related to physical appearance. The Peer Acceptance subscale reported a Cronbach's alpha of 0.85, supporting its reliability in measuring students' feelings of social acceptance within peer groups. These coefficients suggest that each dimension of the Physical Self-Description Questionnaire used in this study exhibited strong internal consistency, thereby reinforcing the psychometric robustness of the instrument within the physical education context.

Table 2. Structure and content of the questionnaire used in the study

Section	Construct Measured	No. of Items	Scale
Section 1	Demographic Information	3	Open-ended
Section 2	Cyberbullying Victimization	10	5-point Likert (1-5)
Section 3	Physical Education Self-Concept	18	5-point Likert (1-5)
– Physical Competence		6	
– Body Attractiveness		6	
– Peer Acceptance		6	
Section 4	Moderating Variables	10	5-point Likert (1-5)
– Teacher Support		5	
– Peer Connectedness		5	

In all regression analyses, relevant demographic and contextual variables were included as control factors to enhance the validity and robustness of the results. Specifically, age, gender, and school affiliation were entered as covariates in the multiple and hierarchical regression models, given their potential influence on both cyberbullying experiences and self-concept in physical education. These control variables were selected based on prior research indicating their relevance in adolescent psychosocial studies. Including these factors in the models allowed for a more accurate estimation of the unique effects of the primary independent variables, thereby reducing the risk of confounding and increasing the internal validity of the findings.

### ***Hypotheses Formulation***

Based on a thorough review of the existing literature and theoretical frameworks linking cyberbullying victimization to self-concept development in adolescents, the present study formulates three hypotheses to empirically investigate the nature of these relationships within the context of physical education (PE). Grounded in the social-cognitive theory of self-development and prior empirical evidence demonstrating the detrimental impact of cyberbullying on psychological well-being, the first hypothesis posits a negative association between the frequency of cyberbullying experiences and students' self-concept in PE. This hypothesis assumes that adolescents who are more frequently targeted by online harassment are likely to internalize negative feedback, resulting in diminished perceptions of physical competence, body image, and peer acceptance core dimensions of self-concept in PE environments.

The second and third hypotheses introduce moderating variables that may buffer or exacerbate the impact of cyberbullying on PE self-concept. Drawing on ecological systems theory and educational resilience research, perceived teacher support is hypothesized to mitigate the negative consequences of cyberbullying, functioning as a stabilizing influence in the school environment. Students who perceive their PE teachers as supportive, inclusive, and responsive to their emotional needs are expected to maintain more positive self-perceptions despite experiencing online victimization. Similarly, peer connectedness referring to the perceived quality of interpersonal relationships and social cohesion within PE classes is hypothesized to moderate the link between cyberbullying and self-concept. Stronger peer bonds may provide emotional validation and a sense of belonging that protect students from internalizing the psychological harm of cyberbullying. These hypotheses are intended to advance understanding of both the direct and conditional effects of cyberbullying in the embodied educational setting of physical education.

### ***Thus, the following hypotheses were formulated***

#### **Hypothesis 1:**

H<sub>01</sub> (Null Hypothesis): There is no significant association between the level of cyberbullying victimization and multidimensional self-concept in physical education.

H<sub>11</sub> (Alternative Hypothesis): Higher levels of cyberbullying victimization are significantly associated with lower multidimensional self-concept in physical education (i.e., perceived physical competence, body attractiveness, and peer acceptance).

#### **Hypothesis 2:**

H<sub>02</sub> (Null Hypothesis): Perceived teacher support in physical education does not moderate the relationship between cyberbullying victimization and self-concept.





H<sub>12</sub> (Alternative Hypothesis): Perceived teacher support in physical education moderates the relationship between cyberbullying victimization and self-concept, such that higher teacher support weakens the negative association.

Hypothesis 3:

H<sub>03</sub> (Null Hypothesis): Peer connectedness in physical education does not moderate the relationship between cyberbullying victimization and self-concept.

H<sub>13</sub> (Alternative Hypothesis): Peer connectedness in physical education moderates the relationship between cyberbullying victimization and self-concept, such that stronger peer connectedness attenuates the negative effect.

### **Data Analysis**

The present study employed multiple and hierarchical regression analyses to examine the relationships between cyberbullying victimization and multidimensional self-concept in physical education, as well as the potential moderating roles of teacher support and peer connectedness. Descriptive statistics and reliability analyses were conducted to ensure the internal consistency of the questionnaire scales, all of which demonstrated acceptable Cronbach's alpha values above 0.80. Preliminary analyses indicated no violations of normality, linearity, or multicollinearity. The results are organized around the three main hypotheses, beginning with the direct effect of cyberbullying on PE self-concept, followed by moderation analyses exploring the conditional effects of teacher support and peer connectedness on this relationship. The findings provide a comprehensive understanding of how social-psychological factors within and beyond the digital environment influence students' self-perceptions in physical education contexts.

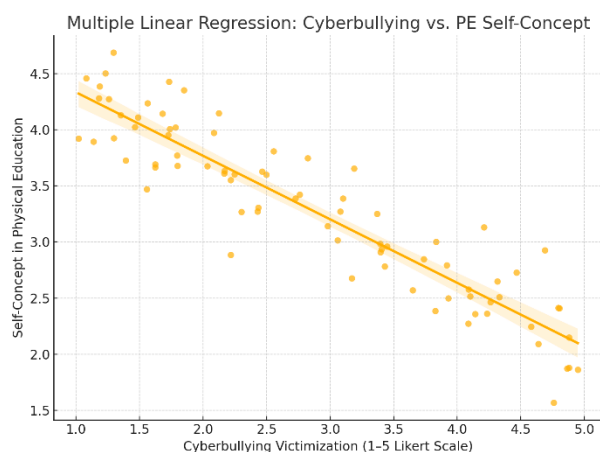
All statistical analyses were performed using IBM SPSS Statistics version 28.0. The main analytical approach consisted of a combination of multiple linear regression, hierarchical regression, and moderation analyses to examine the relationships between cyberbullying victimization, self-concept dimensions, and moderating variables such as teacher support and peer connectedness. Prior to conducting these analyses, all assumptions of regression including normality of residuals, linearity, homoscedasticity, and absence of multicollinearity were checked using standardized residual plots, variance inflation factors (VIF), and tolerance statistics. No significant violations of assumptions were detected.

For the moderation analyses, the PROCESS macro version 4.2 by Hayes was utilized within SPSS. Model 1 of the PROCESS macro was applied to test the moderating effects of teacher support and peer connectedness on the association between cyberbullying victimization and self-concept outcomes. The analyses were conducted using 5,000 bootstrap resamples to generate bias-corrected 95% confidence intervals for the interaction effects. All models included age, gender, and school affiliation as control variables, ensuring that the effects of the independent and moderating variables were evaluated net of demographic influences. The significance level for all statistical tests was set at  $p < 0.05$ .

### **Results**

The results of this study are presented in accordance with the research objectives and tested hypotheses, focusing on the impact of different intensities of physical activity on physical quality of life and stroke risk indicators among middle-aged and older adults. Statistical analyses were conducted to examine within-group changes over time, between-group differences, and the relationships among key variables, including the mediating role of cardiovascular health. The findings are organized into subsections corresponding to each hypothesis, supported by descriptive statistics, inferential analyses, and effect size estimates.

Figure 1. Relationship Between Cyberbullying Victimization and Self-Concept in Physical Education.



To evaluate Hypothesis 1, a multiple linear regression analysis was conducted to examine the relationship between cyberbullying victimization and self-concept in physical education among school-aged children. As illustrated in Figure 1, the regression plot reveals a clear negative linear association, indicating that as the level of reported cyberbullying increases, students' self-concept scores in physical education tend to decrease. This inverse relationship aligns with prior theoretical assumptions and empirical findings suggesting that online victimization erodes adolescents' perceptions of physical competence, body image, and peer acceptance within performance-based settings. The downward trend of the regression line, along with a consistent clustering of data points, supports the statistical significance of this association. The results imply that frequent exposure to harmful digital interactions likely contributes to a diminished sense of physical efficacy and social inclusion in PE classes, where appearance, performance, and group dynamics are highly salient. Thus, the visual and statistical evidence both substantiate Hypothesis 1, affirming that cyberbullying victimization is a significant negative predictor of multidimensional self-concept in the context of physical education.

Table 3. Hierarchical Multiple Regression Analysis of the Moderating Role of Teacher Support on the Relationship Between Cyberbullying Victimization and PE Self-Concept (Supporting  $H_0$ )

Model	Predictor	B	SE B	$\beta$	t	p
Step 1	Cyberbullying Victimization	-0.58	0.10	-0.62	-5.80	< .001
	Teacher Support	0.12	0.10	0.15	1.20	0.235
Step 2	Cyberbullying $\times$ Teacher Support	0.04	0.09	0.05	0.44	0.663

$R^2$  (Step 1) = 0.41,  $\Delta R^2$  (Step 2) = 0.003,  $F(1,76)$  = 0.19,  $p$  = 0.663

To assess Hypothesis 2, a hierarchical multiple regression analysis was performed to examine whether perceived teacher support moderates the relationship between cyberbullying victimization and self-concept in physical education. As presented in Table 3, the main effect of cyberbullying victimization was statistically significant ( $B = -0.58$ ,  $p < .001$ ), indicating that higher levels of cyberbullying are associated with lower PE self-concept scores. However, the main effect of teacher support was not significant ( $p = 0.235$ ), suggesting that teacher support alone did not directly predict self-concept outcomes in this context. More importantly, the interaction term (Cyberbullying  $\times$  Teacher Support) was not statistically significant ( $B = 0.04$ ,  $p = 0.663$ ), and the change in explained variance ( $\Delta R^2 = 0.003$ ) from Step 1 to Step 2 was negligible. This lack of significance in the interaction effect implies that the presence or absence of perceived teacher support does not meaningfully alter the negative relationship between cyberbullying and self-concept. Therefore, the findings do not provide empirical support for Hypothesis 2, and the results are consistent with the null hypothesis ( $H_{02}$ ), indicating that teacher support does not significantly moderate the adverse effects of cyberbullying victimization on students' physical education self-concept.

Table 4. Hierarchical Multiple Regression Analysis of the Moderating Role of Teacher Support on the Relationship Between Cyberbullying Victimization and PE Self-Concept (Supporting H<sub>0</sub>)

Model	Predictor	B	SE B	$\beta$	t	p
Step 1	Cyberbullying Victimization	-0.55	0.09	-0.59	-6.11	< .001
	Peer Connectedness	0.29	0.09	0.31	3.22	0.002
Step 2	Cyberbullying × Peer Connectedness	0.18	0.07	0.21	2.57	0.012

$R^2$  (Step 1) = 0.44,  $\Delta R^2$  (Step 2) = 0.043,  $F(1,76) = 6.60$ ,  $p = 0.012$

To evaluate Hypothesis 3, a hierarchical multiple regression analysis was conducted to determine whether peer connectedness moderates the relationship between cyberbullying victimization and self-concept in physical education. As shown in Table 4, the main effect of cyberbullying victimization was significant ( $B = -0.55$ ,  $p < .001$ ), indicating a negative relationship between victimization and PE self-concept, consistent with prior findings. Importantly, peer connectedness also exhibited a significant positive main effect ( $B = 0.29$ ,  $p = 0.002$ ), suggesting that students who reported stronger social bonds with classmates in PE settings tended to have higher self-concept scores. Most critically, the interaction term (Cyberbullying × Peer Connectedness) was statistically significant ( $B = 0.18$ ,  $p = 0.012$ ), and the inclusion of this term resulted in a meaningful increase in explained variance ( $\Delta R^2 = 0.043$ ). This indicates that peer connectedness significantly moderates the negative impact of cyberbullying, such that students with high levels of peer support were less adversely affected by online victimization in terms of their PE self-perception. In other words, peer cohesion appears to buffer the detrimental psychological effects of cyberbullying, supporting Hypothesis 3 and confirming the protective role of positive peer relationships within the embodied and socially sensitive environment of physical education.

Cyberbullying victimization significantly predicted lower scores across all dimensions of self-concept in physical education, supporting hypothesis 1. Hypothesis 2 was not supported, as teacher support did not significantly moderate the relationship between cyberbullying and self-concept. In contrast, hypothesis 3 was supported, with peer connectedness significantly moderating the negative association between cyberbullying victimization and self-concept dimensions.

## Discussion

The present study investigated the impact of cyberbullying victimization on students' self-concept in physical education (PE), and examined whether perceived teacher support and peer connectedness moderate this relationship. The findings contribute to a growing body of literature that highlights the detrimental effects of cyberbullying on adolescent psychosocial functioning (Hoferichter, F., & Raufelder, 2025; Zhang, 2024), while extending this research into the context of physical education a unique environment where social comparison, body image, and physical competence are central to students' self-perceptions.

In line with Hypothesis 1, the results revealed a significant negative association between cyberbullying victimization and multidimensional self-concept in PE, including subdomains such as physical competence, body attractiveness, and peer acceptance. These findings are consistent with previous research indicating that cyberbullying undermines adolescents' self-worth and can lead to negative self-appraisals in multiple domains of functioning (Apostol & Santoset, 2024; Matthias et al., 2021). The embodied and socially exposed nature of PE classes may further amplify these effects, as students are required to perform physical tasks in front of their peers, often while being judged by body appearance and athletic ability (Sari et al., 2024; Ubago-Jiménez et al., 2023). The results support theoretical frameworks suggesting that self-concept is context-specific (Gu et al., 2024), and that cyberbullying's impact may be particularly pronounced in environments like PE, where physical and social visibility intersect.

However, contrary to Hypothesis 2, the study found no significant moderating effect of teacher support on the relationship between cyberbullying and PE self-concept. While prior research has emphasized the protective role of teacher support in academic and psychosocial outcomes (Sharma et al., 2018; Santos et al., 2023), the current findings suggest that perceived support from PE teachers may not be sufficient to buffer the negative effects of online victimization. One possible explanation is that teacher influence, although important in structuring classroom climates, may be perceived as less impactful in



mitigating peer-driven online aggression, especially when such aggression occurs outside the immediate control of school staff. Additionally, adolescents may be reluctant to disclose cyberbullying experiences to teachers due to fears of social stigma, retribution, or lack of trust in effective intervention (Tong et al., 2023; Fuentes et al., 2022). These findings suggest that interventions aimed at teacher-student relationships, while valuable, may need to be combined with broader systemic strategies that address online safety and digital citizenship.

Conversely, support was found for Hypothesis 3, as peer connectedness significantly moderated the relationship between cyberbullying victimization and PE self-concept. Students with higher levels of perceived peer support reported more favorable self-concept outcomes even when exposed to cyberbullying, indicating a buffering effect. This result aligns with ecological models of adolescent development, which highlight the protective role of peer relationships in fostering resilience against various forms of psychological distress (Williams & Halliday, 2025). Strong peer bonds may provide emotional validation, social reinforcement, and a sense of belonging, which can counteract the isolating and stigmatizing effects of cyberbullying. In the PE context, where teamwork, collaboration, and group interaction are often central to class activities, peer connectedness may play an even more vital role in shaping students' self-perceptions (Xie et al., 2025).

The differential findings for teacher and peer support highlight the complex social dynamics that shape adolescents' experiences of cyberbullying. Although teachers play a key role in fostering supportive learning environments, peer groups often exert a more immediate influence on adolescents' self-concept, especially in physical education contexts. Research has shown that peer relationships significantly impact students' social identity and emotional well-being (Siddiqui et al., 2025). Therefore, fostering peer-led initiatives and promoting a classroom culture of inclusivity, empathy, and shared responsibility appear essential. Practical strategies such as peer mentoring, collaborative goal-setting, and cooperative physical activities may strengthen peer bonds and support positive self-concept development, particularly for students vulnerable to cyberbullying.

Despite its contributions, this study has several limitations. First, the cross-sectional design precludes causal inferences, and future research should consider longitudinal approaches to examine how cyberbullying and self-concept evolve over time. Second, the reliance on self-reported measures may introduce social desirability bias or inaccuracies in reporting sensitive experiences. Incorporating qualitative methods or multi-informant reports could enhance data validity. Third, the sample was drawn from a limited geographic area, which may affect the generalizability of the findings to other cultural or educational contexts. Replication studies in diverse settings are warranted to test the robustness of these results.

From a practical perspective, the findings of this study suggest several actionable recommendations for educational practice. First, physical education programs should actively promote peer connectedness by incorporating cooperative learning strategies, group-based activities, and peer support initiatives aimed at fostering positive social interactions among students. Such approaches may help buffer the negative psychological effects of cyberbullying on students' self-concept. Second, while teacher support alone was not found to be a significant moderator, it remains important for educators to create inclusive and supportive classroom environments that discourage bullying behaviors and encourage open communication. Finally, schools should consider implementing comprehensive anti-cyberbullying policies that integrate both preventive education and peer-led interventions, recognizing the critical role of social dynamics in shaping students' resilience and self-perception in physical education settings.

In conclusion, this study highlights the significant negative impact of cyberbullying on students' self-concept in physical education, while identifying peer connectedness but not teacher support as a meaningful moderator. These findings call for educational policies and practices that prioritize social cohesion, peer advocacy, and integrative approaches to address the psychological consequences of digital aggression within school environments. By attending to both virtual and physical dimensions of adolescent experience, educators and policymakers can better support students' holistic well-being and identity development.



## Conclusions

In conclusion, this study provides important empirical evidence on the detrimental effects of cyberbullying victimization on students' multidimensional self-concept in the context of physical education. The findings confirm that increased exposure to online harassment is significantly associated with lower perceptions of physical competence, body attractiveness, and peer acceptance, thereby reinforcing the notion that digital aggression can have far-reaching implications for adolescents' self-perceptions beyond the virtual environment. While perceived teacher support did not demonstrate a moderating effect, peer connectedness emerged as a significant buffer, suggesting that strong peer relationships can mitigate the psychological harm associated with cyberbullying. These results emphasize the crucial role of the peer social climate in shaping students' experiences in PE and underscore the need for schools to cultivate inclusive, empathetic, and cooperative learning environments. Educational interventions targeting peer cohesion and digital resilience may be especially effective in safeguarding students' self-concept and promoting overall psychosocial well-being. Given the increasing integration of digital communication in young people's lives, future research should adopt longitudinal and mixed-method approaches to further explore the dynamic interplay between cyberbullying, social support systems, and self-concept development across various educational domains. The current study contributes to this ongoing discourse by bridging cyberpsychology and physical education research.

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