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Integrated Physical Education for Mental Health: Enhancing Emotional Regulation, Self-Esteem, and Stress Resilience in Adolescents through Sports, Mindfulness, and Reflection

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Abstract: *This research explored how a planned physical education program, which combined team sports, mindfulness activities, and reflective exercises, could support the mental health of high school adolescents. Using a quasi-experimental design with pre- and post-assessments, the study included 60 teenagers (30 boys and 30 girls, aged 15–17) who were randomly divided into an experimental group (n = 30) and a control group (n = 30). Over eight weeks, the intervention group participated in structured sessions focused on emotional regulation, while the control group continued with standard physical education.*
Psychological outcomes were assessed using the Emotional Balance Scale (EBS), Self-Esteem Inventory (SEI), and Perceived Stress Scale (PSS). Analyses included Shapiro-Wilk tests, Cronbach's alpha, paired t-tests, and a 2×2 Mixed-Design ANOVA.
The intervention group showed significant improvements in emotional balance ($M = 2.90$ to 4.60; $p < 0.01$, $d = 2.002$), self-esteem ($M = 41.00$ to 57.50; $p < 0.001$, $d = 2.134$), and reduced stress ($M = 19.80$ to 12.10; $p < 0.01$, $d = –2.432$). No significant changes occurred in the control group. ANOVA confirmed significant Group × Time interactions ($p < 0.001$) with large effect sizes ($\eta^2 > 0.38$).
These findings demonstrate that integrating emotional development strategies into physical education can significantly enhance adolescents' psychological well-being. The results support incorporating structured, multidimensional programs into school curricula to improve emotional regulation, self-esteem, and stress resilience.

Keywords: *emotional regulation; mental health promotion; psychological resilience; educational psychology; school-based intervention.*

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Introduction

Adolescence is a critical developmental stage marked by psychological, social, and academic transitions that can significantly impact emotional well-being (Hosker et al., 2018; Vasilopoulos & Ellefson, 2021). The increasing levels of stress, anxiety, and emotional instability among high school students necessitate effective interventions that promote emotional balance and psychological resilience (Sanchez-Núñez et al., 2023; Ştefănică et al., 2025). Studies have demonstrated that adolescents who lack effective coping mechanisms for stress are at a higher risk of experiencing emotional distress, low self-esteem, and difficulties in academic and social settings (Pascoe et al., 2020; Aouani et al., 2024). Consequently, the implementation of structured interventions that address emotional regulation has become an essential aspect of educational policies (Liu et al., 2022; Roşu et al., 2024).

Participating in organized physical exercise is among the most beneficial strategies for supporting adolescents' emotional steadiness (Munteanu et al., 2024). Studies indicate that involvement in sports and PE initiatives can greatly enhance skills for managing emotions, build self-worth, and boost general mental wellness (Biddle et al., 2019; Li et al., 2022). Regular movement and sports participation help maintain emotional equilibrium by promoting collaboration, self-control, and social connection — all vital aspects of youth development (Rodriguez-Ayllon et al., 2019; Stefanica et al., 2024). Furthermore, structured physical activities have been linked to improved cognitive functions, reduced levels of perceived stress, and increased self-confidence, reinforcing the necessity of integrating these programs into school curricula (Lubans et al., 2016; Badau et al., 2023).

A structured physical education program that incorporates team-based sports, mindfulness exercises, and guided reflection sessions has been shown to yield substantial benefits in adolescent emotional regulation (Martinez et al., 2024). Team-based sports, such as volleyball and handball, create a sense of camaraderie, encouraging students to develop communication skills, trust, and cooperation, which contribute to emotional resilience (Guddal et al., 2019). These activities also foster a support system among peers, reducing feelings of isolation and stress (Wright et al., 2023; Wright et al., 2021). Mindfulness exercises, including guided breathing techniques and meditation, have been found to significantly decrease stress-related symptoms by reducing cortisol levels and promoting relaxation (De Nys et al., 2022). The integration of guided reflection sessions allows students to develop self-awareness, enhance emotional processing, and cultivate positive coping strategies in a structured setting (Han & Park, 2020). Such a

holistic approach to physical education combines physiological and psychological elements to optimize student well-being and promote long-term mental health.

Additionally, many studies have thoroughly examined how physical activity relates to mental well-being. Findings from Guddal et al. (2019) and Zhu et al. (2022) indicate that consistent involvement in sports is linked to reduced symptoms of depression and anxiety among teenagers, highlighting the mental health advantages of organized physical education initiatives.

Wright et al. (2023) demonstrated that increased participation in physical activities positively influences self-esteem and stress resilience, making it a crucial component of youth development strategies.

Despite the growing body of evidence supporting the effectiveness of physical education interventions, many schools still lack structured programs that integrate emotional regulation techniques. A key challenge is the inadequate training of educators in implementing psychological resilience strategies within physical education curricula (Leisterer & Jekauc, 2019; Popescu-Brădiceni et al., 2021). To address this gap, there is a need for comprehensive interventions that incorporate team-based sports, cooperative challenges, and guided reflection sessions, all of which contribute to the development of emotional stability and psychological well-being in students (Han and Park, 2020).

The innovation of the present study lies in its integrative and evidence-based design, combining competitive team sports with mindfulness and reflective practices over an eight-week structured program—specifically tailored to the needs of high school students. Unlike previous research, which often explores physical activity or mindfulness in isolation, this study evaluates the synergistic impact of combining these elements to enhance emotional regulation, self-esteem, and stress management. While prior studies such as Zhou et al. (2022) have demonstrated the effectiveness of integrating physical activity with mindfulness to improve emotion regulation in adolescents, the present research builds on this foundation by applying the intervention within a real educational context and using a mixed-methods approach tailored to the needs of high school students. By using a mixed-methods approach and applying the intervention within a real educational context, this study provides empirical data that can support the development of school-based policies aimed at improving adolescent mental health and resilience.

Based on this evidence, the current research investigates how organized physical education programs influence the emotional stability of high school learners. By implementing an eight-week intervention program, this study seeks to determine whether structured sports activities, coupled

with mindfulness techniques, can enhance emotional regulation, self-esteem, and stress management in adolescents. The research will contribute empirical evidence to support the integration of structured physical education programs into school curricula, emphasizing their role in promoting adolescent mental health and resilience.

Methods

Experimental Approach

A pretest-posttest quasi-experimental approach was used to evaluate how structured sports participation supports improvements in emotional regulation in high school students. The intervention group participated in structured physical education sessions incorporating team-based sports, mindfulness exercises, and guided reflection sessions, while the control group engaged in standard physical education classes without these components. The intervention lasted for eight weeks, with sessions conducted three times per week.

The structured intervention was designed to address different aspects of emotional regulation and self-awareness. Each session consisted of multiple components, beginning with a warm-up session that included mindfulness and breathing exercises aimed at stress reduction and mental focus. Following this, participants engaged in team-based sports such as volleyball and handball, fostering peer support and cooperative problem-solving. The final segment of each session consisted of guided reflection, where students discussed their emotional responses, coping strategies, and self-regulation techniques under the guidance of trained instructors.

To ensure consistency and effectiveness, all sessions were led by certified physical education instructors trained in emotional regulation strategies. These professionals provided structured feedback and motivation techniques to enhance students' self-awareness and emotional control. The control group, in contrast, followed a traditional physical education curriculum without specific emotional regulation components.

Data collection took place at two time points: pretest (before intervention) and posttest (after intervention). Standardized procedures were followed during administration to maintain uniformity across all measurements, and assessments were conducted in a controlled environment under the supervision of trained researchers.

Participants

This research was conducted with 60 secondary school students (equally split: 30 boys and 30 girls), aged 15–17 years (M = 16.2, SD = 1.2), all attending Elena Cuza National College as full-time pupils in Romania. Participants were chosen through well-defined selection and exclusion standards to guarantee a healthy, uniform, and comparable group appropriate for testing a structured physical education program focused on adolescent mental well-being (Biddle et al., 2019; Guddal et al., 2019).

Eligibility conditions specified that students must have maintained at least 85% attendance in the previous semester, presented no record of serious psychological illnesses, and had no medical limitations preventing moderate-to-intense physical exercise (such as cardiovascular or chronic respiratory diseases). Furthermore, participation was voluntary and required signed informed consent from both students and their parents or guardians before the study commenced, fully respecting the Declaration of Helsinki guidelines.

Exclusion rules eliminated students who were undergoing psychiatric or psychological care for emotional instability, had recorded disciplinary concerns that might hinder group-based sports involvement, or faced health risks compromising safety during physical activities. To uphold the validity of the study, any student missing over a quarter of the planned sessions was marked as withdrawn and removed from the final dataset; when feasible, suitable substitutes were recruited to keep the group sizes equivalent. Students were then randomly divided into two groups through a simple computer-generated randomization process.

Thirty students were assigned to the intervention group, which completed an eight-week structured physical education program integrating team-based sports, mindfulness activities, and guided reflection sessions. The other thirty students formed the control group, which continued with their standard physical education classes according to the national curriculum, without additional mindfulness or emotional regulation components. Randomization was independent of the school's internal class configuration to minimize clustering effects, and balanced gender distribution was maintained in both groups (15 boys and 15 girls per group). Baseline demographic comparability was verified, confirming no significant differences between the groups prior to the intervention.

Although no formal a priori power analysis was conducted before recruitment—a limitation recognized in line with best practices in intervention research (Biddle et al., 2019)—the sample size aligns with typical school-based mental health studies (25–35 participants per group) and was expected to

provide sufficient power ($\beta = 0.80$, $\alpha = 0.05$) to detect medium effect sizes as previously reported (Guddal et al., 2019).

The full research procedure received approval from the Ethics Board of the Doctoral School of Physical Education and Sports Science at the National University of Science and Technology Politehnica Bucharest (Approval No. 09/21.10.2024) and adhered strictly to the ethical standards outlined in the Declaration of Helsinki. All participants' privacy and anonymity were safeguarded during the study, and their right to exit the project at any point without repercussions was ensured. No negative incidents were reported.

A summary of the demographic characteristics for the research groups is presented in Table 1, categorized by gender and group assignment.

Table 1. Overview of Sample Characteristics

Group	Male (n = 30)	Female (n = 30)
Mean Age (years) ± SD	16.2 ± 1.1	16.1 ± 1.3
Attendance Rate (%)	91.5 ± 3.2	92.1 ± 2.8
Sports Practice Level	Recreational	Recreational

Data collection tools

To assess the impact of the intervention, three validated psychological scales were utilized, each measuring a different aspect of emotional regulation and well-being:

1. Emotional Balance Scale (EBS) – a 20-item self-assessment tool used to measure emotional stability and the ability to cope with stress (Clarbour & Roger, 2004). Participants evaluated their experiences using a Likert scale from 1 (strongly disagree) to 5 (strongly agree). Higher scores reflect stronger emotional balance and better stress resilience. In the current study, the EBS showed good internal consistency: experimental group ($\alpha = 0.86$ (pretest), $\alpha = 0.88$ (posttest)); control group ($\alpha = 0.84$ (pretest), $\alpha = 0.83$ (posttest)).

2. Self-Esteem Inventory (SEI) -a widely used 25-item scale that measures self-perception and confidence levels (Hills et al., 2011). This instrument evaluates key aspects of self-esteem, including social competence, personal self-worth, and overall confidence. Participants answered using a 5-point Likert scale, where greater scores indicated stronger self-esteem. Internal consistency was excellent for both groups: experimental group ($\alpha = 0.89$ (pretest), $\alpha = 0.90$ (posttest)); control group ($\alpha = 0.87$ (pretest), $\alpha = 0.86$ (posttest)).

3. Perceived Stress Scale (PSS)- a 10-item scale developed to measure subjective stress levels before and after the intervention (Cohen et al., 1983). Participants assessed their stress levels using a 5-point Likert scale (0 = never, 4 = very often); higher values signified increased perceived stress, while lower scores indicated more effective stress management and emotional control. Internal consistency was acceptable to good: experimental group (α = 0.85 (pretest), α = 0.86 (posttest)); control group (α = 0.84 (pretest and posttest)).

Each of these scales has been extensively validated in previous research, ensuring reliability and consistency in measuring emotional balance, self-esteem, and stress levels. The inclusion of the reliability check conducted in this research confirms the robustness of the instruments for the specific adolescent sample investigated. The use of these psychological assessment tools facilitated accurate tracking of participants' emotional responses to the intervention and provided valuable insights into the efficacy of structured physical education programs in promoting adolescent emotional well-being.

Procedure of the intervention

The intervention program was structured over eight weeks, with three sessions per week, each lasting 60 minutes. The program was designed to foster emotional regulation, self-esteem, and stress management through targeted physical activities and mindfulness exercises.

Table 2 provides a detailed breakdown of the intervention structure and corresponding activities.

Table 2. Intervention Program Structure and Activities

Weeks	Session Focus	Activity Type
1-2	Emotional awareness	Team-based exercises and guided reflection
3-4	Stress management	Breathing techniques, mindfulness activities
5-6	Self-esteem building	Competitive sports (handball, volleyball) with positive reinforcement
7-8	Social bonding	Cooperative challenges and peer support games

Each session was divided into three main phases:

1. Warm-Up Phase (10-15 minutes)

2. Light aerobic exercises to prepare students physically and mentally.

3. Dynamic stretching and breathing exercises to enhance focus and relaxation.

4. Main Activity Phase (35-40 minutes)

5. Engaging in structured activities corresponding to the thematic focus of the week.

6. Incorporating cooperative and competitive games to foster teamwork and self-confidence.

7. Guided implementation of mindfulness techniques, including guided reflection and deep breathing exercises.

8. Cool-Down and Reflection Phase (10 minutes)

9. Relaxation and stretching exercises.

10. Group discussions to evaluate emotional responses and stress management strategies.

The intervention program was supervised by trained physical education instructors, who provided structured feedback and motivation techniques to encourage self-awareness and emotional control. The control group continued their standard physical education curriculum, which included general fitness exercises and traditional sports activities, but did not receive any structured emotional regulation training.

Statistical analysis

This study's data were analyzed using both descriptive and inferential statistics to examine how the intervention influenced adolescents' emotional well-being. Summary statistics, such as averages and standard deviations (SD), were computed for participants' scores on the Emotional Balance Scale (EBS), Self-Esteem Inventory (SEI), and Perceived Stress Scale (PSS).

Prior to conducting parametric testing, normality was checked with the Shapiro-Wilk test. All variables demonstrated acceptable normal distribution ($p > 0.05$), thus supporting the use of parametric procedures.

Internal consistency (reliability) of the instruments was evaluated using Cronbach's α coefficient. All scales demonstrated good to excellent internal consistency, with values ranging from $\alpha = 0.83$ to $\alpha = 0.90$ across both groups and time points. These findings confirm the reliability of the tools within this sample (see Table 3).

To assess within-group changes from pretest to posttest, paired-samples t-tests were conducted separately for the intervention and control groups (Manfei et al., 2017). Effect sizes were computed using Cohen's d, categorized as small (< 0.3), medium (< 0.5), large (< 0.8), and very large (> 0.8).

To compare results between groups (EBS, SEI, PSS), a 2×2 Mixed-Design ANOVA was used, with Group (intervention vs. control) as the between-group factor and Time (pretest vs. posttest) as the within-group

factor. This tested:the overall effect of time, group differences and the interaction (Group × Time), showing if the intervention group improved more than the control group.

Significance was set at $p < 0.05$ and $p < 0.01$. All analyses were run using IBM SPSS Statistics v.23 (Murana & Rahimin, 2021).

Results

This section reports the statistical results evaluating how the structured physical education program affected adolescents' emotional balance, self-esteem, and stress levels.

Normality was checked with the Shapiro-Wilk test before running parametric analyses. Table 3 shows all variables met normality ($p > 0.05$), supporting the use of t-tests and ANOVA.

Table 3. Shapiro-Wilk Test of Normality for EBS, SEI, and PSS by Group and Time Point

Scale	Group	Test	Shapiro-Wilk (p-value)
EBS	Experimental	IT	0.114
		FT	0.192
	Control	IT	0.206
		FT	0.148
SEI	Experimental	IT	0.127
		FT	0.095
	Control	IT	0.134
		FT	0.160
PSS	Experimental	IT	0.187
		FT	0.131
	Control	IT	0.142
		FT	0.118

The internal consistency of the three psychological scales (EBS, SEI, PSS) was assessed using Cronbach's Alpha. Table 4 shows the coefficients recorded at both pre- and post-intervention stages. All values exceeded 0.83, indicating good to excellent internal consistency within this sample.

Table 4. Cronbach's Alpha for EBS, SEI, and PSS Scales by Group and Time Point

Scale	Group	Test	Cronbach's Alpha
EBS	Experimental	IT	0.86
		FT	0.88
	Control	IT	0.84
		FT	0.83
SEI	Experimental	IT	0.89
		FT	0.90
	Control	IT	0.87
		FT	0.86
PSS	Experimental	IT	0.85
		FT	0.86
	Control	IT	0.84
		FT	0.84

To measure changes within each group over time, paired t-tests were run separately for the intervention and control groups.

Table 5 shows the results for the intervention group, which revealed significant gains on all three scales ($p < 0.01$) and very large effect sizes (Cohen's $d > 2$), highlighting the strong effect of the program

Table 5. Within-Group Changes and Effect Sizes for the Intervention Group

Scale	Test	Mean	SD	Mean Δ (FT–IT)	95% CI (Lower–Upper)	p-value	Cohen's d
EBS	IT	2.90	0.70	+1.70	1.32 – 2.08	< 0.01	2.002
	FT	4.60	0.60				
SEI	IT	41.00	5.80	+16.50	13.27 – 19.72	< 0.001	2.134
	FT	57.50	6.20				
PSS	IT	19.80	3.10	–7.70	–9.31 – –6.09	< 0.01	–2.432
	FT	12.10	2.70				

Table 6 shows the findings for the control group. No significant differences were found for any of the three measures ($p > 0.05$), and effect sizes were small (Cohen's $d < 0.30$), suggesting that the regular physical education program did not produce notable psychological changes.

Table 6. Within-Group Results and Effect Estimates for the Control Group

Scale	Test	Mean	SD	Mean Δ (FT–IT)	95% CI (Lower–Upper)	p-value	Cohen's d
EBS	IT	2.95	0.72	+0.10	–0.09 – 0.29	0.276	0.139
	FT	3.05	0.75				
SEI	IT	42.00	6.00	+1.00	–0.71 – 2.71	0.242	0.166
	FT	43.00	5.90				
PSS	IT	19.70	3.20	–0.30	–1.12 – 0.52	0.464	–0.094
	FT	20.00	3.25				

To assess differential change over time between groups, a 2×2 Mixed-Design ANOVA was conducted for each psychological variable. The analysis revealed statistically significant Group × Time interaction effects for all three scales ($p < 0.001$), indicating that the experimental group experienced significantly greater improvements than the control group.

Table 7 summarizes the ANOVA results, including effect sizes. All partial eta squared values were above 0.38, confirming large interaction effects.

Table 7. Mixed-Design ANOVA Results (Group × Time Interaction)

Scale	F (Group × Time)	p-value	Partial Eta Squared (η^2)
EBS	42.68	< 0.001	0.415
SEI	50.33	< 0.001	0.450
PSS	37.45	< 0.001	0.389

- All scales showed acceptable normality, justifying parametric testing.
- Reliability was confirmed via strong internal consistency across scales.
- Notable psychological gains were seen in the intervention group, while the control group showed no meaningful changes.
- Mixed-Design ANOVA demonstrated that improvements in emotional balance, self-esteem, and stress reduction were significantly greater in the intervention group, with large effect sizes.

These results confirm the effectiveness of the structured physical education program in promoting adolescent mental well-being.

Discussion

The goal of this research was to assess the impact of a planned physical education approach, which blended team-based sports, mindfulness practice, and reflective sessions, on students' emotional stability, self-worth, and stress perception. The research population consisted of 60 adolescents (30 male, 30 female), aged 15 to 17 years ($M = 16.2$, $SD = 1.2$), all enrolled at Elena Cuza National College in Romania. This clear demographic profile ensured gender balance and a homogeneous age range, providing relevant context for interpreting the results and understanding their scope.

Before running inferential analyses, normality was checked using the Shapiro-Wilk test, confirming that all variables were normally distributed ($p > 0.05$).The internal consistency of the EBS, SEI, and PSS was also high ($\alpha = 0.83–0.90$), confirming robust measurement reliability. Paired-sample t-tests revealed significant improvements in the experimental group's emotional balance, self-esteem, and perceived stress (Cohen's $d > 2.0$), while the control group showed no meaningful changes (Cohen's $d < 0.30$) — consistent with previous studies emphasizing the limited impact of standard PE on emotional outcomes (Leisterer & Jekauc, 2019; Popescu-Bradiceni et al., 2021). The significant Group × Time interaction effects ($\eta^2 > 0.38$) further underline that these improvements were attributable to the integrated approach.

These findings reinforce prior evidence that regular physical activity enhances emotional regulation and well-being in youth (Biddle et al., 2019; Lubans et al., 2016; Rodriguez-Ayllon et al., 2019). By embedding mindfulness and guided reflection, this study aligns with work by Wright et al. (2023) and Pascoe et al. (2020) showing stronger emotional resilience when cognitive-emotional strategies complement physical training. This is echoed by momentary stress-reduction studies using ecological sampling (Do et al., 2023; Sheikh et al., 2021) and biological evidence linking physical activity with reduced cortisol and improved stress regulation (De Nys et al., 2022; Liu et al., 2022).

While promising, several limitations must be noted. The study's small, single-site sample ($N = 60$) and lack of a priori power analysis limit generalizability (Han & Park, 2020). Future replications should test larger, more diverse cohorts in multiple schools and cultural contexts to confirm robustness. The short intervention duration (eight weeks) did not allow assessment of long-term effects; longitudinal follow-ups at three to six months are recommended (Rodriguez-Ayllon et al., 2019). Potential confounding factors such as family environment or peer dynamics were not controlled for (Biddle et al., 2019), nor were objective measures used to

complement self-report instruments (Guddal et al., 2019). Moreover, the quasi-experimental design limits causal inference; randomized controlled trials (Leisterer & Jekauc, 2019) and triangulation with teacher ratings or physiological markers (e.g., heart rate, cortisol) are suggested to strengthen evidence.

Despite these constraints, this research supports integrating physical activity, mindfulness, and reflection within PE curricula as a viable strategy to promote adolescent mental health (Zhou et al., 2022; Edwards and Hooper, 2023; Plastoi et al., 2020). Addressing these methodological points in future studies will help scale and adapt such programs sustainably for broader educational settings.

Practical implications and recommendations

The results of this research highlight the value of including structured physical education in high school programs to support students' emotional balance and mental well-being (Hosker et al., 2018, Ben Ezzdine et al., 2025). Based on the results, several key practical implications and recommendations can be drawn to enhance the effectiveness of such interventions:

1. schools should design and implement structured emotional regulation exercises within their physical education curricula. These exercises should include mindfulness techniques, breathing exercises, and guided reflection activities that help students develop emotional self-awareness and resilience.

2. the results indicate that team-based sports, such as volleyball and handball, foster social interaction and emotional support among students. Schools should prioritize cooperative sports and group challenges to encourage positive peer interactions and teamwork, which contribute to emotional stability.

3. educators and physical education instructors should receive specialized training in emotional regulation techniques and psychological resilience strategies. This training will equip teachers with the necessary skills to implement effective interventions and provide emotional support to students.

4. schools should create an inclusive environment where all students, regardless of athletic ability, feel encouraged to participate in physical education programs. Motivational strategies, such as goal-setting, self-monitoring, and positive reinforcement, can enhance students' engagement and willingness to participate in activities that promote emotional balance.

5. integrating mental health professionals into school programs can help ensure that students with severe emotional imbalances receive additional

support. School psychologists and counselors should work alongside physical education teachers to develop personalized strategies for students who may require extra guidance.

6. educational policymakers should recognize the psychological benefits of structured physical education programs and consider mandating emotional balance interventions as part of the standard curriculum. Government and institutional funding should support research and program development to ensure the effective implementation of these initiatives.

7. parents play a crucial role in reinforcing emotional balance strategies at home. Schools should organize workshops and informational sessions for parents to educate them on the benefits of physical activity and emotional regulation techniques for adolescent well-being.

Conclusions

This study provides empirical evidence supporting the integration of structured sports programs in high school curricula to promote emotional balance. Findings suggest that targeted physical education interventions significantly enhance students' emotional regulation, self-esteem, and stress management capabilities. The results highlight the importance of structured interventions in equipping adolescents with coping mechanisms that contribute to their emotional well-being and overall psychological development.

Moreover, this research emphasizes the need for continued evaluation and adaptation of physical education curricula to better address students' emotional and mental health needs. By implementing these insights, schools can foster a holistic approach to student development, ensuring that physical education serves not only as a means for physical fitness but also as a tool for emotional resilience and psychological stability.

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