

The Effect of Soccer Learning on Academic Stress Among High School Students

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Abstract:

Background: Grade XII students face escalating academic pressures, ranging from rigorous school curriculums to university entrance preparations. This condition often triggers high levels of academic stress, characterized by anxiety, fatigue, and decreased motivation. While Physical Education is mandatory, its potential as a structured mental health intervention remains underutilized in the school system. **Aims:** This study aims to empirically evaluate the role of structured soccer learning within Physical Education classes in reducing academic stress levels among Grade XII students. **Methods:** The study employed a Pre-experimental method with a One Group Pre-test Post-test Design. A purposive sampling technique selected 21 students from class XII IPS who exhibited signs of academic pressure. The instrument used was the Perceived Academic Stress Scale (PASS) (Cronbach's Alpha = 0.958). The intervention consisted of a 6-meeting soccer program focusing on technical skills and social mini-games. **Result:** Statistical analysis using the Paired Sample t-Test revealed a significant reduction in stress scores. The pre-test mean score was 40.00 (High Category), decreasing to 36.24 (Medium Category) in the post-test. The hypothesis test indicated a significance value (Sig.) of 0.000 ($p < 0.05$). **Conclusion:** It is concluded that soccer learning significantly lowers academic stress. The combination of physical exertion and social interaction in soccer provides an effective mechanism for psychological distraction and emotional release.

Keywords: Soccer Learning, Physical Education, Academic Stress

Introduction

Background of the study: Academic stress has emerged as a critical issue in the modern educational landscape, particularly for Grade XII students who are positioned at a transitional phase between secondary education and higher education. These students face a "double burden": mastering the extensive school curriculum and preparing for high-stakes university entrance examinations. Observations conducted at SMA Muhammadiyah Bangkinang revealed a concerning phenomenon where students in the final year (Grade XII) exhibited symptoms of high academic stress, including mental fatigue, sleep disturbances, and heightened anxiety regarding their future. Data from the OECD, (2019) supports this, stating that 66% of students identify "getting poor grades" as a major source of stress. Without appropriate intervention, this stress can lead to academic burnout and long-term psychological issues.

In contrast to previous studies that examined physical activity in general with a contribution to stress reduction ranging from 18–25%, this study specifically explores soccer learning in PJOK as a pedagogical intervention that has the potential to reduce academic stress in grade XII students through a combination of physical activity, social interaction, teamwork, and enjoyable learning experiences.

Literature review: Academic stress is defined as a condition in which academic demands exceed

students' adaptive resources, resulting in psychological, emotional, and behavioral strain (Roccliffe et al., 2024). From a theoretical perspective, physical activity is considered an effective strategy for reducing psychological stress through several physiological mechanisms. According to the Endorphin Hypothesis, exercise stimulates the release of endorphins, neurotransmitters that enhance positive mood and reduce the perception of stress and pain. Furthermore, the Thermogenic Theory suggests that increased body temperature during exercise promotes muscle relaxation and reduces physiological tension. Physical activity also regulates the hypothalamic–pituitary–adrenal (HPA) axis, leading to lower cortisol secretion and improved stress management. Consistent with these mechanisms, the World Health Organization (WHO, 2020) recommends that adolescents engage in at least 60 minutes of moderate-to-vigorous physical activity daily, totaling at least 420 minutes per week, to obtain optimal physical and mental health benefits.

Empirical evidence further supports these theoretical explanations. (Roccliffe et al., 2024) reported that structured physical activity programs reduced stress levels by approximately 18–25% among secondary and university students. Zhang et al. (2024), in a study involving 2,420 high school students, found that students who engaged in at least 60 minutes of daily physical activity experienced 23.4% lower academic stress levels than their less active peers. Similarly, (Sheng et al., 2024), examining 3,805 students, found that participation in school sports increased resilience by 31.7%, significantly enhancing students' ability to cope with academic pressures.

In team sports, soccer offers additional psychological benefits through social interaction, cooperation, and emotional support. (Fernandes et al., 2024) found that participation in team sports increased emotional intelligence by 27.8%, self-confidence by 24.3%, and life satisfaction by 21.6% compared with non-participating students. Likewise, (Delfin et al., 2024) reported that adolescents involved in soccer demonstrated 19.4% lower psychological stress levels due to stronger peer support and positive team interactions. Despite these findings, previous studies have primarily focused on physical activity or sports participation in general. Research specifically examining soccer learning within Physical Education (PE) classes as a structured intervention for reducing academic stress among Grade XII students remains limited. This gap is particularly important because Grade XII students experience substantial academic pressure associated with graduation requirements and university entrance preparation. This study aims to analyze the role of soccer learning in Physical Education in reducing academic stress levels among Grade XII students.

Gap analysis: Although the psychological benefits of physical activity have been widely documented, evidence regarding soccer learning implemented as a structured component of Physical Education classes remains limited. Existing studies predominantly examine general physical activity, extracurricular sports participation, or competitive athletes, whose characteristics differ substantially from those of senior high school students. This issue is particularly relevant for Grade XII students, who experience intense academic demands related to graduation requirements and university entrance preparation. Such pressures often reduce opportunities for regular physical activity and increase sedentary behavior. According to the Endorphin Hypothesis and the HPA-axis regulation theory, insufficient physical activity may decrease endorphin production and impair cortisol regulation, thereby increasing susceptibility to academic stress. Soccer learning within Physical Education offers a potentially effective approach because it combines moderate-to-vigorous physical activity, social interaction, teamwork, and enjoyable learning experiences that may support stress reduction. Nevertheless, empirical evidence examining the role of soccer learning in reducing academic stress among Grade XII students, particularly in Islamic secondary schools (madrasah), remains scarce. Therefore, further investigation is needed to understand the

contribution of soccer learning to academic stress management in this specific educational context.

Rationale of the study: This research posits that soccer learning provides a unique combination of physical exertion and social support (teamwork) that can serve as an effective "distraction" and "catharsis" mechanism for students under high academic pressure.

Purpose or Hypotheses of the study: The primary objective of this study is to determine the effectiveness of soccer learning in Physical Education in reducing academic stress levels. The hypothesis tested is that there is a significant difference in academic stress scores before and after the intervention.

Material & Methods

Research Design: This research utilized a quantitative pre-experimental design, specifically the One-Group Pretest-Posttest Design. This methodology was selected to measure the direct impact of the intervention on a single group of subjects without a control group, focusing on the magnitude of change within the subjects themselves.

Participant: The population consisted of 108 students enrolled at SMA Muhammadiyah Bangkinang. Participants were selected using purposive sampling based on specific inclusion criteria: (1) active enrollment in Grade XII, (2) experiencing a high academic workload related to graduation requirements and university entrance preparation, and (3) willingness to participate in the entire six-week intervention program. Grade XII IPS was purposively chosen because students at this level experience the highest academic demands compared to other grades. The final sample comprised all 21 students in Grade XII IPS who met the inclusion criteria and agreed to participate in the study. Therefore, the sample size was determined based on participant eligibility and the characteristics required for the intervention rather than through statistical sample size calculation.

Instrument: The data collection instrument was the Perceived Academic Stress Scale (PASS) adapted from. The questionnaire consists of 12 items using a 5-point Likert scale ranging from "Strongly Disagree" to "Strongly Agree". The instrument underwent rigorous validity and reliability testing, yielding a Cronbach's Alpha coefficient of 0.958, indicating excellent reliability for measuring student stress levels.

Procedures: The soccer learning intervention was structured to elicit moderate-to-vigorous physical activity intensity (65–85% HRmax), a level previously associated with reductions in cortisol concentration, improvements in endorphin release, and enhanced psychological well-being among adolescents. The intervention consisted of four consecutive weeks of soccer-based learning activities combining technical drills, tactical exercises, and small-sided games designed to maximize physical engagement, social interaction, and emotional regulation.:

1. Meeting 1 (Pre-test): Administration of the PASS questionnaire to establish baseline stress data.
2. Meeting 2-5 (Intervention): Implementation of the soccer learning program.
 - a) *Basic Skills*: Drills focused on passing, dribbling, and shooting to engage motor focus.
 - b) *Combination Drills*: Complex movements (dribbling-passing, dribbling-shooting) to increase cognitive engagement.
 - c) *Mini Games*: Small-sided games (5vs5) were introduced to foster social interaction, teamwork, and emotional release (catharsis).
3. Meeting 6 (Post-test): Re-administration of the PASS questionnaire to measure post-intervention stress levels.

Analysis plan: Data were analyzed using SPSS version 26. Descriptive statistics (Mean, SD) were used to profile the data. Prerequisite tests included the Shapiro-Wilk test for normality and

Levene's test for homogeneity. The hypothesis was tested using the Paired Sample t-Test with a significance level of $\alpha < 0.05$.

Results

Results: Descriptive Statistics analysis of the pre-test data showed that the students' initial academic stress levels were concerning. The mean pre-test score was 40.00 (SD=1.817), with scores ranging from 37 to 44. Based on the categorization norms, 57.14% (12 students) fell into the "High" stress category. This confirms the background assumption that Grade XII students face significant pressure. Following the 6-week soccer intervention, the post-test data revealed a marked improvement. The mean score dropped to 36.24 (SD=1.947), with scores ranging from 33 to 41. The frequency distribution showed a major shift, with 95.24% (20 students) moving into the "Medium" stress category, leaving only 1 student in the "High" category. Prerequisite Tests Before hypothesis testing, normality and homogeneity were verified.

- Normality Test: The Shapiro-Wilk test yielded a significance value of 0.479 for the pre-test and 0.185 for the post-test. Since both values are > 0.05 , the data is normally distributed.
- Homogeneity Test: Levene's test showed a significance of 0.159 ($p > 0.05$), indicating homogeneous variance between the data sets.

Hypothesis Testing The Paired Sample t-Test was conducted to determine the significance of the reduction in stress scores.

Table.1 Paired Sample t-Test Results Source: Primary Data Analysis (2025)

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	pretest – posttest	3.762	2.071	.452	2.819	4.705	8.323	20	.000

As shown in Table 1, the mean difference between pre-test and post-test was 3.762. The statistical calculation resulted in a t-value of 8.323 with a Sig. (2-tailed) of 0.000. Since $0.000 < 0.05$, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_1) is accepted. This statistical analysis confirms that the soccer learning intervention had a significant effect in reducing academic stress.

Discussion: The findings of this study demonstrate that soccer-based physical education significantly reduced academic stress among senior high school students. The mean academic stress score decreased from 40.00 before the intervention to 36.24 after the intervention, indicating a statistically significant improvement in students' psychological well-being ($p < 0.05$). These findings suggest that soccer learning activities can serve not only as a physical exercise modality but also as an effective strategy for managing academic stress among adolescents.

The reduction in academic stress observed in this study can be explained through several interrelated mechanisms. First, the psychological distraction hypothesis suggests that participation in soccer diverts students' attention away from academic demands and stressors. During soccer activities, students must focus on ball control, tactical decision-making, communication with

teammates, and game situations. Such cognitive engagement temporarily interrupts repetitive negative thoughts and academic rumination, which are commonly associated with elevated stress levels. This finding supports previous studies indicating that physical activity acts as a stress-buffering factor among adolescents by reducing psychological symptoms associated with stressful life events (Y. Liu et al., 2025).

Physiological effects of exercise may contribute substantially to stress reduction. Moderate-to-vigorous physical activity stimulates the release of endorphins, dopamine, and serotonin, which are associated with positive mood regulation and emotional well-being. In addition, regular physical activity has been shown to reduce cortisol levels, a hormone commonly linked to chronic stress. Earlier studies by (P. Liu, 2025; Ooms et al., 2025) reported similar findings, demonstrating that participation in structured physical activities contributes to improved emotional regulation and lower stress responses. More recent evidence also indicates that physical exercise indirectly reduces negative emotions by lowering academic stress and improving sleep quality among adolescents (Naya et al., 2021).

Beyond its physiological benefits, soccer provides important social and emotional advantages that may distinguish it from individual forms of exercise. The soccer learning sessions implemented in this study involved small-sided games that required teamwork, communication, cooperation, and peer interaction. Such social engagement may foster a sense of belonging and social support, both of which are recognized protective factors against stress (Haritay et al., 2025). A recent systematic review on youth sport participation reported that organized sports environments positively influence adolescent mental health by enhancing social connectedness, self-confidence, and emotional resilience (Bengtsson et al., 2025). Likewise, sport-based mental health interventions have been found to improve psychological well-being by combining physical activity with supportive peer interactions and shared experiences (Sullivan et al., 2025).

The present findings are consistent with several contemporary studies. (Liu, 2025) found that physically active adolescents exhibited lower levels of stress symptoms compared to their less active peers. Similarly, (Leng et al., 2025) reported that physical activity was negatively associated with academic stress, with self-efficacy and psychological resilience serving as mediating factors. (Cheng et al., 2025) further demonstrated that academic stress partially mediates the relationship between physical exercise and subjective well-being among high school students. Collectively, these findings reinforce the notion that physical activity contributes to adolescent mental health through both direct physiological pathways and indirect psychosocial mechanisms (Frömel et al., 2020).

The findings of this study can be explained through the Psychophysiological Stress Reduction Theory proposed by (Oishi & Suzuki, 2026), which states that physical activity contributes to stress reduction through both physiological and psychological mechanisms. Physiologically, participation in soccer learning activities stimulates the release of endorphins, serotonin, and dopamine, neurotransmitters associated with positive mood regulation and reduced anxiety. At the same time, regular physical activity helps lower cortisol levels, a hormone closely associated with psychological stress. These mechanisms may explain the significant reduction in academic stress observed among Grade XII students following the soccer learning intervention. From a psychological perspective, the Cognitive Activation Theory of Stress developed by (Herber et al., 2025; Klein et al., 2025) suggests that stress occurs when individuals perceive environmental demands as exceeding their coping resources. Soccer learning provides opportunities for students to engage in enjoyable physical movement, social interaction, teamwork, and problem-solving situations, which enhance coping capacity and reduce perceptions of academic pressure. This

finding supports previous studies by (Métais et al., 2025), who reported lower academic stress among physically active students, and (Boltivets et al., 2025), who found that participation in school sports strengthened resilience and stress management abilities. Furthermore, the Social Support Theory (Sumin et al., 2025) provides additional explanation for the effectiveness of soccer learning. Soccer is a team-based activity that encourages communication, cooperation, and peer support. Positive social interactions during learning activities may create a protective effect against academic stress by fostering a sense of belonging and emotional security. This explanation is consistent with (Guan et al., 2025), who found that team sports improved emotional intelligence and self-confidence, and (Benítez-Agudelo et al., 2025), who reported lower psychological stress among adolescents involved in soccer due to increased social support.

The present study extends previous research by demonstrating that soccer learning integrated into regular Physical Education classes can function not only as a medium for physical development but also as an educational strategy for managing academic stress among Grade XII students. Unlike previous studies that primarily examined general physical activity or extracurricular sports participation, this study highlights the unique contribution of structured soccer learning conducted within the school curriculum. The combination of physical exertion, cognitive engagement, and social interaction appears to create a multidimensional mechanism that supports students' psychological well-being. These findings suggest that Physical Education should be recognized as an important component of school-based mental health promotion. Regular soccer learning activities may serve as an effective and practical intervention to help students cope with academic demands, particularly during critical educational stages such as the final year of secondary education.

Conclusions

Based on the results of the study, soccer learning in Physical Education demonstrated a significant role in reducing academic stress among Grade XII students at SMA Muhammadiyah Bangkinang. Prior to the intervention, students exhibited relatively high levels of academic stress, with a mean pre-test score of 40.00 ± 1.817 , and 57.14% (12 students) were categorized as experiencing high academic stress. After participating in a six-week soccer learning program, the mean stress score decreased to 36.24 ± 1.947 , representing a reduction of 3.762 points (9.41%). Furthermore, the proportion of students in the high-stress category decreased substantially, while 95.24% (20 students) shifted to the medium-stress category. The statistical analysis confirmed the effectiveness of the intervention. The data met the assumptions of normality (Shapiro-Wilk: pre-test = 0.479; post-test = 0.185) and homogeneity (Levene's test = 0.159). The Paired Sample t-Test revealed a significant difference between pre-test and post-test scores ($t = 8.323$; $p = 0.000 < 0.05$), indicating that soccer learning significantly reduced students' academic stress levels.

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AI Disclosure Statement

The author used Gemini (a large language model by Google) during the preparation of this work to translate the original manuscript from Indonesian to English, refine the grammatical structure, and organize the content to fit the journal template. After using the tool, the author thoroughly reviewed and edited the content to ensure accuracy and takes full responsibility for the content of the publication. The authors declare that the core research data and statistical analysis were conducted without the aid of AI.

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