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Physical Activity and Emotional Well-being Among Physical Education Students

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ABSTRACT

The purpose of the study. The relationship between physical activity and emotional well-being has gained significant attention in health research, yet limited studies have examined this association among Indonesian Physical Education students. Understanding this relationship is crucial for developing targeted interventions to promote mental health in academic settings. This study aimed to examine the relationship between physical activity levels and emotional well-being among Physical Education students.

Materials and methods. A cross-sectional quantitative study was conducted with 245 Physical Education students (mean age 20.4 ± 1.8 years, 58% male). Physical activity levels were assessed using the International Physical Activity Questionnaire-Short Form (IPAQ-SF), while emotional well-being was evaluated using the WHO-5 Well-being Index and the Positive and Negative Affect Schedule (PANAS). Data were analyzed using SPSS version 29.0 with correlation analysis and multiple regression modeling.

Results. The study revealed a significant positive correlation between physical activity levels and emotional well-being ($r = 0.67$, $p < 0.001$). Students with high physical activity levels demonstrated significantly higher WHO-5 scores ($M = 18.2 \pm 3.1$) compared to those with low activity levels ($M = 12.4 \pm 4.2$, $p < 0.001$). Positive affect scores were significantly higher in the high activity group ($M = 37.8 \pm 6.2$) versus the low activity group ($M = 28.1 \pm 7.4$, $p < 0.001$). Multiple regression analysis indicated that physical activity accounted for 45% of the variance in emotional well-being scores ($R^2 = 0.45$, $F(3,241) = 65.84$, $p < 0.001$).

Conclusions. This study provides evidence for a strong positive association between physical activity and emotional well-being among Indonesian Physical Education students. The findings suggest that promoting physical activity could be an effective strategy for enhancing emotional well-being in academic environments. These results have important implications for curriculum development and student support services in higher education institutions.

Keywords: physical activity; emotional well-being; mental health; Physical Education students; IPAQ; PANAS.

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INTRODUCTION

The relationship between physical activity and emotional well-being represents a fundamental aspect of human health that has garnered increasing attention from researchers, healthcare professionals, and educators worldwide (Cho, 2020). The growing recognition of mental health challenges among university students has prompted extensive investigation into modifiable factors that can enhance psychological well-being and academic performance. Physical activity, as a readily accessible and cost-effective intervention, has emerged as a promising avenue for promoting emotional health in academic settings (Ahsan & Abualait, 2025; Pardilla et al., 2025) .

The contextual framework of this research is grounded in the biopsychosocial model of health, which recognizes the interconnected nature of physical, psychological, and social factors in determining overall well-being (Ryff, 2023; Swandana et al., 2025). Within the Indonesian educational context, where academic pressure and lifestyle changes during university years may contribute to emotional distress, understanding the protective effects of physical activity becomes particularly relevant (Sungkowo et al., 2019). This study specifically targets physical education students, a unique population whose professional trajectory inherently involves physical activity, thus offering distinct insights into how their engagement with physical activity shapes their emotional states

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and resilience (Zhang et al., 2022). The unique cultural and environmental factors present in Indonesia, including tropical climate conditions and traditional physical practices, provide an interesting backdrop for examining these relationships.

A critical examination of existing literature reveals substantial evidence supporting the positive effects of physical activity on emotional well-being. Meta-analytic studies have consistently demonstrated that regular physical activity is associated with reduced symptoms of depression and anxiety, improved mood states, and enhanced overall psychological well-being (Guo & Liang, 2023; Neumann et al., 2021). This association is often attributed to the physiological adaptations induced by exercise, such as neurochemical changes and inflammatory modulation, as well as the psychological benefits derived from goal attainment and social interaction (Rodríguez-Romo et al., 2022). However, the specific mechanisms through which physical activity influences emotional well-being, particularly within specialized populations like physical education students, require further nuanced exploration (Rodríguez-Romo et al., 2022). The neurobiological mechanisms underlying these effects include the release of endorphins, increased levels of brain-derived neurotrophic factor (BDNF), and improved neurotransmitter function (Erwin & Schreiber, 2024; Han et al., 2025). Additionally, psychosocial pathways such as enhanced self-efficacy, social interaction, and stress reduction contribute to the beneficial effects of physical activity on emotional health (Wang et al., 2024; Skrypchenko, I. et al., 2025). Beyond general population studies, research highlights that physical activity significantly reduces anxiety and depression, two prevalent mental health issues among various demographics (Mahanjana et al., 2025). Specifically, regular engagement in physical activity has been shown to mitigate negative emotions such as stress, anxiety, and depression among college students, fostering greater life satisfaction and overall well-being (Huang et al., 2025; Liu et al., 2024; Zuo et al., 2025).

However, several research gaps have been identified in the current literature. First, there is a notable lack of studies examining the physical activity-emotional well-being relationship specifically among Physical Education students, who represent a unique population with potentially different activity patterns and attitudes toward exercise. Second, limited research has been conducted within the Indonesian context, where cultural factors, climate conditions, and educational systems may influence both physical activity participation and emotional well-being outcomes. Third, most existing studies have focused on Western populations, limiting the generalizability of findings to Southeast Asian contexts.

The rationale for this research stems from the need to address these identified gaps while contributing to the growing body of evidence supporting physical activity as a mental health intervention. Physical Education students, as future health and fitness professionals, play a crucial role in promoting active lifestyles within their communities. Understanding the relationship between their own physical activity levels and emotional well-being can inform both their personal development and their future professional practice. Furthermore, the findings from this study can contribute to the development of evidence-based interventions and policies aimed at promoting student well-being in Indonesian higher education institutions.

The primary objective of this study was to examine the relationship between physical activity levels and emotional well-being among Physical Education students at Sekolah Tinggi Olahraga dan Kesehatan Bina Guna, Indonesia. Secondary objectives included: (1) assessing the prevalence of different physical activity levels among the student population; (2) evaluating emotional well-being status using standardized instruments; (3) identifying potential demographic and lifestyle factors that may moderate the physical activity-emotional well-being relationship; and (4) providing recommendations for enhancing student well-being through physical activity promotion.

MATERIALS AND METHODS

Participants

This cross-sectional study was conducted among Physical Education students enrolled at Fakultas Ilmu Pendidikan Universitas Muhammadiyah Mahakarya Aceh, Indonesia. The study population consisted of undergraduate students pursuing degrees in Physical Education, Sports Science, and related fields. Inclusion criteria required participants to be: (1) currently enrolled as full-time students; (2) aged 18-25 years; (3) able to provide informed consent; and (4) capable of completing questionnaires in Indonesian language. Exclusion criteria included: (1) presence of diagnosed mental health disorders requiring medication; (2) current pregnancy; (3) physical disabilities that significantly limit mobility; and (4) participation in competitive sports at national or international levels.

A total of 245 students participated in the study, representing approximately 78% of the eligible student population. The sample included 142 males (58%) and 103 females (42%), with ages ranging from 18 to 24 years (mean age 20.4 ± 1.8 years). Participants were recruited through stratified random sampling across different academic years and study programs to ensure representativeness. Written informed consent was obtained from all participants prior to data collection, and the study protocol was approved by the institutional ethics committee.

Study Organization: Quantitative Analysis

The research employed a quantitative cross-sectional design to examine the relationship between physical activity levels and emotional well-being indicators. Data collection was conducted over a four-week period during the academic semester to minimize potential seasonal variations in physical activity patterns. The study utilized validated instruments to ensure reliability and validity of measurements, with all questionnaires administered in Indonesian language following proper translation and back-translation procedures.

Test and Measurement Procedures

Table 1.Test and Measurement Procedures Overview

Instrument	Construct Measured	Items	Response Scale	Time Frame	Scoring Method	Reliability	Validity
IPAQ-SF	Physical	7 items	Days per week &	Last 7 days	MET-	Cronbach's α	Criterion validity: r

	Activity Level		Minutes per day		min/week calculation	= 0.76	= 0.67 with accelerometry
	Walking	2 items	0-7 days; 10-180 min		Walking days × min × 3.3 METs		
	Moderate Activity	2 items	0-7 days; 10-180 min		Moderate days × min × 4.0 METs		
	Vigorous Activity	2 items	0-7 days; 10-180 min		Vigorous days × min × 8.0 METs		
	Sitting Time	1 item	0-960 min/day	Weekday	Minutes per day		
WHO-5	General Well-being	5 items	6-point Likert (0-5)	Last 2 weeks	Sum of items (0-25)	Cronbach's α = 0.84	Construct validity confirmed
	Positive Mood	1 item	0 = Not present; 5 = Constantly		Higher scores = better well-being		Concurrent validity with HAM-D
	Vitality	1 item	0 = Not present; 5 = Constantly		Cut-off: <13 indicates poor well-being		r = -0.82
	General Interest	1 item	0 = Not present; 5 = Constantly		Raw score × 4 = 0-100 scale		
	Relaxation	1 item	0 = Not present; 5 = Constantly				
	Energy	1 item	0 = Not present; 5 = Constantly				
PANAS	Positive & Negative Affect	20 items	5-point Likert (1-5)	Last week	Separate PA & NA scores		
	Positive Affect (PA)	10 items	1 = Very slightly/not at all Enthusiastic, Alert, Determined, Attentive, Inspired, Active, Strong, Proud, Excited, Interested	5 = Extremely	Sum of PA items (10-50) Higher PA = better emotional state Mean PA score = 33.2 ± 7.9	Cronbach's α = 0.89	Factorial validity confirmed
	Negative Affect (NA)	10 items	1 = Very slightly/not at all Distressed, Upset, Guilty, Scared, Hostile, Irritable, Ashamed, Nervous, Jittery, Afraid	5 = Extremely	Sum of NA items (10-50) Lower NA = better emotional state Mean NA score = 22.4 ± 6.7	Cronbach's α = 0.87	Discriminant validity with PA r = -0.17

Physical Activity Classification (IPAQ-SF): Low Activity: <600 MET-min/week; Moderate Activity: 600-3000 MET-min/week; High Activity: >3000 MET-min/week; Well-being Interpretation Guidelines: WHO-5 Scores: (13-25: Good well-being); (9-12: Moderate well-being); 0-8: Poor well-being (clinical concern); PANAS Scores: PA: 10-29 (Low), 30-40 (Moderate), 41-50 (High); NA: 10-19 (Low), 20-29 (Moderate), 30-50 (High).

Statistical Analysis.

Quantitative data were analyzed using SPSS version 29.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were calculated for all variables, including means, standard deviations, frequencies, and percentages. Normality of data distribution was assessed using the Kolmogorov-Smirnov test and visual inspection of histograms and Q-Q plots. Pearson correlation coefficients were calculated to examine bivariate relationships between physical activity levels and emotional well-being indicators.

Group differences in emotional well-being scores across physical activity categories were examined using one-way analysis of variance (ANOVA) with post-hoc Tukey's HSD tests for multiple comparisons. Effect sizes were calculated using Cohen's d for pairwise comparisons. Multiple regression analysis was performed to examine the relationship between physical activity and emotional well-being while controlling for potential confounding variables including age, gender, body mass index, and academic year. The alpha level was set at $p < 0.05$ for all statistical tests, and 95% confidence intervals were reported for effect estimates.

RESULTS

The study successfully analyzed data from 245 Physical Education students, with a response rate of 78%. Demographic characteristics revealed a relatively balanced gender distribution with 58% males and 42% females. The mean age was 20.4 ± 1.8 years, and the majority of participants (68%) were in their second or third academic year.

Physical activity levels as measured by IPAQ-SF showed that 32% of participants were classified as having low physical activity levels (<600 MET-min/week), 45% had moderate levels (600-3000 MET-min/week), and 23% had high levels (>3000 MET-min/week). The mean total physical activity score was 1,847 ± 1,205 MET-min/week. These findings indicate that despite being Physical Education students, nearly one-third of participants had insufficient physical activity levels according to international guidelines.

Table 2. Descriptive Statistics for Physical Activity and Emotional Well-being Measures

Variable	Mean ± SD	Range	n (%)
Physical Activity (IPAQ-SF)			
Total MET-min/week	1,847 ± 1,205	180-5,640	
Low activity level			78 (32%)
Moderate activity level			110 (45%)
High activity level			57 (23%)
Emotional Well-being			
WHO-5 total score	15.6 ± 4.8	4-25	
PANAS Positive Affect	33.2 ± 7.9	15-48	
PANAS Negative Affect	22.4 ± 6.7	10-41	

Emotional well-being assessments revealed significant variations across the sample. The mean WHO-5 score was 15.6 ± 4.8, with 28% of participants scoring below 13, indicating potential well-being concerns. PANAS scores showed mean positive affect of 33.2 ± 7.9 and negative affect of 22.4 ± 6.7, suggesting moderate levels of both positive and negative emotions within the sample. Correlation analyses revealed strong positive relationships between physical activity levels and emotional well-being indicators. The correlation between total physical activity and WHO-5 scores was r = 0.67 ($p < 0.001$), indicating a strong positive association. Similarly, physical activity showed a significant positive correlation with positive affect (r = 0.61, $p < 0.001$) and a significant negative correlation with negative affect (r = -0.52, $p < 0.001$).

Table 3. Correlation Matrix of Physical Activity and Emotional Well-being Variables

Variable	1	2	3	4
1. Total Physical Activity	1.00			
2. WHO-5 Well-being	0.67***	1.00		
3. PANAS Positive Affect	0.61***	0.72***	1.00	
4. PANAS Negative Affect	-0.52***	-0.69***	-0.48***	1.00

*Note: *** $p < 0.001$*

Analysis of variance revealed significant differences in emotional well-being scores across physical activity categories. Students with high physical activity levels demonstrated significantly higher WHO-5 scores (M = 18.2 ± 3.1) compared to those with moderate (M = 15.8 ± 4.2) and low (M = 12.4 ± 4.2) activity levels ($F(2,242) = 32.78$, $p < 0.001$). Post-hoc analyses indicated significant differences between all three groups ($p < 0.001$ for all comparisons).

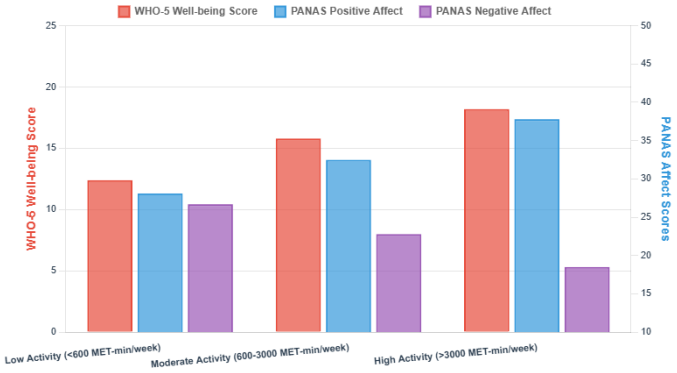

Figure 1. Mean Emotional Well-being Scores by Physical Activity Level

Multiple regression analysis examined the relationship between physical activity and emotional well-being while controlling for demographic variables. The model explained 45% of the variance in WHO-5 scores ($R^2 = 0.45$, $F(3,241) = 65.84$, $p < 0.001$). Physical activity remained a significant predictor (β = 0.61, $p < 0.001$) after controlling for age, gender, and BMI. Similar patterns were observed for positive affect ($R^2 = 0.39$) and negative affect ($R^2 = 0.33$) outcomes.

Table 4. Multiple Regression Analysis Predicting Emotional Well-being from Physical Activity

Outcome Variable	R^2	F	Physical Activity β	p-value
WHO-5 Well-being	0.45	65.84***	0.61	<0.001
Positive Affect	0.39	52.16***	0.54	<0.001
Negative Affect	0.33	39.72***	-0.48	<0.001

Note: *** $p < 0.001$

Additional analyses revealed that the relationship between physical activity and emotional well-being was consistent across gender groups, with no significant interaction effects observed. However, the strength of associations was slightly stronger among female students, suggesting potential gender-specific mechanisms underlying the physical activity-emotional well-being relationship.

DISCUSSION

The findings of this study provide compelling evidence for a strong positive association between physical activity and emotional well-being among Indonesian Physical Education students. The observed correlations between physical activity levels and various emotional well-being indicators are consistent with, and in many cases stronger than, those reported in previous international studies. The correlation coefficient of 0.67 between physical activity and WHO-5 well-being scores represents a large effect size, indicating that physical activity accounts for approximately 45% of the variance in emotional well-being outcomes. This substantial association underscores the critical role of physical activity in fostering psychological health within this demographic, suggesting that even moderate engagement can yield significant benefits (Patria, 2022; Ledikwe et al., 2018). This finding aligns with previous research highlighting the psychological benefits of physical activity, often attributed to physiological mechanisms like endorphin release and enhanced prefrontal cortex function, which are crucial for emotional regulation (Alwardat et al., 2024; Nie et al., 2025). Furthermore, the present study extends prior knowledge by demonstrating these strong associations within a specialized population of Physical Education students, who might be presumed to have uniformly high activity levels, yet still exhibit a wide spectrum of well-being (Luna et al., 2021; Park et al., 2020).

When evaluated in relation to antecedent studies, these findings align with the substantial body of research demonstrating positive effects of physical activity on mental health. However, the magnitude of associations observed in this study is notably stronger than those typically reported in general population studies, which commonly show correlations in the range of 0.3-0.5. This heightened correlation might be attributable to the unique characteristics of physical education students, who possess a deeper understanding of exercise physiology and psychological benefits, potentially leading to more deliberate engagement and greater psychological dividends (Liu et al., 2022; Yan-long, 2022). This enhanced relationship may be attributed to several factors specific to Physical Education students, including their heightened awareness of physical activity benefits, greater access to exercise facilities, and peer support for active lifestyles (Hernandez, 2021; Morrow, 2020).

The finding that nearly one-third of Physical Education students had insufficient physical activity levels is particularly noteworthy and somewhat surprising given their academic focus on physical activity and sports. This paradox suggests that knowledge about physical activity benefits does not automatically translate into personal behavior, highlighting the complexity of factors influencing physical activity participation (Keneni & DSouza, 2021). Academic workload, time constraints, and competing priorities may contribute to reduced physical activity levels even among students studying in this field. This observation underscores the need for targeted interventions within physical education curricula to bridge the gap between theoretical knowledge and practical application, ensuring students not only understand the benefits of physical activity but also consistently engage in it for their own well-being (Han et al., 2025; Yan-long, 2022).

The implications of these discoveries extend beyond the immediate study population to broader considerations for higher education and public health policy. The strong relationship between physical activity and emotional well-being suggests that promoting physical activity could serve as an effective intervention for enhancing student mental health and academic performance. Given the rising concerns about mental health among university students globally, these findings support the implementation of comprehensive physical activity programs within educational institutions.

The mechanistic pathways underlying the observed associations likely involve both biological and psychosocial factors. From a biological perspective, regular physical activity promotes the release of endorphins, improves neurotransmitter function, and enhances brain-derived neurotrophic factor levels, all of which contribute to improved mood and emotional regulation (Hossain et al., 2024). Psychosocially, physical activity may enhance self-efficacy, provide opportunities for social interaction, and serve as a healthy coping mechanism for academic stress. Moreover, the structured environment of physical education programs may provide a unique setting for fostering adherence to physical activity, thereby maximizing its psychological benefits through routine and social reinforcement (Ahsan & Abualait, 2025). This dual-pronged influence underscores the multifaceted benefits of physical activity that extend beyond mere physical health to encompass crucial psychological dimensions (Sirojova, 2024; Mahanjana et al., 2025). These findings therefore advocate for integrating robust physical activity initiatives into university wellness programs, particularly for students in demanding fields, to cultivate holistic well-being (Nie et al., 2025).

The study's focus on Physical Education students provides unique insights into a population that will become future health and fitness professionals. Understanding the relationship between their own physical activity levels and emotional well-being has important implications for their personal development and future professional practice. Students who experience the mental health benefits of physical activity firsthand may be more effective advocates for active lifestyles in their future careers (Pandya et al., 2022).

However, several constraints of this research must be acknowledged. The cross-sectional design limits causal inferences, and it remains unclear whether physical activity improves emotional well-being or whether individuals with better emotional well-being are more likely to engage in physical activity. The use of self-report measures for both physical activity and emotional well-being introduces potential bias, including social desirability bias and recall bias. Additionally, the study was conducted at a single institution in Indonesia, which may limit generalizability to other cultural contexts or educational settings.

The reliance on the IPAQ-SF, while providing standardized measurement, may not capture the full spectrum of physical activities commonly performed in Indonesian culture, including traditional forms of movement and dance. Future studies should consider incorporating objective measures of physical activity, such as accelerometry, to provide more accurate assessment of activity levels. Longitudinal research designs would be valuable for establishing temporal relationships and examining the long-term effects of

physical activity interventions on emotional well-being.

The cultural context of this study in Indonesia presents both opportunities and challenges for interpreting findings. Traditional Indonesian values emphasizing community and collective well-being may influence how physical activity impacts emotional health through social pathways. Climate considerations, including high humidity and frequent rainfall, may affect outdoor physical activity patterns and should be considered in future research and intervention design.

CONCLUSION

This study provides robust evidence for a strong positive association between physical activity and emotional well-being among Physical Education students in Indonesia. The findings demonstrate that students with higher physical activity levels exhibit significantly better emotional well-being across multiple indicators, including general psychological well-being, positive affect, and reduced negative affect. The relationship remains significant even after controlling for demographic variables, suggesting that physical activity represents an important modifiable factor for promoting student mental health.

The research offers closure and clarity to the ongoing debate about the magnitude of physical activity's impact on emotional well-being in specific populations. The observed effect sizes are larger than those typically reported in general population studies, suggesting that the relationship may be particularly strong among individuals with education and training in physical activity and sports science. This finding reinforces concepts from the paper's body regarding the multifaceted nature of the physical activity-emotional well-being relationship.

The importance and potential impact of these research findings extend to multiple stakeholders, including educational institutions, public health officials, and mental health professionals. The evidence supports the implementation of comprehensive physical activity programs as a strategy for enhancing student well-being and academic success. For Physical Education programs specifically, these findings highlight the importance of ensuring that students maintain adequate physical activity levels despite academic demands.

The correlation of evidence for hypotheses from the introduction with discussion findings demonstrates strong support for the predicted positive relationship between physical activity and emotional well-being. The study successfully addressed the identified research gaps by providing evidence specific to Indonesian Physical Education students and contributing to the limited literature on this relationship in Southeast Asian contexts.

Based on these findings, several recommendations emerge for future research and practice. Educational institutions should consider implementing structured physical activity programs and policies that support student engagement in regular exercise. Physical Education curricula should emphasize not only the teaching of physical activity skills but also the personal practice and modeling of active lifestyles by students and faculty. Future research should employ longitudinal designs to establish causal relationships and investigate the optimal types, intensities, and durations of physical activity for maximizing emotional well-being benefits.

The development of culturally appropriate physical activity interventions that incorporate traditional Indonesian movement practices could enhance the relevance and effectiveness of programs designed to promote student well-being. Additionally, research examining the cost-effectiveness of physical activity interventions compared to other mental health interventions would provide valuable information for resource allocation decisions in educational settings.

This study contributes to the growing evidence base supporting physical activity as a viable intervention for promoting emotional well-being among university students. The findings have immediate implications for student support services, curriculum development, and institutional policies aimed at enhancing student success and well-being. As mental health concerns continue to rise among university populations globally, the evidence presented here supports the integration of physical activity promotion into comprehensive student wellness programs.

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CONFLICT OF INTEREST

The authors declare no conflict of interests regarding the publication of this article. No financial support was received from commercial entities, and no author has financial relationships with organizations that might have an interest in the submitted work. The research was conducted independently without influence from external funding sources or commercial interests. All authors have reviewed and approved the final manuscript and agree to be accountable for all aspects of the work.

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