



Physical activity and Happiness among Student-Athletes: The Moderating Role of Self-Efficacy

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ABSTRACT

Physical activity is generally associated with greater happiness. However, this relationship may differ among student-athletes who experience physical activity within structured training, competitive pressure, and dual academic-athletic demands. This study examined the relationship between physical activity and happiness and investigated the novel role of self-efficacy as a moderator of this relationship among university student-athletes. A quantitative cross-sectional design was employed with 215 student-athletes (153 males and 62 females) participating in eight sports. Physical activity, happiness, and self-efficacy were assessed using standardized questionnaires. Data were analysed using Spearman's rho correlation and moderation regression. Physical activity was not significantly associated with happiness ($p = .031$, $p = .652$), whereas self-efficacy showed a moderate positive association with happiness ($p = .488$, $p < .001$). The moderation model explained 26.0% of the variance in happiness ($R^2 = .260$), while the interaction between physical activity and self-efficacy was not significant ($\beta = .152$, $p = .714$). These findings indicate that, unlike the positive associations commonly reported in general populations, physical activity was not directly associated with happiness among student-athletes. Also, self-efficacy did not significantly alter this relationship. The findings highlight the contextual role of psychological factors in understanding happiness among student-athletes and suggest that athlete development programs should integrate physical training with self-efficacy enhancement, psychological skill training, stress management, emotion regulation, and psychological support to promote psychological well-being.

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INTRODUCTION

Happiness is considered an important indicator of psychological functioning and successful adaptation among student-athletes, who must simultaneously manage academic responsibilities and competitive sport demands. In sport science, happiness is not only associated with quality of life but is also closely related to motivation, training sustainability, adaptation to competitive situations, and athletic performance outcomes. Recent evidence from a systematic review indicates that symptoms of anxiety, depression, and psychological distress remain prevalent among student-athletes, reflecting the substantial psychological burden associated with balancing competitive sports and academic responsibilities (Beisecker et al., 2024). These findings highlight the importance of identifying protective factors that can promote happiness in this population. Student-athletes frequently experience dual-career demands that require them to simultaneously manage academic and athletic responsibilities, potentially increasing psychological strain and burnout risk (Camiré et al., 2021; Sorkkila et al., 2020). Therefore, identifying factors that contribute to happiness among student-athletes has become increasingly important, especially factors associated with engagement in physical activity as a fundamental component of athletic training and daily routines.

Previous studies have consistently demonstrated that individuals who engage in higher levels of physical activity tend to report greater happiness and more positive psychological outcomes compared to those who are less physically active (Buecker et al., 2021; Murphy et al., 2018). Within sport settings, physical activity is not only intended to improve physical fitness but also plays an important role in shaping emotional and psychological conditions. Regular participation in physical activity has been associated with enhanced positive affect, reduced stress levels, and improved psychological functioning. Empirical evidence has further shown positive associations between physical activity and happiness among university students and physically active populations (Bourke et al., 2025; Selland et al., 2024). In addition, physical activity has been associated with lower risks of mental health problems, including depression and emotional distress, as well as greater levels of subjective well-being (Román et al., 2023; Pearce et al., 2022).

Despite these positive findings, participation in physical activity does not always guarantee optimal psychological outcomes because individual experiences may differ depending on contextual and psychosocial factors. Student-athletes, for example, are frequently exposed to intensive training loads, performance expectations, and competitive pressures that may influence how physical activity is psychologically experienced. Among university populations, physically active individuals generally demonstrate more stable psychological conditions and higher levels of happiness compared to their less active counterparts (Noonan et al., 2024; Selland et al., 2024). However, the psychological benefits of physical activity may vary across individuals due to differences in psychological resources and self-perceptions.

One psychological factor that may explain these variations is self-efficacy, which refers to an individual belief in their ability to successfully perform actions and overcome challenges. In sport contexts, self-efficacy plays an important role in determining persistence, confidence, effort, and engagement during physical activity participation (Alves et al., 2024; Han et al., 2022). Individuals with higher self-efficacy generally demonstrate greater confidence in maintaining training programs and coping with obstacles encountered during physical activity, which may lead to more positive psychological outcomes, including higher levels of happiness. Conversely, individuals with lower self-efficacy may experience greater psychological pressure and difficulties maintaining consistent engagement in physical activity. Previous studies have demonstrated that self-efficacy is consistently associated with physical

activity and positive psychological outcomes. Depending on the theoretical framework adopted, self-efficacy has been examined either as a mediating mechanism explaining how physical activity influences well-being or as a moderating factor that changes the strength of this relationship (Di Maio et al., 2021; Wang et al., 2022).

From the perspective of Social Cognitive Theory, self-efficacy is conceptualized as a personal cognitive resource that shapes how individuals interpret challenges and regulate their behaviours when facing demanding situations (Bandura, 1997). Rather than functioning solely as an explanatory mechanism through which physical activity influences psychological outcomes, self-efficacy may also determine the extent to which individuals benefit from engaging in physical activity. Individuals with higher self-efficacy are more likely to perceive training demands as manageable and maintain confidence when facing obstacles, which may influence how they psychologically experience physical activity. Therefore, consistent with Social Cognitive Theory (Bandura, 1997), this study conceptualizes self-efficacy as a moderating variable because individuals with different levels of efficacy beliefs may experience different psychological benefits from similar levels of physical activity. Accordingly, self-efficacy is expected to strengthen or weaken the relationship between physical activity and happiness rather than serve as an intermediate mechanism explaining how physical activity influences happiness.

In the context of student-athletes, self-efficacy represents an essential psychological resource that helps athletes maintain confidence, persistence, and adaptive coping while facing training demands, academic responsibilities, and competitive challenges. Athletes with stronger self-efficacy are more likely to sustain motivation, regulate emotional responses, recover from setbacks, and remain committed to long-term training goals. Consequently, self-efficacy may influence the extent to which engagement in physical activity contributes to greater happiness among student-athletes. Previous research has indicated that psychological factors, including self-efficacy, contribute to the athlete well-being, motivation maintenance, stress management, and performance adaptation (Öztürk Çelik, 2025; Shannon et al., 2023). Furthermore, interactions between physical activity and psychological resources may produce stronger effects on well-being compared to explanations based solely on physical activity involvement (Jannah et al., 2024; Monterrosa Quintero et al., 2022). From a broader theoretical perspective, happiness may also be understood through both hedonic and eudaimonic approaches, where psychological well-being is influenced by multiple dimensions of human functioning and self-regulation (Martela & Sheldon, 2019).

Nevertheless, most previous studies have primarily focused on direct associations between physical activity and happiness or have examined self-efficacy as a mediating mechanism. Evidence remains limited regarding whether self-efficacy functions as a moderator of the physical activity–happiness relationship among university student-athletes, who experience physical activity within structured, performance-oriented, and competitive environments. This gap is important because the psychological benefits of physical activity may depend not only on the amount of physical activity performed but also on individual psychological resources. Accordingly, the objective of this study was to examine the relationship between physical activity and happiness and to investigate whether self-efficacy moderates this relationship among university student-athletes. Based on Social Cognitive Theory, it was hypothesized that higher levels of physical activity would be associated with greater happiness and that this relationship would vary according to individual levels of self-efficacy. The findings of this study are expected to contribute to the sport psychology literature by extending current understanding of the contextual role of self-efficacy in the relationship between physical activity and happiness among university student-athletes.

Practically, the findings may inform athlete development programs by integrating physical training with psychological skill development to promote happiness among university student-athletes.

METHODS

This study employed a quantitative approach using a cross-sectional design to examine the relationship between physical activity and happiness while considering the moderating role of self-efficacy among student-athletes. A cross-sectional design was selected because it enables the assessment of relationships among variables at a single point in time within naturally occurring settings where variables are not experimentally manipulated. This approach was considered appropriate for identifying both direct and interaction effects among the variables examined in the present study.

Participants

A total of 215 student-athletes fulfilled the inclusion criteria and were included in the study. Participants were recruited using purposive sampling from university sporting activities and training settings. Eligible participants were university students who were actively participating as athletes in organized training activities and agreed to participate voluntarily.

The sample size was determined with consideration of the statistical requirements of the planned moderation analysis. Because moderation effects are examined through interaction terms in regression models, adequate sample size is important for detecting interaction effects, which are typically more difficult to detect than the main effects (Baranger et al., 2023). The final sample of 215 participants was considered sufficient for the planned analysis based on the characteristics of the regression model and the number of predictors included.

Sampling Procedures

Participants were recruited directly from training environments and university sport activity settings. Prior to data collection, participants received information regarding the objectives and procedures of the study. Participation was voluntary and all respondents agreed to participate without coercion. Data collection was conducted directly at the participant training locations under controlled and conducive conditions to ensure the quality and consistency of responses.

Materials and Apparatus

The variables in this study were measured using standardized and widely validated instruments. Physical activity was measured using the Global Physical activity Questionnaire (GPAQ) developed by the World Health Organization, which assesses physical activity across several domains based on frequency and duration (Bull et al., 2009). Happiness was assessed using the 8-item Oxford Happiness Questionnaire (OHQ), developed by Hills and Argyle (Hills & Argyle, 2002). The OHQ uses a six-point Likert response format and has demonstrated satisfactory psychometric properties, with recent validation research further supporting its reliability and validity in measuring happiness (Barattucci et al., 2024). Based on the present study sample, the OHQ demonstrated acceptable internal consistency (Cronbach's $\alpha = .725$) with the corrected item-total correlations ranged from .473 to .741, indicating satisfactory item-level validity. Self-efficacy was assessed using the General Self-Efficacy Scale (GSES), which measures individual beliefs regarding their ability to manage situations and overcome challenges effectively (Schwarzer et al., 1995). In the present sample, the GSES demonstrated excellent internal consistency (Cronbach's $\alpha = .912$), with corrected item-total correlations

ranging from .585 to .850, indicating satisfactory item-level validity. These findings indicate that the OHQ and GSES demonstrated satisfactory psychometric properties in the present sample and were considered suitable for subsequent analyses.

Procedures

Data were collected by distributing questionnaires directly to participants at their respective training locations. Before completing the questionnaires, participants were provided with explanations regarding the purpose of the study, research procedures, and ethical considerations. Participants were informed that their participation was voluntary and that all responses would remain confidential and used exclusively for research purposes. Informed consent was obtained from all participants before data collection was conducted. This study was conducted in accordance with research ethics standards and institutional research guidelines. All questionnaires were completed independently by participants under the supervision of the researcher to ensure that the procedures were conducted consistently.

Design or Data Analysis

Data analysis was conducted using JASP software. Descriptive statistics were initially performed to summarize the characteristics and distribution of the study variables. Internal consistency of the self-report instruments was assessed using Cronbach's alpha, while corrected item-total correlations were examined as indicators of item-level validity. Prior to inferential analyses, regression assumptions, including normality of residuals, homoscedasticity, multicollinearity, and independence of errors, were evaluated. The results indicated that the assumptions relevant to linear regression were satisfactorily met, supporting the use of regression analysis.

Because physical activity scores were not normally distributed and demonstrated substantial variability, bivariate associations among the variables were examined using Spearman's rho correlation. Spearman's rho was selected because it is a non-parametric correlation method that does not require normally distributed variables and is appropriate for assessing monotonic associations in the presence of non-normal distributions.

Linear regression analysis was subsequently employed because the primary objective of the study was to estimate the predictive effects of physical activity and self-efficacy on happiness and to examine whether self-efficacy moderated this relationship through an interaction term. To test the moderating role of self-efficacy, moderation regression analysis was performed by including an interaction term between physical activity and self-efficacy (physical activity $\times$ self-efficacy) using the following formula:

$$Y = b_0 + b_1X + b_2M + b_3(X \times M) + \varepsilon$$

Y represents happiness, X represents physical activity, and M represents self-efficacy. The moderating effect was considered statistically significant when the interaction coefficient was significant at $p < 0.05$.

RESULTS

Table 1 presents the demographic characteristics of the 215 student-athletes included in the final analysis. The participants varied in terms of age, gender, athletic status, and occupational status. The diversity of participant demographic backgrounds indicates that the sample represented student-athletes with different personal and activity characteristics.

These characteristics provide relevant contextual information for interpreting the relationships among physical activity, self-efficacy, and happiness.

Table 1. Demographic Characteristics of Participants

Sports	Male	Female	n	%
Muay Thai	15	9	24	11.2
Taekwondo	14	11	25	11.6
Futsal	28	0	28	13.0
Karate	14	9	23	10.7
Wushu	13	9	22	10.2
Silat	16	9	25	11.6
Kabaddi	23	15	38	17.7
Football	30	0	30	14.0
Total	153	62	215	100.0

The descriptive statistics of the study variables. All data included in the final analysis were complete without missing values. Self-efficacy had a mean score of 40.11 (SD = 5.78), with scores ranging from 24 to 50, whereas happiness had a mean score of 29.38 (SD = 4.91), with scores ranging from 16 to 40. Physical activity demonstrated a mean score of 3,393 (SD = 4,566), with scores ranging from 120 to 29,100.

The distribution of physical activity was further examined using a boxplot, Q-Q plot, and frequency plot. The boxplot indicated several potential high-value outliers, while the Q-Q plot and frequency distribution indicated a markedly non-normal and positively skewed distribution. These findings demonstrate substantial heterogeneity in physical activity among the student-athletes and were considered in selecting the subsequent non-parametric correlation analysis.

Table 2. Correlations between Research Variables

Variable	ρ Spearman	p	Effect Size (Fisher's z)	SE Effect Size
Physical Activity – Happiness	0.03091	.652	0.03092	0.06869
Physical Activity – Self-Efficacy	0.1833**	.007	0.1854	0.06954
Happiness – Self-Efficacy	0.4878***	< .001	0.5332	0.07141

Table 2 presents the Spearman's rho correlations among the study variables. Physical activity was not significantly associated with happiness ($\rho = .031$, $p = .652$), indicating that higher levels of physical activity were not directly associated with higher happiness among the student-athletes. In contrast, physical activity showed a weak but significant positive association with self-efficacy ($\rho = .183$, $p = .007$). Self-efficacy demonstrated a moderate positive association with happiness ($\rho = .488$, $p < .001$). Overall, self-efficacy showed a substantially stronger association with happiness than physical activity, suggesting that psychological factors may have a more prominent relationship with happiness in this sample.

In table 3, the multicollinearity diagnostics indicated that there was no evidence of problematic multicollinearity among the predictors. Both physical activity and self-efficacy had tolerance values of 0.985 and VIF values of 1.015. These values were within acceptable ranges, indicating that the predictors were sufficiently independent and that multicollinearity was unlikely to affect the estimation of the regression coefficients. Therefore, the data were considered appropriate for subsequent regression and moderation analyses.

Table 3. Multicollinearity Diagnostics

Predictor	B	SE	β	Tolerance	VIF
(Constanta)	13.35	1.899	–	–	–
Physical Activity	-1.915×10^{-5}	6.113×10^{-5}	-0.019	0.985	1.015
Self-Efficacy	0.4069	0.04740	0.511	0.985	1.015

Table 4 presents the results of the moderation regression analysis. The overall regression model was statistically significant, $R = .510$, $R^2 = .260$, adjusted $R^2 = .249$, $F(3, 211) = 24.70$, $p < .001$, indicating that physical activity, self-efficacy, and their interaction collectively explained 26.0% of the variance in happiness (Table 5). Physical activity did not significantly predict happiness ($\beta = -.166$, $p = .683$), whereas self-efficacy was a significant positive predictor of happiness ($\beta = .494$, $p < .001$). The interaction between physical activity and self-efficacy was not significant ($\beta = .152$, $p = .714$), indicating that self-efficacy did not significantly moderate the relationship between physical activity and happiness. Although the interaction coefficient was positive, the non-significant interaction indicates that the association between physical activity and happiness did not significantly differ across levels of self-efficacy.

Table 4. Moderation Regression Analysis Predicting Happiness

Predictor	B	SE	β	T	p
Physical Activity	-1.701×10^{-4}	4.155×10^{-4}	-0.166	-0.410	.683
Self-Efficacy	0.3933	0.06019	0.494	6.535	< .001
Physical Activity $\times$ Self-Efficacy	3.712×10^{-6}	1.010×10^{-5}	0.152	0.367	.714

Table 5. Model Summary

Model	R	R^2	Adjusted R^2	RMSE	R^2 Change	df1	df2	P
M0	0.000	0.000	0.000	4.687	0.000	0	214	
M1	0.510	0.260	0.249	4.061	0.260	3	211	<.001

Table 6. Bootstrap Coefficients

Predictor	B	Bias	SE	p	95% CI
Physical Activity	-1.977×10^{-4}	-5.686×10^{-5}	4.279×10^{-4}	.707	$[-0.001048, 6.139 \times 10^{-4}]$
Self-Efficacy	0.3907	-0.003327	0.06101	< .001	[0.2729, 0.5233]
Physical Activity $\times$ Self-Efficacy	4.471×10^{-6}	1.278×10^{-6}	1.068×10^{-5}	.758	$[-1.674 \times 10^{-5}, 2.530 \times 10^{-5}]$

Table 6 presents the bootstrap estimates of the moderation model based on 5,000 bootstrap samples. The bootstrap results were consistent with the conventional regression analysis. Physical activity did not significantly predict happiness, as indicated by the bootstrap confidence interval including zero. In contrast, self-efficacy remained a significant positive predictor of happiness, with its bootstrap confidence interval excluding zero. The interaction between physical activity and self-efficacy was not significant, as its 95% bootstrap confidence

interval included zero. These findings provide additional evidence that self-efficacy did not significantly moderate the relationship between physical activity and happiness.

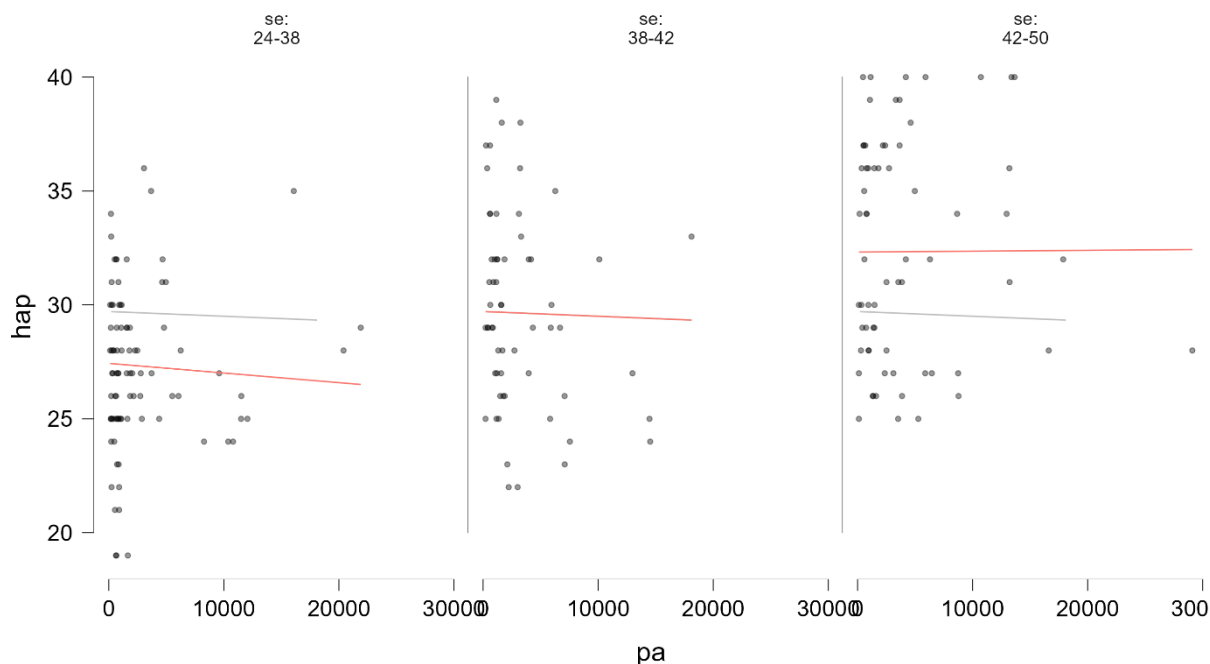


Figure 1. Moderation Interaction Plot

Figure 1 illustrates the interaction between physical activity and self-efficacy in predicting happiness. The regression slopes across low, moderate, and high levels of self-efficacy showed relatively similar patterns, with no statistically meaningful divergence between the slopes. This visual pattern is consistent with the non-significant interaction effect reported in the moderation analysis ($\beta = .152$, $p = .714$). Thus, although happiness tended to vary across levels of self-efficacy, the relationship between physical activity and happiness did not significantly change as a function of self-efficacy.

DISCUSSION

The findings of this study indicate that physical activity was not significantly associated with happiness among student-athletes, whereas self-efficacy demonstrated a stronger positive contribution to happiness. In addition, self-efficacy did not significantly moderate the relationship between physical activity and happiness. These findings suggest that happiness among student-athletes may not be determined solely by physical activity engagement, but may also depend on broader psychological and contextual factors within competitive sport environments.

Importantly, the non-significant relationship between physical activity and happiness identified in the present study represents an important contextual finding in sport science. Previous studies have generally reported positive associations between physical activity and happiness or psychological well-being in general populations (Buecker et al., 2021; Murphy et al., 2018). However, the present findings suggest that this relationship may not be universally applicable to student-athletes. The novelty of the present study lies in demonstrating that, within a student-athlete context, physical activity was not significantly associated with happiness and self-efficacy did not significantly moderate this relationship. These findings indicate that the psychological effects of physical activity may depend on the context in which

it is performed, particularly in environments characterized by structured training, competitive pressure, and dual-career demands.

The non-significant relationship between physical activity and happiness also contrasts with several studies conducted among university students and physically active populations, where regular engagement in physical activity was positively related to happiness and emotional well-being (Bourke et al., 2025; Noonan et al., 2024). Furthermore, physical activity has frequently been associated with reduced risks of depression and improved mental health outcomes (Ibáñez Román et al., 2023; Pearce et al., 2022). Nevertheless, the present findings indicate that these positive relationships may not consistently emerge within student-athlete populations, particularly when physical activity is embedded within highly demanding competitive sport environments.

One possible explanation is that physical activity among student-athletes is often embedded within structured, performance-oriented, and highly demanding training systems. Unlike non-athlete populations, where physical activity is frequently performed voluntarily for recreation, leisure, or health purposes, student-athletes commonly experience physical activity as an obligation associated with training targets, competition schedules, and performance evaluations. Consequently, physical activity may not always generate positive emotional experiences or psychological recovery. This interpretation is consistent with previous studies suggesting that participation in sports does not automatically produce psychological benefits because the emotional impact of sport participation is strongly influenced by environmental and contextual conditions (Patel & Shah, 2025; Selland et al., 2024). In competitive sport settings, prolonged exposure to intensive training and performance demands may instead contribute to emotional fatigue and psychological exhaustion (Glandorf et al., 2025). This may explain why physical activity did not significantly predict happiness in the present study.

The present findings also support literature emphasizing the psychological challenges experienced by student-athletes due to dual-career demands. Student-athletes are required to simultaneously manage academic responsibilities and athletic commitments, which may contribute to fatigue, stress, and emotional pressure (Camiré et al., 2021; Sorkkila et al., 2020). Previous studies have shown that prolonged exposure to training demands and competitive expectations may increase burnout symptoms and reduce psychological well-being among athletes (Schary & Lundqvist, 2021; Shannon et al., 2023). Similar findings have also been discussed in studies on elite athletes, which reported that mental health difficulties frequently emerge when athletes experience excessive pressure, performance expectations, and limited recovery opportunities (Reardon et al., 2019; Rice et al., 2016). Under such conditions, higher levels of physical activity may not necessarily translate into greater happiness because the psychological experience of training may become more exhausting than restorative.

In contrast, self-efficacy demonstrated a significant positive contribution to happiness. This finding supports previous research suggesting that individuals with stronger self-efficacy beliefs tend to demonstrate better psychological adjustment, emotional regulation, and well-being (Alves et al., 2024; Wang et al., 2022). Within sport contexts, self-efficacy is associated with confidence in handling challenges, persistence during difficult situations, and stronger beliefs regarding personal competence (Han et al., 2022). Student-athletes with higher self-efficacy may therefore possess greater psychological resources for coping with academic pressure, training demands, and competitive stress, which may contribute positively to their happiness and emotional stability. Recent evidence among physical education students also demonstrated that self-efficacy was positively associated with subjective well-being and

adaptive psychological functioning (Yiming et al., 2024). These findings reinforce the notion that psychological resources may play a more central role in shaping happiness among student-athletes compared to physical activity participation alone.

This finding is also consistent with Bandura self-efficacy theory, which proposes that stronger efficacy beliefs enhance an individual perceived capability to manage challenges and persist in demanding situations (Bandura, 1997). Among student-athletes, such psychological resources may be particularly relevant for coping with academic, training, and competitive demands.

From a theoretical perspective, these findings are consistent with broader conceptualizations of well-being proposed within contemporary sport psychology literature. Happiness can be understood as a component of hedonic well-being, reflecting an individual subjective evaluation of positive affect and overall life satisfaction. It is therefore not solely determined by behavioural participation or activity engagement but is also influenced by psychological need fulfilment, emotional regulation, and perceptions of competence (Martela & Sheldon, 2019). Recent studies among athletes have similarly emphasized that both hedonic and eudaimonic well-being are influenced by multiple positive psychological factors beyond sport participation alone (Kinoshita et al., 2024). In highly competitive sport environments, psychological factors such as confidence, emotional control, and perceived competence may become more central determinants of well-being compared to physical activity participation alone. This perspective is also supported by recent studies showing that athlete happiness is strongly associated with psychological adaptation and emotional experiences within training and competition settings (Zhang et al., 2024).

Importantly, the moderation analysis demonstrated that self-efficacy did not significantly strengthen or weaken the relationship between physical activity and happiness. Although self-efficacy was a significant predictor of happiness, its interaction with physical activity was not significant. This finding differs from previous studies suggesting that self-efficacy may function as a mediator or moderator in the relationship between physical activity and psychological outcomes (Di Maio et al., 2021; Wang et al., 2022). Therefore, the present study provides a distinct finding by showing that the role of self-efficacy among student-athletes may operate more directly in relation to happiness rather than by changing the strength of the relationship between physical activity and happiness.

One possible explanation is that self-efficacy may contribute more directly to resilience, persistence, and performance adaptation rather than modifying the emotional impact of physical activity itself. Student-athletes with high self-efficacy may indeed feel more capable of handling training demands. However, this does not necessarily mean that they experience greater happiness from physical activity participation. In some cases, stronger self-efficacy may even increase performance expectations and internal pressure to achieve, thereby reducing opportunities for emotional recovery and relaxation. Similar interpretations have been discussed in recent studies examining athlete psychological functioning, where self-efficacy was more strongly associated with coping processes, emotional adjustment, and performance maintenance than with subjective emotional outcomes alone (Foster & Chow, 2020; Öztürk Çelik, 2025). Additional evidence has also shown that psychological well-being among student-athletes is multidimensional and strongly influenced by broader psychosocial conditions (Sato et al., 2023). Recent findings further highlighted that psychological well-being and emotional adjustment among student-athletes are closely related to how athletes manage stress, emotional experiences, and training adaptation processes (Mao, 2025).

Another possible explanation relates to the multidimensional nature of happiness among student-athletes. Psychological well-being in sport settings is influenced not only by physical

activity and self-efficacy, but also by other contextual factors such as burnout, social support, coach–athlete relationships, recovery quality, and academic balance (Mao, 2025; Simons & Bird, 2023). Previous studies have shown that supportive social environments and effective psychological coping mechanisms contribute substantially to athlete well-being (Jannah et al., 2024; Shannon et al., 2023). Furthermore, recent studies among university students reported that psychological resilience and adaptive coping mechanisms contribute substantially to subjective well-being in physically active populations (Nairun et al., 2025). Therefore, the contribution of physical activity to happiness may become relatively weaker when broader psychosocial conditions are not simultaneously considered.

The explanatory contribution of the overall model should also be considered. The moderation model explained 26.0% of the variance in happiness ($R^2 = .260$), indicating that physical activity, self-efficacy, and their interaction collectively accounted for a meaningful proportion of individual differences in happiness. However, approximately 74.0% of the variance remained unexplained, suggesting that other psychological and contextual factors may contribute substantially to happiness among student-athletes. Factors such as burnout, perceived stress, social support, recovery quality, academic demands, and coach–athlete relationships may therefore warrant greater attention in future research.

The findings of this study provide several practical implications for student-athlete development. Athlete development programs should not focus exclusively on increasing physical activity levels or training intensity but should also integrate psychological and academic support. Psychological skills training can be implemented to strengthen self-efficacy, emotional regulation, coping skills, and stress management. In addition, coaches and university support services should provide appropriate recovery strategies and academic support to help student-athletes manage training, competition, and academic responsibilities. Such integrated approaches may be more beneficial for promoting happiness than interventions focused solely on increasing physical activity.

Several limitations of this study should be acknowledged. First, the cross-sectional design limits the ability to establish causal relationships among physical activity, self-efficacy, and happiness. Second, the study relied on self-report questionnaires, which may be subject to recall bias and subjective interpretation. Third, physical activity demonstrated substantial variability and a positively skewed distribution, with several potential high-value outliers identified through graphical inspection. Although these characteristics were considered when selecting Spearman's rho for the bivariate associations, the substantial variability and potential outliers may still have influenced the stability and interpretation of the regression estimates. Finally, the study focused specifically on student-athletes, which may limit the generalizability of the findings to other populations.

Overall, this study contributes to the fields of sport science and sport psychology by demonstrating that the relationship between physical activity and happiness may differ between student-athletes and the general population. Although self-efficacy was a significant predictor of happiness, it did not significantly moderate the relationship between physical activity and happiness. The findings highlight the importance of considering psychological and contextual conditions when examining happiness among student-athletes. Theoretically, the study contributes to a more context-sensitive understanding of the relationship between physical activity and happiness, while practically, it supports integrated athlete development programs that combine physical training with psychological skills training, stress management, recovery, and academic support.

CONCLUSION

This study found that physical activity was not significantly related to happiness among student-athletes, while self-efficacy showed a significant positive contribution to happiness. In addition, self-efficacy did not significantly moderate the relationship between physical activity and happiness. These findings highlight a contextual distinction between student-athletes and the general population, suggesting that the relationship between physical activity and happiness may not be universal and may depend on the psychological and situational context in which physical activity is experienced.

Theoretically, this study contributes to the sport psychology literature by demonstrating that happiness among student-athletes may be more strongly associated with psychological resources than with physical activity participation alone. The significant contribution of self-efficacy, combined with the absence of a significant moderation effect, suggests that self-efficacy may function as a direct psychological resource rather than as a factor that changes the relationship between physical activity and happiness. This finding provides a more context-sensitive understanding of the determinants of happiness among student-athletes.

From a practical perspective, athlete development should not focus exclusively on physical training. Coaching and university-based support programs are recommended to integrate self-efficacy enhancement, emotion regulation, stress management, psychological skills training, and psychological support alongside physical training. Such integrated programs may help student-athletes manage competitive demands, academic responsibilities, and psychological challenges more effectively.

This study has several limitations, including its cross-sectional design, reliance on self-reported measures, and the substantial variability and potential outliers in physical activity scores, which may limit causal interpretation and generalizability. Future research should therefore employ longitudinal designs and consider additional psychological and contextual factors that may influence happiness among student-athletes. Overall, the findings emphasize the importance of integrating physical and psychological development in promoting happiness and sustainable development among student-athletes.

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AUTHORS' NOTE

The authors state that there are no conflicts of interest related to this study or the publication of this manuscript. This article was prepared as an original academic work and written in accordance with ethical research and publication standards. The authors also confirm that the manuscript has not been published or submitted to another journal and is free from plagiarism.

ETHICAL CLEARANCE

This study received ethical approval from the Faculty of Psychology, State University of Surabaya (UNESA), under Ethical Approval No. B/34629/UN38.11/TU.00/2026, dated January

5, 2026. All participants provided informed consent before participating in the study. Participant confidentiality was maintained throughout the research process.

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