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The Mediating Role of Psychological Resilience in the Relationship Between Physical Activity Enjoyment and Life Satisfaction Among Turkish University Students: A Cross-Sectional Study

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Abstract

Background

Physical activity enjoyment has been proposed as a key motivational factor sustaining active participation; however, the mechanisms through which it influences life satisfaction remain underexplored. Drawing on the Broaden-and-Build Theory, this study aimed to examine the mediating role of psychological resilience in the relationship between physical activity enjoyment and life satisfaction among university students.

Methods

A cross-sectional correlational design was employed with 495 university students enrolled at a single Turkish university. Data were collected via an online questionnaire comprising the Physical Activity Enjoyment Scale, the Satisfaction with Life Scale, and the Brief Resilience Scale. Mediation analysis was conducted using Hayes' PROCESS macro (Model 4) with 10,000 bootstrap replications and 95% bias-corrected confidence intervals.

Results

Physical activity enjoyment was positively associated with both psychological resilience and life satisfaction. Psychological resilience was also positively associated with life satisfaction. Bootstrap-based mediation analysis indicated that physical activity enjoyment did not directly predict life satisfaction; instead, it exerted a significant indirect effect through psychological resilience, supporting full mediation.

Conclusions

These findings suggest that the positive impact of physical activity enjoyment on life satisfaction operates primarily through the strengthening of psychological resilience rather than through a direct pathway. University-based physical activity programs should be designed not only to increase participation frequency but also to foster enjoyment, as this may build resilience and, in turn, enhance life satisfaction. Future longitudinal research with diverse samples is recommended to confirm the causal ordering of these relationships.

Introduction

Regular physical activity not only reduces the risk of numerous chronic diseases but also confers significant physical, psychological, and social benefits (Molanorouzi, Khoo, & Morris, 2015; Zhang, Ren, & Zou, 2022; Zuo, Li, Liu, & Wang, 2022). In contrast, physical inactivity stands out as a critical risk factor

responsible for approximately 7.2% of all-cause mortality (Katzmarzyk, Friedenreich, Shiroma, & Lee, 2022). University students who show limited interest in physical activity are known to gravitate more toward social and cultural pursuits. However, physical activity not only preserves health but also supports the fulfillment of basic psychological needs and substantially enhances life satisfaction (J. Deng, Liu, Chen, & Wang, 2023; Liu et al., 2024; Pineda-Espejel et al., 2023). Life satisfaction is defined as an individual's overall sense of contentment with life (Siahpush, Spittal, & Singh, 2008). Individuals with higher levels of life satisfaction are reported to be happier and to hold greater optimism regarding their future (Park & Kang, 2023). Accordingly, the sustained maintenance of life satisfaction contributes to improvements in overall quality of life (Slavinski, Bjelica, Pavlović, & Vukmirović, 2021). Numerous factors have been identified as influencing life satisfaction, including family and social life, health, academic expectations, and psychological states such as stress (Kumar, Shaheen, Rasool, & Shafı, 2016; Slavinski et al., 2021). Physical activity—widely regarded as a cornerstone of health—has also been reported to exert a meaningful influence on life satisfaction (Bácsné Bába et al., 2025). Physical activity encompasses bodily movements produced by skeletal muscles that result in energy expenditure, including occupational, sport-related, conditioning, household, and other activities (Rhodes & Sui, 2021). Engaging in regular physical activity plays an important role in improving health and preventing serious health risks (Powell, Paluch, & Blair, 2011). Its benefits include weight management, blood pressure regulation, enhanced bone and muscle health, improvements in cognitive function, and reductions in anxiety and depression (Ferreira Silva et al., 2022). From this perspective, regular physical activity is recognized as an important factor for both physical and psychological health (San Román-Mata, Puertas-Molero, Ubago-Jiménez, & González-Valero, 2020). Despite the biopsychosocial benefits of physical activity, engagement levels among university students appear to be insufficient (Maselli, Ward, Gobbi, & Carraro, 2018). Low levels of physical activity are partly attributable to perceived barriers. Time constraints, lack of motivation, and limited access to appropriate facilities are among the most commonly reported barriers by students (Ferreira Silva et al., 2022). A review of the literature reveals that exercise motivation and physical activity participation behaviors increase psychological resilience and substantially contribute to individuals' capacity to cope with life challenges (D. Deng, Sun, & Li, 2025; Dunston et al., 2022; Yıldırım, Yıldırım, & Düzel, 2014).

Physical activity enjoyment is a fundamental motivational factor that encourages regular participation in physical activity and ensures the sustainability of such behavior (Burns, Fu, & Podlog, 2017). It can be conceptualized as an experience that generates positive affect in the individual. Participation in physical activity is directly related to the degree of enjoyment derived from it. An individual who enjoys physical activity is expected to develop a positive attitude toward the activity and to cultivate motivation for continued participation (Peker, Teke, Çakar, Kabadayı, & Caner, 2023). Therefore, physical activity enjoyment is associated with the extent to which the activity meets the individual's needs (Leisterer & Gramlich, 2021). Psychological resilience has been identified as one of the factors that promotes physical activity participation among university students (Qiu et al., 2025). Psychological resilience refers to the degree to which individuals are affected by adverse circumstances encountered in daily life (Gooding, Hurst, Johnson, & Tarrier, 2012). Producing more favorable outcomes than expected in

response to adversity is indicative of psychological resilience (Parsons, Kruijt, & Fox, 2016). This capacity enables individuals to be more resistant in the face of negative circumstances (Den Hartigh & Hill, 2022). Research demonstrates that university students constitute a high-risk group with respect to mental health, and that the various challenges encountered during the educational process amplify this risk (Baik, Larcombe, & Brooker, 2019; Slimmen, Timmermans, Mikolajczak-Degrauwe, & Oenema, 2022). Academic difficulties, financial constraints, difficulties in social adjustment, career-related anxieties, and exposure to traumatic events represent only a few of the challenges faced (Alkhawaldeh et al., 2023; Galatzer-Levy, Burton, & Bonanno, 2012). How individuals cope with these challenges has become critically important. The ability to manage any given problem has become a marker of resilience at both the individual and societal levels. Interventions aimed at supporting psychological resilience are therefore of critical importance for the preservation of individuals' mental well-being (Xu et al., 2021). The literature indicates that physical activity participation enhances psychological resilience (Qiu et al., 2025). Furthermore, the development of a motivational climate oriented toward physical activity enjoyment has been associated with increased resilience in university students when facing potential adversities (Chacón-Cuberos, Castro-Sánchez, Pérez-Turpin, Olmedo-Moreno, & Zurita Ortega, 2019). From this perspective, strategies designed to enhance students' motivation to enjoy physical activity may contribute to strengthening their psychological resilience (Papaioannou, Bebetsos, Theodorakis, Christodoulidis, & Kouli, 2006).

This study is grounded in the Broaden-and-Build Theory (Fredrickson, 2001). Within this framework, physical activity enjoyment is conceptualized as an experience that supports the enhancement of positive affect in the individual. According to the Broaden-and-Build Theory, positive emotions contribute to the development of psychological resilience. In line with this theory, positive emotions such as enjoyment derived from physical activity broaden the individual's momentary thought-action repertoires and, over time, build enduring psychological resources. This process is theorized to enhance the individual's capacity to cope with daily challenges, thereby increasing life satisfaction (Fredrickson, 2001). Accordingly, the proposition that psychological resilience functions as a mediating mechanism in the relationship between physical activity enjoyment and life satisfaction constitutes the theoretical rationale for the mediation model examined in this study. Therefore, while physical activity enjoyment may directly enhance life satisfaction, it may also exert an indirect effect by strengthening the individual's psychological resilience. In other words, physical activity enjoyment may influence life satisfaction not only through a direct pathway but also indirectly, by fostering psychological resilience. Individuals who enjoy physical activity tend to sustain their participation in such activities, which may in turn strengthen their capacity to recover from stress and adversity—a core component of psychological resilience (Smith et al., 2008). Increased psychological resilience has been reported to elevate life satisfaction (Den Hartigh & Hill, 2022). This sequential pathway provides the theoretical justification for examining psychological resilience as a mediating variable.

A review of the existing literature reveals that prior studies have been predominantly limited to descriptive and correlational designs. The present study is expected to make a meaningful contribution to the body of research on physical activity enjoyment, life satisfaction, and psychological resilience.

Psychological resilience is hypothesized to mediate the relationship between physical activity enjoyment and life satisfaction. Specifically, it is anticipated that as physical activity enjoyment increases, psychological resilience will increase accordingly, and that this increase in resilience will in turn enhance life satisfaction.

Drawing on the Broaden-and-Build Theory, it is proposed that physical activity enjoyment (positive affect) broadens cognitive resources, which in turn builds psychological resilience (a durable personal resource), ultimately enhancing life satisfaction. This sequential mechanism provides the theoretical justification for psychological resilience as the mediating variable. The following hypotheses were formulated within the scope of this study:

H1: Physical activity enjoyment is positively associated with life satisfaction.

H2: Physical activity enjoyment is positively associated with psychological resilience.

H3: Psychological resilience is positively associated with life satisfaction.

H4: Psychological resilience mediates the relationship between physical activity enjoyment and life satisfaction.

Method

Research Design

This study was conducted using a correlational survey design, one of the quantitative research methods. A correlational survey design is an approach in which the researcher, without any intervention, examines whether co-variation exists between two or more variables, as well as the direction and degree of such variation (Karasar, 2009). The present study aimed to investigate the relationships among physical activity enjoyment, life satisfaction, and psychological resilience. The study sample was formed using a convenience sampling method. A key advantage of convenience sampling is the ease of access to individuals within the population of interest (Büyüköztürk, Akgün, Demirel, Karadeniz, & Çakmak, 2015). This method was chosen to minimize time, cost, and labor constraints that may be encountered during data collection and to ensure more feasible implementation of the study.

Participants

A total of 495 students participated in this study. The mean age of the participants was 21.58 years. Of the participants, 272 (54.9%) were female and 223 (45.1%) were male. In terms of academic year, 163 participants (32.9%) were first-year students, 226 (45.7%) were second-year students, 44 (8.9%) were third-year students, and 62 (12.5%) were fourth-year students. The adequacy of the sample size was evaluated using G*Power 3.1 software. Cohen's $f^2 = 0.136$ was employed as the effect size metric appropriate for the mediation model. Under the conditions of $\alpha = .05$ and $n = 495$, the achieved statistical

power (1−β) was calculated as 1.00. This value exceeds the recommended threshold of .80 and confirms that the sample size is sufficient for the planned analyses.

Ethical Approval

This study received ethical approval from the Scientific Research and Publication Ethics Committee of Iğdır University, as per the decision dated 14.03.2025 and numbered 2025/8. Informed consent was obtained from all participants throughout the research process, and data were collected on a voluntary basis. This study was conducted in accordance with the standards of the Declaration of Helsinki (1964), which defines the ethical principles governing research involving human participants.

Measures

Physical Activity Enjoyment Scale. The Physical Activity Enjoyment Scale was developed by Mullen et al. (2011) (Mullen et al., 2011) and adapted to Turkish culture by Özkurt, Küçükibiş, and Eskiler (2022) (Özkurt, Küçükibiş, & Eskiler, 2022). The scale is a 7-point Likert-type instrument consisting of eight items and a single subscale. Higher scores indicate greater enjoyment derived from physical activity. The scale contains no reverse-scored items. Özkurt et al. (2022) reported that the scale accounted for 76% of the total variance and demonstrated a Cronbach's alpha internal consistency coefficient of .95 (Özkurt et al., 2022). In the present study, Cronbach's alpha was calculated as .97.

Satisfaction with Life Scale. The Satisfaction with Life Scale was developed by Diener et al. (1985) (Diener, Emmons, Larsen, & Griffin, 1985) and is designed to measure global life satisfaction based on individuals' subjective evaluations. The Turkish adaptation was conducted by Dağlı and Baysal (2016) (Dağlı & Baysal, 2016). The scale is a 5-point Likert-type instrument consisting of five items and a single dimension. Higher scores reflect greater life satisfaction. In the adaptation study by Dağlı and Baysal (2016), the Cronbach's alpha internal consistency coefficient was reported as .88 (Dağlı & Baysal, 2016), indicating that the scale is a highly reliable measurement instrument. In the present study, Cronbach's alpha was calculated as .89.

Brief Resilience Scale. The Brief Resilience Scale was developed by Smith et al. (2008) to assess individuals' levels of psychological resilience (Smith et al., 2008). The Turkish adaptation was carried out by Doğan (2015), who also examined the scale's validity and reliability. The scale consists of six items and a single dimension. Items 2, 4, and 6 are reverse-scored, and a 5-point Likert-type rating system is employed. Higher scores indicate greater psychological resilience. In Doğan's (2015) adaptation study, the Cronbach's alpha coefficient was reported as .83 (Doğan, 2015). In the present study, Cronbach's alpha was calculated as .71.

Procedure

Prior to data collection, ethical committee approval was obtained. Data collection was conducted online. Participants were informed about the purpose of the study, and it was clearly stated that participation was entirely voluntary. Participants were assured that all data would be used exclusively for scientific purposes, and informed consent was obtained accordingly. Data were collected between March 25 and April 15, 2025. Completion of the scales took approximately 10 minutes on average. No missing data were encountered due to the use of an online data collection method.

Data Analysis

To test the normality of the data, skewness and kurtosis coefficients were examined and found to fall within the range of −1.5 to +1.5, indicating a normal distribution (Tabachnick, Fidell, & Ullman, 2007). Additionally, the Durbin-Watson statistic was inspected to assess the presence of autocorrelation. Values between 1 and 3 are considered acceptable (Durbin & Watson, 1992). In the present study, this assumption was found to be unviolated. To test for multicollinearity, the Variance Inflation Factor (VIF) and tolerance values were examined. It is required that the correlations among predictor variables not exceed .90 (Field, 2024), that VIF values be less than 5, and that tolerance values be greater than .20 (Çokluk, Şekercioğlu, & Büyüköztürk, 2012; Hair Jr Joseph, Black William, Babin Barry, & Anderson Rolph, 2009). In the present study, the relationships among the variables were found to meet all specified criteria, and both VIF and tolerance values were within acceptable ranges. Accordingly, no multicollinearity problem was identified. Cook's D values were also inspected to detect potential outliers, and all values were found to be less than 1, indicating the absence of influential outliers (Cook, 2000). Descriptive statistics and correlation analyses were conducted in this study. Pearson correlation analysis was employed to examine the relationships among physical activity enjoyment, psychological resilience, and life satisfaction. Subsequently, a mediation model was tested to examine the mediating role of psychological resilience. IBM SPSS 27 was used to compute descriptive statistics, correlations, and multiple regression analyses. To determine whether psychological resilience mediated the relationship between physical activity enjoyment and life satisfaction, Model 4 of Hayes' (2022) PROCESS macro was applied (Hayes, 2022), and a bootstrapping procedure was conducted. Bootstrapping is a widely used resampling method (Preacher & Hayes, 2008). A total of 10,000 bootstrap samples were generated, and the resulting confidence intervals were considered statistically significant when they did not contain zero (Hayes, 2022; MacKinnon, Lockwood, & Williams, 2004).

Results

This section first reports the means, standard deviations, and skewness-kurtosis coefficients for the study variables. This is followed by an examination of the mediating role of psychological resilience in the relationship between physical activity enjoyment and life satisfaction. The results of the bootstrapping analysis are also presented. The descriptive statistics and correlation analysis results for physical activity enjoyment, life satisfaction, and psychological resilience are presented in Table 1.

Table 1.Descriptive Statistics and Correlation Analysis Results

Variables	X	SD	Skewness	Kurtosis	Correlation		
1.Enjoyment of physical activity	15.70	4.61	-.63	-.15	–		
2.Life satisfaction	14.23	4.42	.17	.12	0.40*	–	
3.Psychological resilience	19.06	3.06	-.48	.49	0.35**	0.45**	–

*Note. ** p < .01; * p < .05*

As shown in Table 1, the mean score for physical activity enjoyment was 15.70 (SD = 4.61), the mean score for life satisfaction was 14.23 (SD = 4.42), and the mean score for psychological resilience was 19.06 (SD = 3.06). Skewness and kurtosis coefficients were found to fall within the range of −1.5 to +1.5, indicating that the data met the assumption of normal distribution (Tabachnick et al., 2007). Correlation analysis results revealed a statistically significant, positive, and moderate relationship between physical activity enjoyment and life satisfaction ($r = .40$, $p < .05$). A positive, moderate, and significant association was also found between physical activity enjoyment and psychological resilience ($r = .35$, $p < .01$). The relationship between psychological resilience and life satisfaction was likewise positive, moderate, and statistically significant ($r = .45$, $p < .01$). These findings indicate that the associations among the variables are in the expected direction and satisfy the prerequisites for testing the mediation model.

Mediating Role of Psychological Resilience

To examine the effect of physical activity enjoyment (X) on life satisfaction (Y) through psychological resilience (M), Model 4 of Hayes' (2022) PROCESS macro was applied, and 10,000 bootstrap samples were generated with 95% confidence intervals as the criterion (Hayes, 2022). The mediation model for physical activity enjoyment, life satisfaction, and psychological resilience is presented in Figure 1.

The mediation analysis results for physical activity enjoyment, life satisfaction, and psychological resilience are presented in Table 2.

Table 2: Mediation Analysis Results for Physical Activity Enjoyment, Life Satisfaction, and Psychological Resilience

Effect Type	(B)	(β)	(SE)	t	p	%95 (GA)	Effect size (f^2
Enjoyment of Physical Activity → Psychological Resilience **c** (path a)	0.039	0.123	0.014	2.748	0.006	0.011-0.067	0.012
Psychological Resilience → **Life Satisfaction** (path b)	0.251	0.206	0.054	4.663	0.000	0.145-0.356	
Enjoyment of Physical Activity → Life Satisfaction (Direct Effect, c')	0.027	0.070	0.017	1.578	0.115	-0.007-0.060	
Total Effect (c)	0.037	0.095	0.017	2.123	0.034	0.003-0.070	
Enjoyment of Physical Activity → Psychological Resilience → Life Satisfaction (Indirect Effec)	0.010	0.025	0.005	-	-	0.002-0.020	

As shown in Table 2, Model 4 of Hayes' (2022) PROCESS macro was applied to test the effect of physical activity enjoyment (X) on life satisfaction (Y) through psychological resilience (M), and 10,000 bootstrap samples were generated. Regarding path a, physical activity enjoyment significantly and positively predicted psychological resilience (B = 0.039, β = .123, SE = 0.014, t = 2.748, p = .006, 95% CI [0.011, 0.067]). This finding indicates that as individuals' enjoyment of physical activity increases, their level of psychological resilience also increases. Regarding path b, psychological resilience was found to significantly and positively predict life satisfaction (B = 0.251, β = .206, SE = 0.054, t = 4.663, p < .001, 95% CI [0.145, 0.356]). This result indicates that individuals with higher levels of psychological resilience report greater life satisfaction. With respect to the direct effect (c'), physical activity enjoyment did not exert a statistically significant direct effect on life satisfaction (B = 0.027, β = .070, SE = 0.017, t = 1.578, p = .115, 95% CI [−0.007, 0.060]). The fact that the confidence interval includes zero supports this interpretation. When psychological resilience was included in the model, the direct effect of physical activity enjoyment on life satisfaction was rendered non-significant. The total effect (c) was found to be significant (B = 0.037, β = .095, SE = 0.017, t = 2.123, p = .034, 95% CI [0.003, 0.070]). This finding confirms that a significant association between physical activity enjoyment and life satisfaction existed prior to the inclusion of the mediating variable. The indirect effect was found to be statistically significant based on the bootstrap analysis (B = 0.0097, β = .025, BootSE = 0.0045, 95% CI [0.0019, 0.0195]). The fact that the confidence interval does not contain zero indicates that the indirect effect is statistically significant. The non-significant direct effect and the significant indirect effect together indicate that psychological resilience functions as a full mediator in the relationship between physical activity enjoyment and life satisfaction (Preacher & Hayes, 2008). The mediation model illustrating the indirect effect of physical activity enjoyment on life satisfaction through psychological resilience is presented in Figure 2.

Discussion

The aim of this study was to examine the mediating role of psychological resilience in the relationship between physical activity enjoyment and life satisfaction. The findings revealed that psychological resilience mediated the relationship between physical activity enjoyment and life satisfaction, indicating that the effect of physical activity enjoyment on life satisfaction operates through psychological resilience. The results also demonstrate that as university students' levels of physical activity enjoyment increase, so does their psychological resilience. In other words, although the direct effect of physical activity enjoyment on life satisfaction is limited, the findings support the notion that it enhances life satisfaction indirectly through psychological resilience. The present study contributes to the literature by demonstrating that physical activity enjoyment strengthens life satisfaction not only through a direct pathway but also indirectly through psychological resilience. The findings are consistent with the Broaden-and-Build Theory (Fredrickson, 2001), which posits that positive emotions enhance individuals' well-being. According to this theoretical framework, positive emotions such as physical activity enjoyment may strengthen individuals' psychological resources, including resilience, self-regulation, and coping skills. These strengthened psychological resources are thought to enable individuals to cope more effectively with life challenges, thereby enhancing life satisfaction. The findings thus align with the theoretical expectation that positive emotions may support life satisfaction through the mediation of psychological resilience.

A study in the literature demonstrating that physical activity is a contributor to individuals' life satisfaction is consistent with the present findings (Fredrickson, 2001). Similarly, research has indicated that regular physical activity is associated with happiness, subjective well-being, and life satisfaction (Diener, Lucas, & Oishi, 2018; Eime, Young, Harvey, Charity, & Payne, 2013; Kleszczewska, Dzielska, Salonna, & Mazur, 2018; Syue et al., 2022). Examining the factors that influence life satisfaction, Joshanloo and Jovanović (2021) noted that positive and negative emotions play an important role among the determinants of life satisfaction. In particular, the experience of positive emotions may be effective in increasing individuals' life satisfaction. This further reinforces the positive association between enjoyment derived from physical activity and life satisfaction (Joshanloo & Jovanović, 2021). Zuo et al. (2022) reported a positive association between physical activity and life satisfaction among secondary school students (Zuo et al., 2022). Similarly, Ayhan et al. (2021) confirmed this relationship by emphasizing that regular physical activity contributes to both physical and psychological well-being and exerts a positive effect on life satisfaction (Ayhan, Işık, & Kaçay, 2021).

Furthermore, an examination of the mediation analyses in the present study reveals that while the direct effect of physical activity enjoyment on life satisfaction is positive, it is limited in magnitude. However, the analysis of indirect effects demonstrates that the effect of physical activity enjoyment on life satisfaction operates through psychological resilience.

This provides strong support for the notion that psychological resilience serves as an important mediating mechanism in the relationship between physical activity enjoyment and life satisfaction. The bootstrapping analysis results indicated that the 95% confidence interval for the indirect effect did not contain zero, confirming that the indirect effect is statistically significant. These findings are consistent

with studies in the existing literature. In the systematic review by White et al. (2024), psychological processes including self-efficacy, self-esteem, and psychological resilience were identified as mediators of the effects of physical activity on subjective well-being (White et al., 2024). These results, together with the findings of the present study, corroborate the mediating function of psychological resilience. Similarly, a study conducted among university students in China reported that the relationship between physical activity and life satisfaction was explained through self-efficacy and psychological resilience (J. Deng et al., 2023). Moreover, the meta-analysis by Buecker et al. (2021) emphasized that physical activity exerts a significant and moderate effect on positive affect and life satisfaction (Buecker, Simacek, Ingwersen, Terwiel, & Simonsmeier, 2021), findings that align with those of the present study. In addition, this study provides evidence supporting the relationship between physical activity enjoyment and psychological resilience. Qiu et al. (2025) demonstrated the positive association between physical activity levels and psychological resilience in youth through a systematic review and meta-analysis (Qiu et al., 2025). Román-Mata et al. (2020) found that individuals who engage in greater levels of physical activity exhibit higher levels of psychological health and life satisfaction (San Román-Mata et al., 2020). Guo and Liang reported that physical activity exerts positive effects on psychological resilience in adolescents, which in turn positively influences their social relationships (Guo & Liang, 2023). From this perspective, participation in physical activity indirectly strengthens life satisfaction by enhancing individuals' psychological resilience. Taken together, the existing literature supports the conclusion that physical activity participation, operating through psychological resilience, reinforces life satisfaction.

Conclusion

This study examined the mediating role of psychological resilience in the relationship between physical activity enjoyment and life satisfaction among university students. The findings revealed that psychological resilience fully mediated this relationship: while physical activity enjoyment did not directly predict life satisfaction, it exerted a significant indirect effect through the strengthening of psychological resilience. These results indicate that the pathway from physical activity enjoyment to life satisfaction operates primarily through psychological resilience rather than through a direct mechanism. The findings are theoretically consistent with the Broaden-and-Build Theory, which posits that positive emotional experiences broaden individuals' momentary thought-action repertoires and, over time, build enduring psychological resources. In the present study, physical activity enjoyment appears to function as one such positive emotional experience that contributes to the accumulation of psychological resilience, which in turn supports higher levels of life satisfaction. This sequential mechanism aligns with the proposition that positive affect strengthens coping capacity, enabling individuals to navigate daily stressors more effectively and sustain a higher sense of life satisfaction.

From a practical standpoint, these results carry meaningful implications for university health promotion. Physical activity programs at universities should be designed not only to increase participation frequency but also to cultivate the quality of the activity experience—particularly enjoyment. Environments that support autonomy, social interaction, and individual preference are more likely to foster physical activity enjoyment and, consequently, psychological resilience. Psychoeducational

interventions targeting resilience-building skills may further amplify these benefits when integrated alongside physical activity programming.

Several limitations of this study should be acknowledged. First, the cross-sectional design precludes causal inference; the temporal ordering of physical activity enjoyment, psychological resilience, and life satisfaction cannot be established from the present data. Longitudinal and experimental designs are needed to clarify the directionality of these relationships. Second, data were collected via self-report measures, which are susceptible to social desirability bias and common method variance. Future studies incorporating objective physical activity measurement or multiple data sources would improve construct validity. Third, the sample consisted exclusively of students from a single Turkish university, with a predominantly female composition, which limits the generalizability of the findings to other populations, age groups, and cultural contexts. Fourth, potential confounding variables—including gender, physical activity frequency, socioeconomic status, and health condition—were not controlled in the present analyses. Incorporating these variables as covariates in future models would provide a more comprehensive understanding of the underlying mechanisms.

In conclusion, physical activity enjoyment contributes to university students' life satisfaction not through a direct pathway, but by building psychological resilience. These findings underscore the importance of designing physical activity environments that prioritize enjoyment, and suggest that resilience-focused psychoeducational interventions may serve as a complementary strategy for enhancing well-being in university populations.

Declarations

Ethics Approval and Consent to Participate

This study adhered to the ethical guidelines set forth by the institutional and national research committees, as well as the principles of the 1964 Helsinki Declaration and its later amendments or equivalent ethical standards. This study was approved by the Scientific Research, Publication, and Ethics Committee of Iğdır University by decision dated 14.03.2025 and numbered 2025/8.

Data availability statements

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare that they have no competing interests" in this section.

Informed Consent

Written informed consent was obtained from all participants.

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Author Contributions:

Ercan Aras: Conceptualization, supervision, resources, materials, data collection and/or processing, analysis and/or interpretation, writing – original draft & critical review.

İsmail Keleş: Conceptualization, design, resources, materials, data collection and/or processing, literature review & writing – original draft.

Ramazan Cihad Yılmaz: Design, supervision, resources, materials, data collection and/or processing, literature review & writing – review & editing.

References

1. Alkhawaldeh, A., Al Omari, O., Al Aldawi, S., Al Hashmi, I., Ann Ballad, C., Ibrahim, A., . . . ALBashtawy, M. (2023). Stress factors, stress levels, and coping mechanisms among university students. *The Scientific World Journal, 2023*(1), 2026971. doi:10.1155/2023/2026971
2. Ayhan, C., Işık, Ö., & Kaçay, Z. (2021). The relationship between physical activity attitude and life satisfaction: A sample of university students in Turkey. *Work, 69*(3), 807-813. doi:10.3233/WOR-213513
3. Bácsné Bába, É., Lengyel, A., Pfau, C., Müller, A., Bartha, É. J., Balogh, R., . . . Ráthonyi, G. (2025). Physical activity: the key to life satisfaction-correlations between physical activity, sedentary lifestyle, and life satisfaction among young adults before and after the COVID-19 pandemic. *Frontiers in Public Health, 13*, 1486785. doi:10.3389/fpubh.2025.1486785
4. Baik, C., Larcombe, W., & Brooker, A. (2019). How universities can enhance student mental wellbeing: The student perspective. *Higher education research & development, 38*(4), 674-687. doi:10.1080/07294360.2019.1576596
5. Buecker, S., Simacek, T., Ingwersen, B., Terwiel, S., & Simonsmeier, B. A. (2021). Physical activity and subjective well-being in healthy individuals: a meta-analytic review. *Health psychology review, 15*(4), 574-592. doi:10.1080/17437199.2020.1760728
6. Burns, R. D., Fu, Y., & Podlog, L. W. (2017). School-based physical activity interventions and physical activity enjoyment: A meta-analysis. *Preventive medicine, 103*, 84-90. doi:10.1016/j.ypmed.2017.08.011
7. Büyüköztürk, Ş., Akgün, Ö. E., Demirel, F., Karadeniz, Ş., & Çakmak, E. K. (2015). Bilimsel araştırma yöntemleri.

8. Chacón-Cuberos, R., Castro-Sánchez, M., Pérez-Turpin, J. A., Olmedo-Moreno, E. M., & Zurita Ortega, F. (2019). Levels of physical activity are associated with the motivational climate and resilience in university students of physical education from Andalucía: an explanatory model. *Frontiers in Psychology, 10*, 1821. doi:10.3389/fpsyg.2019.01821
9. Cook, R. D. (2000). Detection of influential observation in linear regression. *Technometrics, 42*(1), 65-68.
10. Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2012). *Sosyal bilimler için çok değişkenli istatistik: SPSS ve LISREL uygulamaları* (Vol. 2): Pegem akademi Ankara.
11. Dağlı, A., & Baysal, N. (2016). Yaşam doyumu ölçeğinin türkçe'ye uyarlanmasi: geçerlik ve güvenirlik çalişmasi. *Elektronik Sosyal Bilimler Dergisi, 15*(59). doi:10.17755/esosder.75955
12. Den Hartigh, R. J., & Hill, Y. (2022). Conceptualizing and measuring psychological resilience: What can we learn from physics? *New Ideas in Psychology, 66*, 100934. doi:10.1016/j.newideapsych.2022.100934
13. Deng, D., Sun, Q., & Li, H. (2025). The influences of physical exercise on student burnout: based on the mediating role of psychological resilience. *BMC psychology, 13*(1), 114. doi:10.1186/s40359-025-02394-9
14. Deng, J., Liu, Y., Chen, R., & Wang, Y. (2023). The relationship between physical activity and life satisfaction among university students in China: the mediating role of self-efficacy and resilience. *Behavioral Sciences, 13*(11), 889. doi:10.3390/bs13110889
15. Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of personality assessment, 49*(1), 71-75. doi:10.1207/s15327752jpa4901_13
16. Diener, E., Lucas, R. E., & Oishi, S. (2018). Advances and open questions in the science of subjective well-being. *Collabra: Psychology, 4*(1), 15. doi:10.1525/collabra.115
17. Doğan, T. (2015). Kısa psikolojik sağlamlık ölçeği'nin Türkçe uyarlaması: Geçerlik ve güvenirlik çalışması. *The Journal of Happiness & Well-Being, 3*(1), 93-102.
18. Dunston, E. R., Messina, E. S., Coelho, A. J., Chriest, S. N., Waldrip, M. P., Vahk, A., & Taylor, K. (2022). Physical activity is associated with grit and resilience in college students: Is intensity the key to success? *Journal of American College Health, 70*(1), 216-222. doi:10.1080/07448481.2020.1740229
19. Durbin, J., & Watson, G. S. (1992). Testing for serial correlation in least squares regression. I. In *Breakthroughs in statistics: Methodology and distribution* (pp. 237-259): Springer.
20. Eime, R. M., Young, J. A., Harvey, J. T., Charity, M. J., & Payne, W. R. (2013). A systematic review of the psychological and social benefits of participation in sport for children and adolescents: informing development of a conceptual model of health through sport. *International journal of behavioral nutrition and physical activity, 10*(1), 98. doi:10.1186/1479-5868-10-98
21. Ferreira Silva, R. M., Mendonca, C. R., Azevedo, V. D., Raoof Memon, A., Noll, P. R. E. S., & Noll, M. (2022). Barriers to high school and university students' physical activity: A systematic review. *PloS one, 17*(4), e0265913. doi:10.1371/journal.pone.0265913
22. Field, A. (2024). *Discovering statistics using IBM SPSS statistics*: Sage publications limited.

23. Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American psychologist, 56*(3), 218. doi:10.1037/0003-066X.56.3.218
24. Galatzer-Levy, I. R., Burton, C. L., & Bonanno, G. A. (2012). Coping flexibility, potentially traumatic life events, and resilience: A prospective study of college student adjustment. *Journal of Social and Clinical Psychology, 31*(6), 542-567. doi:10.1521/jscp.2012.31.6.542
25. Gooding, P. A., Hurst, A., Johnson, J., & Tarrier, N. (2012). Psychological resilience in young and older adults. *International journal of geriatric psychiatry, 27*(3), 262-270. doi:10.1002/gps.2712
26. Guo, L., & Liang, L. (2023). Physical activity as a causal variable for adolescent resilience levels: A cross-lagged analysis. *Frontiers in Psychology, 14*, 1095999. doi:10.3389/fpsyg.2023.1095999
27. Hair Jr Joseph, F., Black William, C., Babin Barry, J., & Anderson Rolph, E. (2009). Multivariate data analysis 7th ed. *Upper Saddle River, NJ: Prentice Hall, 3*, 256-291.
28. Hayes, A. F. (2022). Counterfactual/potential outcomes “causal mediation analysis” with treatment by mediator interaction using PROCESS. *Canadian Centre for research analysis and methods technical report*, 1-12.
29. Joshanloo, M., & Jovanović, V. (2021). Similarities and differences in predictors of life satisfaction across age groups: A 150-country study. *Journal of health psychology, 26*(3), 401-411. doi:10.1177/1359105318819054
30. Karasar, N. (2009). Bilimsel arastirma yontemi: Kavramlar-ilkeler-teknikler. *Ankara: Nobel Yayin Dağitim*.
31. Katzmarzyk, P. T., Friedenreich, C., Shiroma, E. J., & Lee, I.-M. (2022). Physical inactivity and non-communicable disease burden in low-income, middle-income and high-income countries. *British journal of sports medicine, 56*(2), 101-106. doi:10.1136/bjsports-2020-103640
32. Kleszczewska, D., Dzielska, A., Salonna, F., & Mazur, J. (2018). The association between physical activity and general life satisfaction in lower secondary school students: The role of individual and family factors. *Community mental health journal, 54*(8), 1245-1252. doi:10.1007/s10597-018-0309-x
33. Kumar, H., Shaheen, A., Rasool, I., & Shafı, M. (2016). Psychological distress and life satisfaction among university students. *Journal of psychology & clinical psychiatry, 5*(3), 1-7.
34. Leisterer, S., & Gramlich, L. (2021). Having a positive relationship to physical activity: Basic psychological need satisfaction and age as predictors for students’ enjoyment in physical education. *Sports, 9*(7), 90. doi:10.3390/sports9070090
35. Liu, F., Duan, H., Hou, Y., Zhang, B., Wu, J., & Guo, L. (2024). The relationship between physical exercise and aggressive behavior among college students: the mediating roles of life satisfaction, meaning in life, and depression. *Psychology research and behavior management*, 305-315. doi:10.2147/PRBM.S450326
36. MacKinnon, D. P., Lockwood, C. M., & Williams, J. (2004). Confidence limits for the indirect effect: Distribution of the product and resampling methods. *Multivariate behavioral research, 39*(1), 99-128. doi:10.1207/s15327906mbr3901_4

37. Maselli, M., Ward, P. B., Gobbi, E., & Carraro, A. (2018). Promoting physical activity among university students: a systematic review of controlled trials. *American Journal of Health Promotion, 32*(7), 1602-1612. doi:10.1177/0890117117753798

38. Molanorouzi, K., Khoo, S., & Morris, T. (2015). Motives for adult participation in physical activity: type of activity, age, and gender. *BMC public health, 15*(1), 66. doi:10.1186/s12889-015-1429-7

39. Mullen, S. P., Olson, E. A., Phillips, S. M., Szabo, A. N., Wójcicki, T. R., Mailey, E. L., . . . McAuley, E. (2011). Measuring enjoyment of physical activity in older adults: invariance of the physical activity enjoyment scale (paces) across groups and time. *International journal of behavioral nutrition and physical activity, 8*(1), 103. doi:10.1186/1479-5868-8-103

40. Özkurt, B., Küçükibiş, H. F., & Eskiler, E. (2022). Fiziksel aktivitelerden keyif alma ölçeği (FAKÖ): Türk kültürüne uyarlama, geçerlik ve güvenirlik çalışması. *Anemon Muş Alparslan Üniversitesi Sosyal Bilimler Dergisi, 10*(1), 21-37. doi:10.18506/anemon.976300

41. Papaioannou, A., Bebetsos, E., Theodorakis, Y., Christodoulidis, T., & Kouli, O. (2006). Causal relationships of sport and exercise involvement with goal orientations, perceived competence and intrinsic motivation in physical education: A longitudinal study. *Journal of sports sciences, 24*(4), 367-382. doi:10.1080/02640410400022060

42. Park, J.-H., & Kang, S.-W. (2023). *Social interaction and life satisfaction among older adults by age group.* Paper presented at the Healthcare.

43. Parsons, S., Kruijt, A.-W., & Fox, E. (2016). A cognitive model of psychological resilience. *Journal of Experimental Psychopathology, 7*(3), 296-310. doi:10.5127/jep.053415

44. Peker, H., Teke, C., Çakar, B., Kabadayı, Y., & Caner, N. (2023). Fiziksel aktiviteden keyif alma, tekrar katılma niyeti ve mutluluk arasındaki ilişki: Kampüs rekreasyonuna katılan üniversite öğrencileri örneği. *Uluslararası Güncel Eğitim Araştırmaları Dergisi, 9*(2), 206-220.

45. Pineda-Espejel, H. A., Morquecho-Sánchez, R., Terán, L., López-Gaspar, I., Hernández-Mendo, A., Morales-Sánchez, V., . . . Granero-Gallegos, A. (2023). Satisfied and frustrated needs, subjective vitality and university students' life satisfaction of physical activity and sports. *Sustainability, 15*(4), 3053. doi:10.3390/su15043053

46. Powell, K. E., Paluch, A. E., & Blair, S. N. (2011). Physical activity for health: What kind? How much? How intense? On top of what? *Annual review of public health, 32*(1), 349-365. doi:10.1146/annurev-publhealth-031210-101151

47. Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior research methods, 40*(3), 879-891. doi:10.3758/BRM.40.3.879

48. Qiu, W., Huang, C., Xiao, H., Nie, Y., Ma, W., Zhou, F., & Liu, C. (2025). The correlation between physical activity and psychological resilience in young students: a systematic review and meta-analysis. *Frontiers in Psychology, 16*, 1557347. doi:10.3389/fpsyg.2025.1557347

49. Rhodes, R. E., & Sui, W. (2021). Physical activity maintenance: a critical narrative review and directions for future research. *Frontiers in Psychology, 12*, 725671. doi:10.3389/fpsyg.2021.725671

50. San Román-Mata, S., Puertas-Molero, P., Ubago-Jiménez, J. L., & González-Valero, G. (2020). Benefits of physical activity and its associations with resilience, emotional intelligence, and psychological distress in university students from southern Spain. *International journal of environmental research and public health, 17*(12), 4474. doi:10.3390/ijerph17124474
51. Siahpush, M., Spittal, M., & Singh, G. K. (2008). Happiness and life satisfaction prospectively predict self-rated health, physical health, and the presence of limiting, long-term health conditions. *American Journal of Health Promotion, 23*(1), 18-26. doi:10.4278/ajhp.061023137
52. Slavinski, T., Bjelica, D., Pavlović, D., & Vukmirović, V. (2021). Academic performance and physical activities as positive factors for life satisfaction among university students. *Sustainability, 13*(2), 497. doi:10.3390/su13020497
53. Slimmen, S., Timmermans, O., Mikolajczak-Degrauwe, K., & Oenema, A. (2022). How stress-related factors affect mental wellbeing of university students A cross-sectional study to explore the associations between stressors, perceived stress, and mental wellbeing. *PloS one, 17*(11), e0275925. doi:10.1371/journal.pone.0275925
54. Smith, B. W., Dalen, J., Wiggins, K., Tooley, E., Christopher, P., & Bernard, J. (2008). The brief resilience scale: assessing the ability to bounce back. *International journal of behavioral medicine, 15*(3), 194-200. doi:10.1080/10705500802222972
55. Syue, S.-H., Yang, H.-F., Wang, C.-W., Hung, S.-Y., Lee, P.-H., & Fan, S.-Y. (2022). The associations between physical activity, functional fitness, and life satisfaction among community-dwelling older adults. *International journal of environmental research and public health, 19*(13), 8043. doi:10.3390/ijerph19138043
56. Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). *Using multivariate statistics* (Vol. 5): pearson Boston, MA.
57. White, R. L., Vella, S., Biddle, S., Sutcliffe, J., Guagliano, J. M., Uddin, R., . . . Young, C. (2024). Physical activity and mental health: a systematic review and best-evidence synthesis of mediation and moderation studies. *International journal of behavioral nutrition and physical activity, 21*(1), 134. doi:10.1186/s12966-024-01676-6
58. Xu, S., Liu, Z., Tian, S., Ma, Z., Jia, C., & Sun, G. (2021). Physical activity and resilience among college students: the mediating effects of basic psychological needs. *International journal of environmental research and public health, 18*(7), 3722. doi:10.3390/ijerph18073722
59. Yıldırım, S., Yıldırım, H. D., & Düzel, Ş. (2014). Fiziksel aktivite ve psikolojik sağlık ilişkisinde psikolojik sağlamlığın aracı rolü. *Research in Sports Science, 14*(2), 73-79.
60. Zhang, Y., Ren, M., & Zou, S. (2022). Effect of physical exercise on college students' life satisfaction: mediating role of competence and relatedness needs. *Frontiers in Psychology, 13*, 930253. doi:10.3389/fpsyg.2022.930253
61. Zuo, Z., Li, S., Liu, S., & Wang, Q. (2022). Life satisfaction and parental support among secondary school students in Urumqi: the mediation of physical activity. *PeerJ, 10*, e14122. doi:10.7717/peerj.14122

Figures

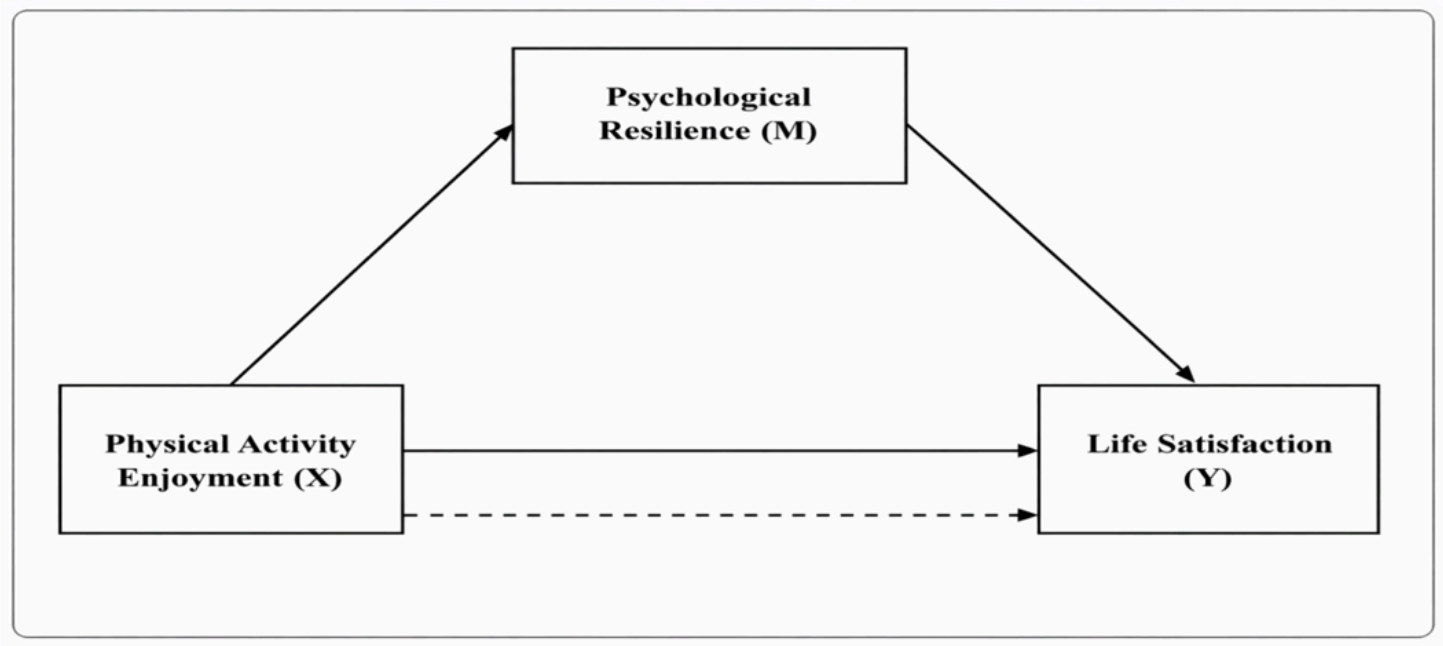
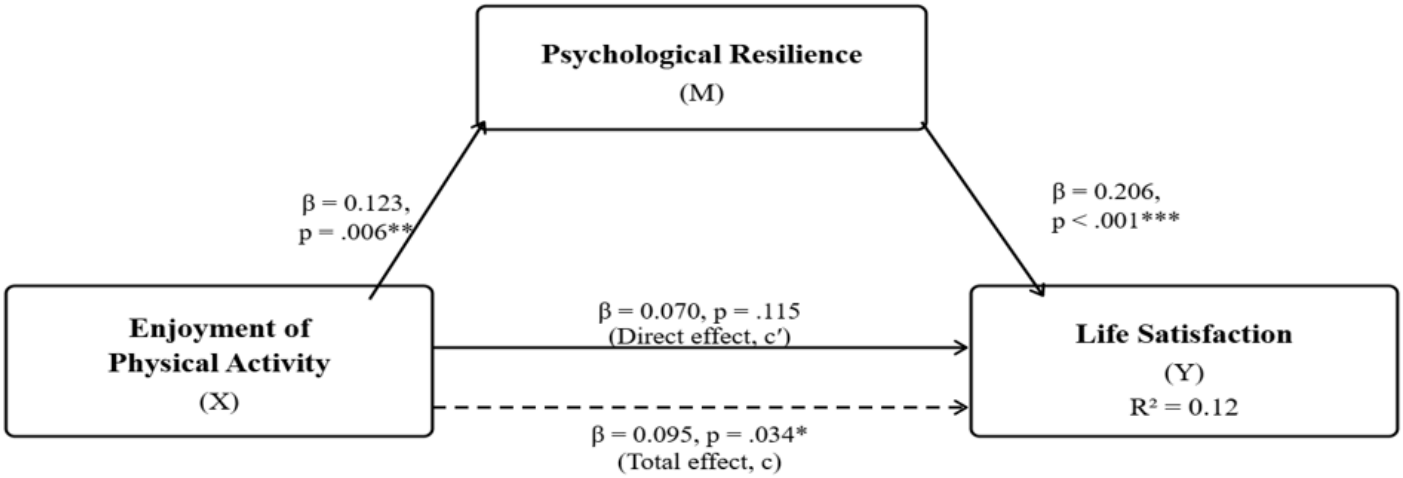


Figure 1

Mediation Model



Note. β = Standardized path coefficient; c′ = direct effect; c = total effect.
*** p < .001, ** p < .01, * p < .05.

Figure 2

Mediation model showing the indirect effect of physical activity enjoyment on life satisfaction through psychological resilience. Standardized coefficients (β) are presented.

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- Dataexcell.xlsx
- variables.xlsx
- Dataspss.sav