

The Relationship Between Fitness Program Participation, Academic Stress, and Academic Achievement in University Students: A Cross-Sectional Study

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Haya Qatami¹ and Hashem A. Kilan^{2*}

¹ The Hashemite University, Zarqa, Jordan

² The University of Jordan, Amman, Jordan

*Correspondence Author: hashemkilani@gmail.com

ABSTRACT

Background: University students frequently experience substantial academic stress, which may negatively influence both psychological well-being and academic performance. Physical activity has been recognized as a potential protective factor that supports mental health and cognitive functioning; however, evidence from Middle Eastern university populations remains limited.

Objective: This study examined the relationship between Fitness Program Participation, academic stress, and academic achievement among university students in Jordan.

Methods: A cross-sectional descriptive–analytical design was employed. A total of 300 undergraduate students from public and private universities in Jordan were recruited using simple random sampling. Data were collected using a validated questionnaire assessing Fitness Program Participation and academic stress. Academic achievement was represented by students' self-reported academic performance. Descriptive statistics, Pearson correlation coefficients, and linear regression analyses were performed using SPSS Version 26.

Results: Students reported relatively high levels of Fitness Program Participation ($M = 3.68$, $SD = 0.87$) and academic stress ($M = 3.77$, $SD = 0.89$). Fitness Program Participation was significantly and negatively associated with academic stress ($r = -0.42$, $p < .001$), indicating that higher participation levels were related to lower stress levels. In addition, Fitness Program Participation demonstrated a significant positive association with academic achievement ($r = 0.35$, $p = .001$). Regression analysis revealed that Fitness Program Participation was significantly associated with lower academic stress ($\beta = -0.39$, $p < .001$).

Conclusions: Higher levels of Fitness Program Participation were associated with reduced academic stress and improved academic achievement among university students. These findings support the integration of structured physical activity programs within university settings as a strategy to promote student well-being and academic success. Future longitudinal studies are needed to clarify the directionality of these relationships.

Keywords: physical activity; academic stress; academic achievement; university students; health promotion

INTRODUCTION

University students frequently encounter multiple academic, social, and psychological demands that may contribute to elevated levels of stress during higher education. Academic stress has been identified as one of the most prevalent challenges affecting university students worldwide, with potential consequences for mental health, well-being, and academic performance (Beiter et al., 2015; Pascoe et al., 2020). Excessive academic stress has been associated with anxiety, reduced motivation, impaired concentration, and lower academic achievement, making it an important concern for educational institutions and public health professionals (Beiter et al., 2015; Pascoe et al., 2020).

Physical activity has been widely recognized as a key determinant of physical and psychological health. Regular participation in physical activity contributes to improved cardiovascular fitness, enhanced psychological well-being, reduced symptoms of anxiety and depression, and improved quality of life (World Health Organization [WHO], 2022; Bull et al., 2020; Warburton & Bredin, 2017). Among university students, physical activity has also been linked to better stress management and greater resilience in coping with academic and personal challenges (Biddle et al., 2019; Rodriguez-Ayllon et al., 2019). Academic stress and mental health concerns remain highly prevalent among university students internationally. Recent reports from the American College Health Association indicate that stress, anxiety, and academic pressures continue to be among the most frequently reported challenges affecting student well-being and academic success (American College Health Association, 2023).

Growing evidence suggests that physical activity may play an important role in reducing academic stress and enhancing psychological resilience among young adults and university students (Lubans et al., 2016; Rodriguez-Ayllon et al., 2019). Recent evidence among college students has also demonstrated significant associations between physical fitness levels and mental health outcomes, suggesting that physically active students may experience better psychological well-being and lower levels of distress (Hong et al., 2024). Also, studies have consistently reported that individuals who engage in regular physical activity tend to report lower levels of perceived stress and greater psychological well-being compared with their less active peers (Lubans et al., 2016; Rodriguez-Ayllon et al., 2019). A recent systematic review and meta-analysis further concluded that physical exercise interventions significantly improve university students' mental health, including reductions in stress, anxiety, and depressive symptoms (Liu et al., 2025). Consequently, physical activity has increasingly been viewed as a protective factor that may help students manage academic demands more effectively.

In addition to its relationship with stress, physical activity has been associated with academic achievement. Research indicates that regular participation in physical activity may contribute to improved cognitive functioning, including attention, memory, executive functioning, and information processing speed (Donnelly et al., 2016; Esteban-Cornejo et al., 2015; Hillman et al., 2008). These cognitive benefits may translate into improved academic outcomes, as physically active students tend to demonstrate better academic engagement and learning performance (Sibley & Etnier, 2003; Singh et al., 2019). Several

studies have reported positive associations between Fitness Program Participation and academic performance, although the magnitude of these relationships varies across populations and educational contexts (Singh et al., 2019; Alvarez-Bueno et al., 2017).

Despite the growing body of international literature, evidence examining the relationships among Fitness Program Participation, academic stress, and academic achievement in Middle Eastern university populations remains relatively limited. Recent global reports indicate that insufficient physical activity remains common among adolescents and young adults, reinforcing the need for university-based health-promotion strategies (Guthold et al., 2020). Cultural, educational, and environmental factors may influence students' opportunities for physical activity and their experiences of academic stress, highlighting the importance of context-specific investigations (World Health Organization, 2022; Bull et al., 2020). Understanding these relationships within Jordanian universities may provide valuable information for developing health-promotion strategies aimed at improving student well-being and educational outcomes.

Therefore, the purpose of this study was to examine the relationship between Fitness Program Participation, academic stress, and academic achievement among university students in Jordan. Specifically, the study investigated whether Fitness Program Participation was associated with lower levels of academic stress and higher levels of academic achievement.

Based on previous literature, the following hypotheses were proposed:

H1: Fitness Program Participation is negatively associated with academic stress among university students.

H2: Fitness Program Participation is positively associated with academic achievement among university students.

MATERIALS AND METHODS

STUDY DESIGN

A cross-sectional descriptive–analytical design was employed to investigate the relationships among Fitness Program Participation, academic stress, and academic achievement among university students in Jordan. This design was considered appropriate for examining associations between variables within a large student population at a single point in time.

2.2 Participants and Setting

The study was conducted among undergraduate students enrolled in public and private universities in Jordan during the 2025–2026 academic year. Participants were recruited using a simple random sampling approach. Eligibility criteria included: (a) being enrolled as a full-time undergraduate student, (b) being between 18 and 25 years of age, and (c) providing informed consent to participate. Students with incomplete questionnaire responses were excluded from the final analysis.

A total of 300 students participated in the study. This sample size was considered adequate for correlation and regression analyses and exceeded commonly recommended minimum sample requirements for social science research.

Eligibility Criteria

Participants were required to be currently enrolled university students, aged 18 years or older, and willing to provide informed consent. Incomplete questionnaires were excluded from the final analysis.

INSTRUMENTS

PHYSICAL ACTIVITY SCALE

Fitness program participation was assessed using a **3-item** self-report scale evaluating the frequency, regularity, and institutional integration of physical activity into the students' routine. The items included tracking if students exercise regularly, engage in weekly physical activity, or participate in university fitness programs. Responses were recorded on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher cumulative scores indicated a greater level of participation in physical activity and fitness programs.

ACADEMIC STRESS SCALE

Perceived academic stress was measured using a **3-item** scale assessing students' exposure to examination pressure, semester-long anxiety, and stress-induced academic concentration difficulties. Responses were recorded on a five-point Likert scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Higher scores reflected higher levels of perceived academic stress.

ACADEMIC ACHIEVEMENT SCALE

Academic achievement was assessed using a self-reported measure of perceived academic performance. Participants rated their overall academic achievement using a five-point Likert scale ranging from 1 (very low) to 5 (very high). The scale evaluated perceived academic success, satisfaction with academic performance, ability to meet academic requirements, and perceived progress toward educational goals. Higher scores reflected greater perceived academic achievement.

VALIDITY AND RELIABILITY

Content validity of the developed instrument was established through a rigorous review process by a panel of expert referees specialized in physical education, sport sciences, and educational measurement. The panel evaluated the clarity, linguistic appropriateness, and thematic relevance of the items to the cultural and academic context of universities in Jordan. Based on their constructive feedback, minor modifications were implemented to improve item readability.

Internal consistency reliability was assessed using Cronbach's alpha coefficient, which yielded a value of **0.87** for the instrument, indicating high internal consistency and strong reliability for research purposes.

DATA COLLECTION PROCEDURES

Following the receipt of institutional ethical clearance, data collection was conducted during the second semester of the 2025–2026 academic year. The target population consisted of undergraduate students across public and private faculties in Jordan. The questionnaire was distributed digitally via a secure online survey platform.

Prior to completing the instrument, all participants were presented with a clear explanatory disclosure highlighting the study's primary objectives, voluntary nature of participation, and their right to withdraw at any stage without academic penalty. Explicit informed consent was obtained from each respondent before unlocking the survey items. Complete anonymity was maintained throughout the process, and all completed responses were audited for missing data and statistical completeness prior to formal database entry.

STATISTICAL ANALYSIS

Quantitative data analysis was performed utilizing IBM SPSS Statistics (Version 26.0). Descriptive statistics, including frequencies and percentages, were calculated to summarize the demographic characteristics of the student sample, while means (M) and standard deviations (SD) were used to evaluate continuous subscale scores. To test the hypotheses, Pearson product-moment correlation coefficients (r) were computed to analyze the bivariate associations among fitness program participation, perceived academic stress, and academic achievement.

Subsequently, linear regression analyses were executed to investigate the predictive power of fitness program participation on academic stress. Prior to conducting the inferential analyses, statistical assumptions—including linearity, normality of residuals, independence of residuals, and homoscedasticity were assessed and satisfied. The threshold for statistical significance across all tests was established a priori at $p \leq .05$.

ETHICAL CONSIDERATIONS

This investigation was conducted in strict accordance with the ethical principles outlined in the Declaration of Helsinki. The study protocol received formal institutional review and administrative approval from the Institutional Review Board (IRB) of The Hashemite University, Jordan (Approval No. 9/2025–2026; approved on 10 May 2026). All collected participant data were securely encrypted, treated with strict confidentiality, and utilized exclusively for the designated research aims of this study.

Conceptual framework of the study

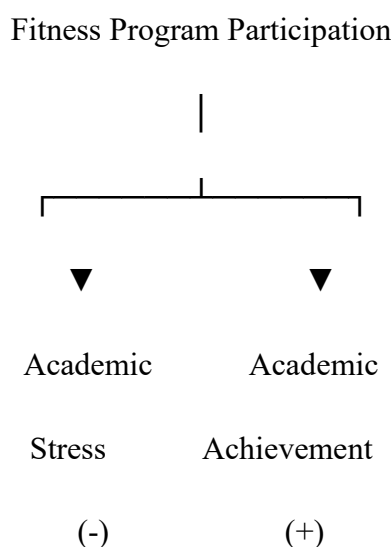


Figure 1. Conceptual framework of the study showing the hypothesized negative association between fitness program participation and academic stress and the positive association between fitness program participation and academic achievement.

RESULTS

3.1 Participant Characteristics

A total of 300 university students participated in the study. As presented in Table 1, female students represented 55.0% of the sample ($n = 165$), while male students accounted for 45.0% ($n = 135$). Regarding academic level, second-year students constituted the largest proportion of participants (30.0%), followed by third-year students (26.7%), first-year students (25.0%), and fourth-year students (18.3%).

Table 1: Demographic Characteristics of Participants ($N = 300$)

Variable	Category	n	%
Gender	Male	135	45.0
	Female	165	55.0
Academic Year	First year	75	25.0
	Second year	90	30.0
	Third year	80	26.7
	Fourth year	55	18.3

PARTICIPATION IN FITNESS PROGRAMS

As shown in Table 2, descriptive statistics indicated that students reported relatively high levels of participation in fitness programs ($M = 3.68$, $SD = 0.87$). The highest-rated item was “I exercise regularly” ($M = 3.82$, $SD = 0.91$), followed by “I engage in weekly physical activity” ($M = 3.76$, $SD = 0.84$). Participation in university-organized fitness programs received the lowest relative score within the subscale, yielding a moderate rating ($M = 3.45$, $SD = 0.88$).

Table 2: Descriptive Statistics for Fitness Program Participation Items

Item	M	SD	Level
I exercise regularly	3.82	0.91	High
I engage in weekly physical activity	3.76	0.84	High
I participate in university fitness programs	3.45	0.88	Moderate
Overall Subscale Index	3.68	0.87	High

Note. Measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

ACADEMIC STRESS LEVELS

As presented in Table 3, the student cohort experienced high baseline levels of perceived academic stress ($M = 3.77$, $SD = 0.89$). Evaluation demands represented the primary source of strain, with the item “I feel pressure due to exams” demonstrating the highest mean score ($M = 3.90$, $SD = 0.92$). This was followed by cognitive interference, where stress significantly degraded academic concentration ($M = 3.78$, $SD = 0.85$). General subjective anxiety during the academic semester was rated moderately ($M = 3.65$, $SD = 0.89$).

Table 3: Descriptive Statistics for Academic Stress Items

Item	M	SD	Level
I feel pressure due to exams	3.90	0.92	High
Stress affects my academic concentration	3.78	0.85	High
I experience anxiety during the semester	3.65	0.89	Moderate
Overall Subscale Index	3.77	0.89	High

Note. Measured on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

BIVARIATE CORRELATION ANALYSIS

To evaluate the relationships among fitness program participation, perceived academic stress, and subjective academic achievement, Pearson product-moment correlation coefficients ((r)) were calculated. As shown in Table 4, a statistically significant, moderate negative correlation was found between fitness program participation and academic stress, $(r = -.42)$, $(p < .001)$. This confirms hypothesis $(H\{1\})$, demonstrating that students with greater fitness engagement experienced lower levels of academic stress. (see Figure 2).

Additionally, a significant positive correlation was observed between fitness program participation and academic achievement, $(r = .35)$, $(p = .001)$. This confirms hypothesis $(H\{2\})$, showing that higher levels of fitness participation were associated with better academic achievement. (see Figure 3).

Table 4: Pearson Correlations Among Study Variables ($(N = 300)$)

Variable	1	2	3
1. Fitness Participation	—		
2. Academic Stress	-.42***	—	
3. Academic Achievement	.35**	-.29*	—

Note. * $p < .05$, ** $p = .001$, *** $p < .001$ (Two-tailed).

REGRESSION ANALYSIS

As shown in Table 5, a simple linear regression was conducted to examine the predictive capacity of fitness program participation on perceived academic stress. The model was statistically significant, $(F(1, 298) = 52.56)$, $(p < .001)$, explaining approximately 15.0% of the variance in stress outcomes $(R^2 = .150)$, Adjusted $(R^2 = .147)$. Fitness program participation served as a highly significant negative predictor of academic stress $(\beta = -.39)$, $(t = -7.25)$, $(p < .001)$. The unstandardized regression coefficient indicated that higher fitness participation scores were associated with lower academic stress scores $(B = -0.45)$.

Table 5: Linear Regression Analysis Examining the Association Between Fitness Program Participation and Academic Stress

Predictor	B	SE	β	t	p
Fitness Program Participation	-0.45	0.062	-0.39	-7.25	<.001

Note. Dependent variable = Academic Stress. B = unstandardized coefficient; SE B = standard error; β = standardized coefficient. Model summary: $R^2 = .150$, Adjusted $R^2 = .147$, $F(1, 298) = 52.56$, $p < .001$.

As shown in Table 5, fitness program participation demonstrated a statistically significant, negative association with academic stress, $(B = -0.45)$, $(\beta = -.39)$, $(t = -7.25)$, $(p < .001)$. This indicates that higher levels of participation in structured fitness initiatives are a significant predictor of lower levels of perceived academic strain and exam anxiety.

DISCUSSION

The present study examined the relationships between participation in fitness programs, academic stress, and academic achievement among university students in Jordan. The findings revealed three main outcomes. First, students reported relatively high baseline levels of participation in fitness programs $(M = 3.68)$, $(SD = 0.87)$. Second, academic stress levels were also noticeably elevated among the student cohort $(M = 3.77)$, $(SD = 0.89)$. Third, participation in fitness programs was significantly and negatively associated with perceived academic stress $(r = -.42)$ and positively correlated with subjective academic achievement $(r = .35)$. These findings are consistent with the growing body of empirical evidence suggesting that engagement in regular physical activity contributes positively to both psychological well-being and academic functioning among university students (Warburton & Bredin, 2017; Lubans et al., 2016). This interpretation is supported by recent evidence indicating that structured exercise interventions significantly improve mental health outcomes and reduce stress-related symptoms among university students (Liu et al., 2025). Furthermore, Hong et al. (2024) reported that higher levels of physical fitness were associated with more favorable mental health profiles among college students,

reinforcing the potential psychological benefits of regular physical activity. The significant negative association observed between participation in fitness programs and academic stress tracks with previous research demonstrating that physically active individuals report lower levels of perceived stress, anxiety, and psychological distress (Pascoe et al., 2020; Rodriguez-Ayllon et al., 2019). Physical activity enhances emotional regulation, improves mood states, and reduces physiological reactivity to stress through neurobiological mechanisms involving endorphin release, autonomic regulation, and optimized sleep quality (Lubans et al., 2016; Biddle et al., 2019). Consequently, students who participate more frequently in fitness-related activities appear better equipped to cope with acute academic demands and examination pressures ($M = 3.90$).

The high academic stress levels observed in the present study are consistent with contemporary trends in higher education. University students encounter compounding academic responsibilities, including heavy workloads, rigid deadlines, and future career competitiveness. Similar levels of academic stress have been reported among university populations worldwide, particularly within highly demanding educational environments (Beiter et al., 2015; Pascoe et al., 2020). These findings are also consistent with broader evidence demonstrating that university students frequently experience substantial academic pressures associated with academic workload, examinations, and future career expectations (Beiter et al., 2015; Pascoe et al., 2020). The positive relationship between participation in fitness programs and academic achievement further substantiates the international literature. Regular physical activity is reliably linked to improved cognitive functioning, including attention, working memory, executive functioning, and information processing speed (Hillman et al., 2008; Donnelly et al., 2016). These cognitive adaptations have been associated with improved educational outcomes and academic performance (Sibley & Etnier, 2003; Singh et al., 2019). Although the magnitude of the correlation observed in this study was moderate ($r = .35$), it confirms that lifestyle factors like physical activity are meaningful indicators of favorable educational outcomes.

Regression analysis further demonstrated that participation in fitness programs was a significant negative predictor of academic stress, accounting for 15.0% of the variance ($R^2 = .150$), ($\beta = -.39$). However, given the cross-sectional nature of this study, these findings must be interpreted as evidence of statistical association rather than definitive causation. It cannot be conclusively stated that increasing fitness participation directly alleviates stress. Alternative unmeasured explanations—including distinct lifestyle choices, robust peer social support, adaptive personality traits, or baseline health behaviors—may also drive these observed paths.

The findings are particularly relevant in Jordanian universities, where academic competition and employment-related concerns may contribute to elevated stress levels among students. Expanding structured fitness opportunities within university settings may therefore provide a practical strategy for supporting both student well-being and academic engagement. The present findings are also consistent with recent evidence demonstrating

that physically active university students report lower stress levels and better mental health outcomes than their less active counterparts (Hong et al., 2024; Liu et al., 2025).

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PRACTICAL IMPLICATIONS

From a practical perspective, these findings highlight the immense institutional value of integrating structured fitness and physical activity opportunities within university environments in Jordan. Higher education institutions would benefit from expanding campus recreational sports programs, investing in student fitness facilities, and launching wellness initiatives that incentivize regular physical activity. Such structural interventions stand to improve not only students' physical health but also their psychological coping mechanisms and overall academic development.

These findings are particularly relevant given reports that many university-aged individuals fail to meet recommended physical activity guidelines, despite the well-documented physical, psychological, and academic benefits of regular exercise (Guthold et al., 2020; World Health Organization, 2022).

STRENGTHS AND LIMITATIONS

A key strength of this investigation is its rigorous random sampling approach ($N = 300$) and its intentional focus on university students within a Middle Eastern context, where empirical evidence bridging fitness participation, academic stress, and academic achievement has remained scarce. By examining both psychological and academic outcomes simultaneously, the study provides a more holistic view of the protective role of physical activity in higher education.

Several limitations should be acknowledged when interpreting these results. First, the cross-sectional design strictly prevents the deduction of causal inferences. Second, data collection relied entirely on self-report scales, which may introduce social desirability bias or retrospective recall errors. Third, the sample was drawn exclusively from university

students in Jordan, which may limit the generalizability of the insights to distinct international student cultures. Finally, confounding variables that heavily influence both academic stress and achievement—such as socioeconomic status, clinical mental health history, and objective sleep quality—were not controlled for in the current model.

DIRECTIONS FOR FUTURE RESEARCH

Future research should employ longitudinal and experimental designs to clarify the precise directionality and potential bi-directional nature of the relationships observed in this study. Further investigations should also explore complex mediating and moderating pathways—including intrinsic motivation, exercise self-efficacy, peer social support, and dietary habits—to fully clarify the exact mechanisms through which fitness participation translates into superior academic and psychological outcomes.

CONCLUSION

Participation in fitness programs was significantly associated with lower levels of academic stress and higher levels of academic achievement among university students. These findings suggest that regular engagement in fitness-related activities may be linked to improved psychological well-being and educational outcomes in higher education settings. Given the increasing prevalence of academic stress among university students, promoting participation in fitness programs may represent a valuable component of comprehensive student wellness strategies. Nevertheless, longitudinal and intervention-based studies are required to establish causal relationships and further explore the mechanisms underlying these associations.

DECLARATIONS & DISCLOSURES

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DISCLOSURE STATEMENT

The authors report no conflicts of interest associated with this research project.

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DATA AVAILABILITY STATEMENT

The raw quantitative dataset supporting the empirical findings of this study is available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

- Conceptualization: H.K.
- Methodology: H.Q.
- Formal Analysis: H.K.
- Writing – Original Draft: H.Q.
- Writing – Review & Editing: H.K.
- All authors have read and approved the final version of the manuscript.

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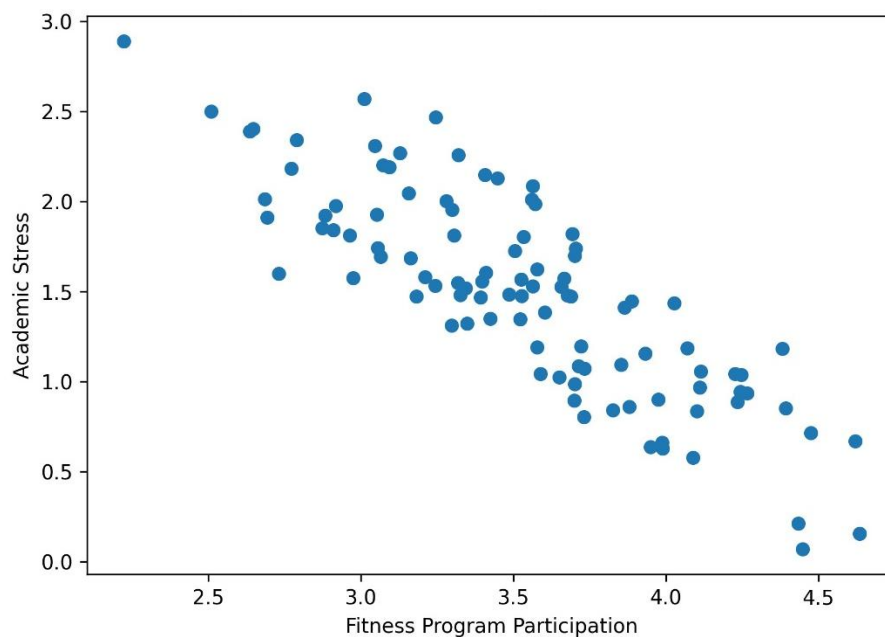


Figure 2: Relationship between fitness program participation and academic stress among university students.

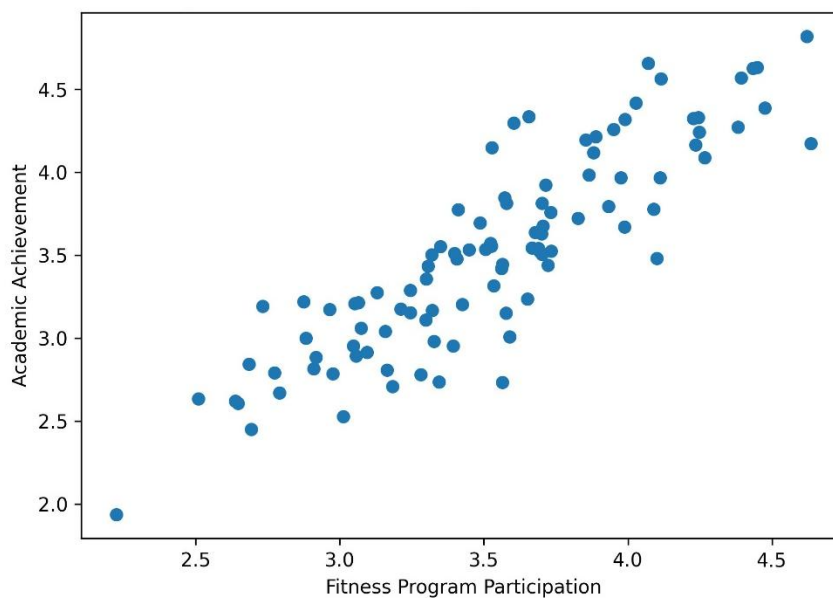


Figure 3: Relationship between fitness program participation and academic achievement among university students.