



Academic Stress in First-Year Biology Education Students: The Role of Coping Strategies and Self-Esteem

Jajang Miharja^{1*}, Rukun Maulana Sidik¹, Indra Darmawan¹, Solihin²

¹La Tansa Mashiro University, Rangkasbitung, Indonesia

²Syarif Hidayatullah State Islamic University Jakarta, South Tangerang, Indonesia

*Email: jajang.miharja@unilam.ac.id

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Abstract

First-year university students frequently experience academic stress as they adapt to new academic, social, and personal demands. Excessive academic stress may adversely affect students' psychological well-being, self-esteem, and academic performance. Therefore, understanding the roles of coping strategies and self-esteem is important for identifying factors associated with academic stress among first-year students. This study aimed to examine the relationships among coping strategies, self-esteem, and academic stress among first-year biology education students. A quantitative correlational design was employed involving 22 first-year biology education students selected through purposive sampling. The study investigated three variables, namely coping strategies, self-esteem, and academic stress, without administering any intervention or treatment. Data were collected using standardized questionnaires measuring coping strategies, self-esteem, and academic stress. Pearson correlation analysis was conducted to examine the relationships between coping strategies and academic stress as well as between self-esteem and academic stress, while multiple correlation analysis was used to determine the combined relationship of coping strategies and self-esteem with academic stress. The results demonstrated a significant negative relationship among coping strategies, self-esteem, and academic stress, indicating that students with more effective coping strategies and higher levels of self-esteem tended to report lower levels of academic stress. These findings suggest that coping strategies and self-esteem are important psychological factors associated with academic stress among first-year university students and should be considered in developing programs to support students' psychological adjustment and academic success during the transition to higher education.

Keywords: academic stress; adolescence; coping strategies; higher education; self-esteem

INTRODUCTION

Higher education provides opportunities for students to develop knowledge, competencies, and personal attributes through academic, social, organizational, and leadership experiences (Dewanti *et al.*, 2025; Purwoko *et al.*, 2025). However, the transition from secondary school to university presents significant challenges, particularly for first-year students who must adapt to new academic expectations, learning environments, and social contexts (Mulyadi *et al.*, 2016; Priest *et al.*, 2016). This transition often requires greater independence in learning, effective time management, and adjustment to unfamiliar institutional systems. Consequently, many first-year students experience difficulties in adapting to university life, making them more vulnerable to psychological stress and adjustment problems (Isnayanti & Harahap, 2018; Omar *et al.*, 2020; Mamlukah & Kumalasari, 2022; Siregar, 2022).

Stress arises when perceived demands exceed an individual's available coping resources (Joseph *et al.*, 2021; Slykerman & Mitchell, 2021). In higher education, this condition is commonly manifested as academic stress, which refers to the psychological pressure associated with academic demands, performance expectations, and time constraints (Omar *et al.*, 2020; Siregar, 2022). Academic stress is highly prevalent among university students, especially during the first year of study. Previous studies have reported that a substantial proportion of students experience high levels of academic tension, with female students generally reporting greater school related anxiety than male students (OECD, 2017; Isnayanti & Harahap, 2018). Academic stress has been associated with impaired concentration, reduced learning effectiveness, lower academic achievement, and poorer psychological well-being (Rabbi & Islam, 2024; Nayak, 2025).

Given its adverse consequences, identifying factors that help students manage academic stress is essential. One important factor is coping strategies, which refer to the cognitive and behavioral efforts individuals use to manage stressful situations (Martin *et al.*, 2023; Chorfi *et al.*, 2024). Effective coping strategies enable students to adapt to academic challenges, regulate emotional responses, and maintain psychological well-being. Conversely, ineffective coping strategies may increase vulnerability to stress and negatively affect academic functioning (Omar *et al.*, 2020; Ningrum *et al.*, 2025). Previous studies consistently demonstrate a significant relationship between coping strategies and academic stress, indicating that students with more adaptive coping mechanisms tend to report lower levels of stress (Omar *et al.*, 2020; Fogel *et al.*, 2022).

Another factor associated with academic stress is self-esteem, defined as an individual's overall evaluation of self worth and competence (Alyami *et al.*, 2017; Gobena, 2024). Self-esteem influences how students perceive and respond to academic demands and challenges. Students with high self-esteem generally exhibit greater confidence in their abilities, are more resilient when facing difficulties, and are better able to manage academic pressure. In contrast, low self-esteem has been linked to greater psychological vulnerability and higher levels of academic stress (Galanakis *et al.*, 2016; Perwira *et al.*, 2024). Previous research suggests that self-esteem serves as an important psychological resource that supports students' adjustment to university life and contributes to more positive academic outcomes.

The issue of academic stress is particularly relevant among biology education students. Compared with students in many other disciplines, biology education students are frequently required to complete laboratory activities, practical assignments, and extensive practicum reports while simultaneously mastering complex scientific concepts and terminology (Howard *et al.*, 2021; Harini, 2025). These academic demands may increase the likelihood of experiencing academic stress, especially during the first year of study when students are still adapting to university learning. Although previous studies have examined academic stress, coping strategies, and self-esteem separately, research investigating the relationships among these variables within biology education students remains limited. Therefore, This study aimed to examine the relationships among coping strategies, self-esteem, and academic stress among first-year biology education students. Understanding these relationships may contribute to the development of evidence-based strategies to support student adjustment, promote psychological well-being, and reduce academic stress during the transition to higher education.

METHOD

This study employed a quantitative correlational design to examine the relationships among coping strategies, self-esteem, and academic stress. A correlational approach was selected because the variables under investigation could not be experimentally manipulated and were examined based on naturally occurring variations among participants. This design is appropriate for identifying the strength and direction of relationships among variables and for providing empirical evidence regarding their associations (Fraenkel *et al.*, 2012). The study involved 22 first-year students selected through purposive sampling. No intervention or treatment was administered, and the study focused on describing the relationships among the variables as they naturally occurred. The research variables consisted of coping strategies (X_1), self-esteem (X_2), and academic stress (Y). The correlation coefficient r_{x_1y} represents the

relationship between coping strategies and academic stress, while r_{x_2y} represents the relationship between self-esteem and academic stress. The multiple correlation coefficient (R) was used to examine the combined relationship of coping strategies and self-esteem with academic stress (Figure 1).

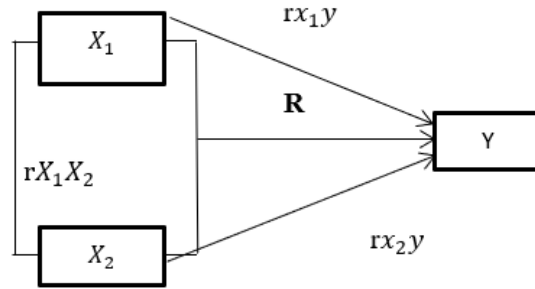


Figure 1. Correlational research design showing the relationships among coping strategies (X_1), self-esteem (X_2), and academic stress (Y)

Data were collected using three self-report questionnaires measuring coping strategies, self-esteem, and academic stress. All instruments were developed based on established theoretical frameworks and were subjected to validity and reliability testing prior to data collection. The coping strategies questionnaire consisted of 30 items representing problem focused coping and emotion focused coping dimensions. The self-esteem questionnaire comprised 30 items covering confidence in one's own abilities, self acceptance, and social skills. The academic stress questionnaire contained 30 items measuring stress related to academic workload, examinations and evaluations, academic demands, excessive academic burden, social interaction difficulties, and future career concerns. Both positive and negative statements were included in each instrument to reduce response bias. Questionnaires were administered both face-to-face and online using standardized instructions, and participants were asked to respond honestly based on their personal experiences. All completed questionnaires were screened for completeness before being analyzed. A summary of the research instruments is presented in Table 1.

The data analysis in this study consisted of prerequisite analysis tests and hypothesis testing. The prerequisite analysis tests included a normality test and a homogeneity test. The normality test was conducted to determine whether the data were normally distributed, and it was calculated using the Kolmogorov–Smirnov test with a significance level of $\alpha = 0.05$. Meanwhile, the homogeneity test was carried out to determine whether the samples had a similar level of variance, and it was analyzed using the Bartlett test with $\alpha = 0.05$. Furthermore, hypothesis testing in this study was conducted using linear regression and correlation analysis. The first step involved a linear regression test using the F-test at a significance level of $\alpha = 0.05$ to examine the functional relationship between the variables. This was followed by a correlation analysis to determine the degree, strength, and direction of the relationship among the variables.

The correlation was calculated using the Pearson Product-Moment correlation coefficient (r_{xy}) with $\alpha = 0.05$ using SPSS version 20. The magnitude of the correlation coefficient (r) was interpreted according to established criteria. An r value between 0.80 and 1.00 indicates a very strong relationship, 0.60–0.799 indicates a strong relationship, 0.40–0.599 indicates a moderately strong relationship, 0.20–0.399 indicates a weak relationship, and 0.00–0.199 indicates a very weak relationship. The next step is to determine the coefficient of determination. The coefficient of determination is a number or index used to determine the extent of the independent variable's contribution to the variation (increase/decrease) of the dependent variable. The formula for determining the coefficient of determination is: Coefficient of determination = $r^2 \times 100$. A summary of the research instruments and their dimensions is presented in Table 1.

Table 1. Summary of research instruments and their dimensions

Instrument	Dimension	Indicator	Item		Number of items		
			Positive	Negative			
Coping Strategies	Problem-Focused Coping	Problem-Oriented Coping Strategies	15, 20	9, 12, 17, 19, 22	7		
		Socially Oriented Coping Strategies	18, 21, 23, 27, 28	24	6		
		Cognitive-Oriented Coping Strategies	25, 26	30, 5, 8	5		
	Emotion-Focused Coping	Behavior-Oriented Coping Strategies	1, 29	2, 3, 4	5		
		Emotion-Oriented Coping Strategies	6, 7, 10, 16	11, 13, 14	7		
	Total				30		
	Self-Esteem	Confidence in one's own abilities	Self-satisfaction	4	1, 5, 7, 11, 13	6	
			Self-confident	6, 15, 19, 22, 26	30	6	
			Problem-solving skills	2	3	2	
		Empathy	The feeling of helping others	10, 18	9	2	
			Self-acceptance	Self-acceptance	20, 23, 25, 27, 29	24	6
				Social skills	Acceptance from others	14, 21	17, 28
		Courage in making decisions	8, 12		2		
Total				30			
Academic Stres		Academic Stress Related to Academic Demands	Stress related to college assignments	6, 21, 26	1, 11, 16	6	
	Stress related to academic examinations and evaluations		7	2, 12, 17, 22, 27	6		
	Stress related to high academic demands		8, 23, 28	3, 13, 18	6		
	Difficulty in social interaction	Stress related to excessive academic workload	9, 29	4, 14, 19, 24	6		
		Stress related to future career responsibilities after graduation	30	5, 10, 15, 20, 25	6		
	Total				30		

RESULT AND DISCUSSION

The study found a significant negative relationship between coping strategies (X_1) and academic stress (Y) among biology education students. This negative relationship indicates that the better students' coping strategies, the lower their academic stress. Conversely, students with less effective coping strategies have the potential to experience higher academic stress. Coping strategies refer to efforts, both cognitive and behavioral, carried out to face, reduce, and overcome challenges from within and outside themselves (Galanakis *et al.*, 2016; Gong *et al.*, 2023). Figure 2 shows students' scores for coping strategies.

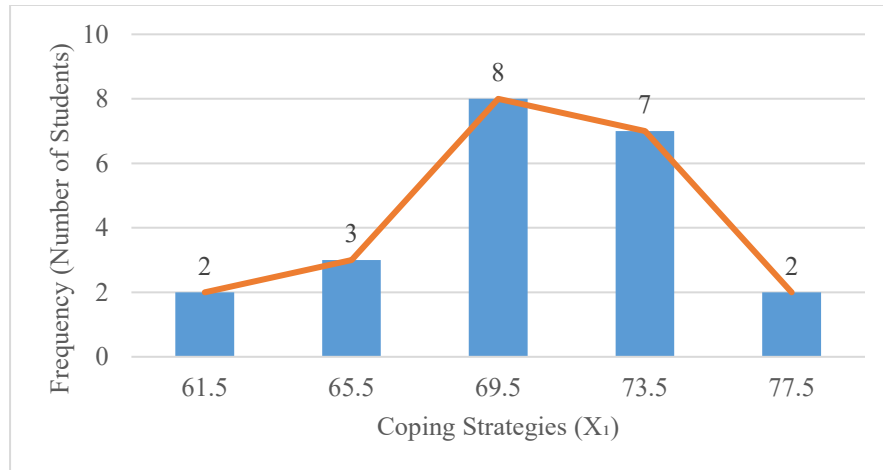


Figure 2. Frequency distribution graph of coping strategies

The results of the study indicate that students' coping strategy scores ranged from 61.5 to 77.5 reflecting a moderate level of variation in their ability to manage academic stress. The highest concentration of scores was found in the interval of 69.5–73.5, with 8 students, showing that most respondents tend to demonstrate similar and relatively moderate coping capacities. In contrast, only 2 students achieved scores in the higher interval (76–80), suggesting that a limited number of students possess more advanced or highly adaptive coping strategies. Furthermore, the mean score of 70.50 with a standard deviation of 4.708 indicates that the distribution of coping strategies is fairly homogeneous, meaning that most students' scores are clustered around the average with relatively low dispersion. These findings suggest that, in general, students are able to cope with academic stress at a moderate level, although their coping strategies may not yet be optimal.

Previous studies have shown that university students commonly rely on coping mechanisms that are adequate but not fully effective, particularly when faced with similar academic demands and environmental pressures. The relatively small variation in scores may also indicate that students share comparable experiences in dealing with stress, resulting in similar coping patterns (Compas *et al.*, 2017; Pascoe *et al.*, 2020). In addition, research highlights that while students often employ both problem-focused and emotion-focused coping, the effectiveness of these strategies varies depending on individual skills and available support systems (Carver & Connor-Smith, 2010; Akanpaadgi *et al.*, 2023).

Self-esteem is an evaluation individuals make of themselves, subjective and capable of being positive or negative (Kariuki *et al.*, 2019; Chorfi *et al.*, 2024). Figure 3 shows students' self-esteem scores. The findings indicate that students' self-esteem scores ranged from 54.5 to 95, showing a fairly broad distribution in how individuals evaluate their self-worth. The highest concentration of scores was found in the interval of 70–79, with 11 students, which suggests that most respondents tend to have a moderate level of self-esteem. Meanwhile, only one student was in the highest category (90–100), indicating that very high self-esteem is relatively uncommon within the sample. The mean score of 76.50, with a standard deviation of 9.927, reflects not only a moderate average level but also a relatively wide spread of scores, implying considerable variation in students' self-perceptions. This pattern is consistent with report that self-esteem among university students generally falls within a moderate range, while still showing substantial individual differences (Schoeler *et al.*, 2018; Siregar, 2022).

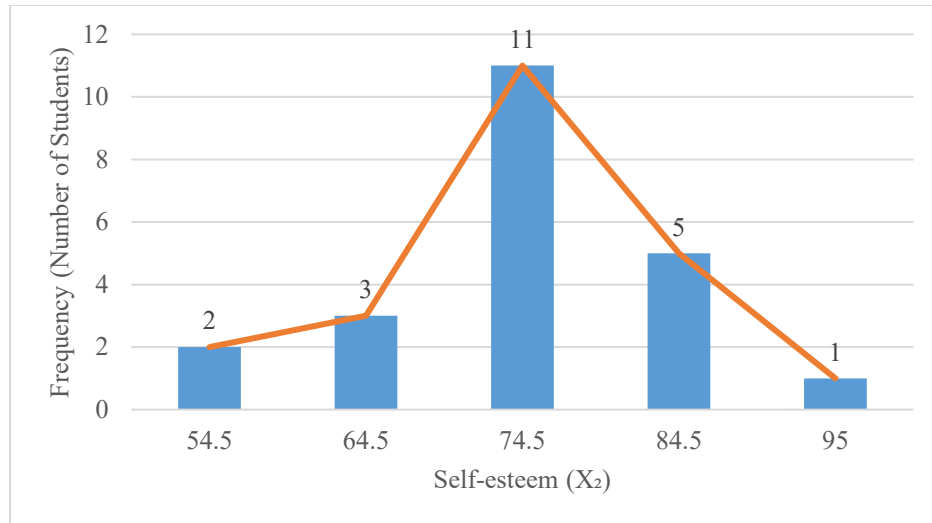


Figure 3. Frequency distribution graph of self esteem

The relatively large standard deviation observed in this study suggests that students differ notably in how they perceive their abilities and personal value, which may be influenced by factors such as academic achievement, peer relationships, and psychological resilience. In addition, research has shown that only a small proportion of students tend to exhibit very high self-esteem, as such levels are often associated with specific supporting conditions, including strong social support and high self-efficacy (Mulyadi *et al.*, 2016; Harris & Orth, 2020). Academic stress is pressure arising from factors in the academic environment. Academic stressors refer to the pressure students experience that originates from elements related to the learning process or learning activities (Ganesan *et al.*, 2018; Oktaviani *et al.*, 2023). The Figure 4 below shows students' academic stress scores.

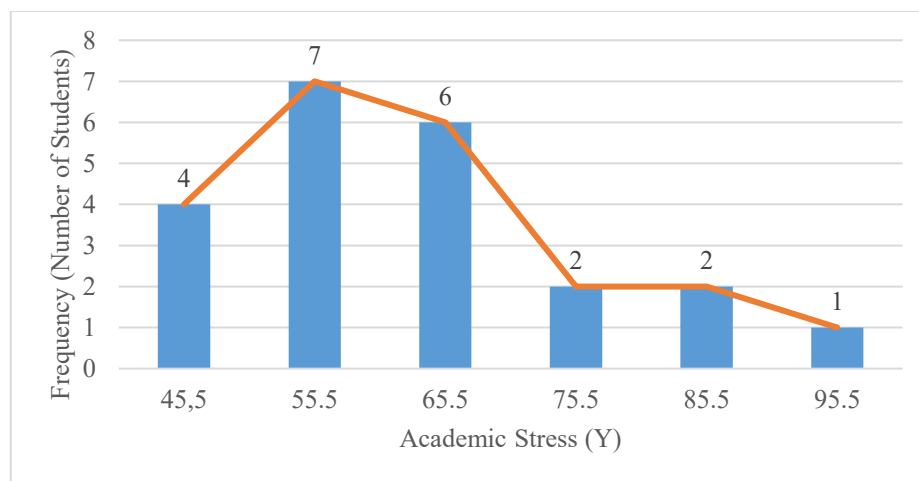


Figure 4. Frequency distribution graph of academic stress

The results indicate that students' academic stress scores ranged from 45.5 to 95.5, reflecting a relatively wide variation in the level of pressure experienced within the academic environment. The highest frequency was observed in the score interval of 51–60, with 7 students, suggesting that most respondents experience academic stress at a moderate level. In contrast, only one student fell within the highest category (90–100), indicating that extreme levels of academic stress are relatively uncommon in this sample. The mean score of 62.95, with a standard deviation of 13.127, further confirms a moderate average level of stress accompanied by considerable variability, implying that students differ substantially

in how they perceive and respond to academic demands. These findings suggest that academic stress among university students generally falls within a moderate range, although substantial individual differences exist in how students perceive and respond to academic challenges.

This finding is consistent with previous studies reporting that academic stress is influenced by a combination of personal, academic, and environmental factors, resulting in varying levels of stress among students (Pascoc *et al.*, 2020; Oktaviani *et al.*, 2024). Recent evidence indicates that first-year students commonly experience moderate levels of stress during the transition to higher education, with variations in stress levels largely influenced by their ability to adapt to academic, social, and personal demands as well as by individual psychological resources such as self efficacy. Students who possess stronger self beliefs and greater adaptive capabilities tend to manage academic challenges more effectively and consequently report lower levels of academic stress than those with lower levels of self efficacy and adjustment (Dewi *et al.*, 2026; Lajuma *et al.*, 2026).

The relatively large standard deviation observed in this study further indicates that students differ in how they perceive and respond to academic demands, emphasizing the important role of psychological resources and support systems in managing stress (Ganesan *et al.*, 2018; Oktaviani *et al.*, 2024). The linearity test in this study was conducted to determine whether the relationship between the independent variables and the dependent variable is linear. This test is an important prerequisite in regression analysis to ensure that the model used is appropriate for examining the relationship between variables. The linearity test was carried out using a significance level of $\alpha = 0.05$. The results of the linearity test are presented in Table 2.

Table 2. Result of the linearity test

Corelation	Alfa α	Sig.	Description
$X_1 \longrightarrow Y$	0.05	0.429	Linier
$X_2 \longrightarrow Y$	0.05	0.082	Linier
$X_1, X_2 \longrightarrow Y$	0.05	0.429	Linier

*) significance level at $\alpha = 0.05$

Based on the Table 2, the linearity test of coping strategy data (X_1) with academic stress (Y) at a significance level of 0.05. In the linearity test, the significance value was 0.429 (> 0.05), indicating a positive relationship between coping strategy and academic stress. The linearity test of self-esteem data (X_2) with academic stress (Y) at a significance level of 0.082. In the linearity test, the p-value was 0.082. > 0.05 , so the positive relationship line between self-esteem and academic stress. From a theoretical standpoint, these results support the assumption that psychological variables such as coping strategies and self-esteem play an important role in influencing how students respond to academic demands. Coping strategies function as adaptive mechanisms that help individuals manage stressors effectively through both problem focused and emotion focused approaches (Compas *et al.*, 2017; Pascoc *et al.*, 2020).

Previous studies have demonstrated that coping strategies are closely associated with students' experiences of academic stress and serve as important resources for managing academic pressures (Basith *et al.*, 2021). Meanwhile, self-esteem contributes to how individuals evaluate their abilities and cope with challenges, with higher self-esteem generally associated with more effective stress management and lower perceived stress (Harris & Orth, 2020; Kaur, 2024). Similar findings have been reported in studies highlighting the role of self efficacy and other positive psychological resources in reducing academic stress and enhancing students' capacity to adapt to academic demands, particularly in contemporary learning environments (Muhtar & Wijaya, 2024; Fikhri *et al.*, 2026).

Figure 5 illustrates a negative relationship between coping strategies and academic stress, as indicated by the regression equation $y = -1.4189x + 162.99$. This suggests that higher levels of coping strategies are associated with lower levels of academic stress among students. The correlation coefficient $r = -0.509$ is greater than the r table value of 0.3438 at $\alpha = 0.05$, indicating that the relationship between coping strategies and academic stress is in the moderate range and statistically significant. This is

reinforced by a significance value (2-tailed) of 0.016, which is smaller than 0.05, indicating that the hypothesis that there is a relationship between coping strategies and academic stress is accepted. The coefficient of determination ($R^2 = 0.259$) indicates that coping strategies account for 25.9% of the variance in academic stress, while the remaining 74.1% is explained by other factors not included in the model. This evidence supports research findings that adaptive coping strategies, such as problem focused coping or social support seeking, are associated with reduced stress among students (Deepthi *et al.*, 2024; Alfawair *et al.*, 2025).

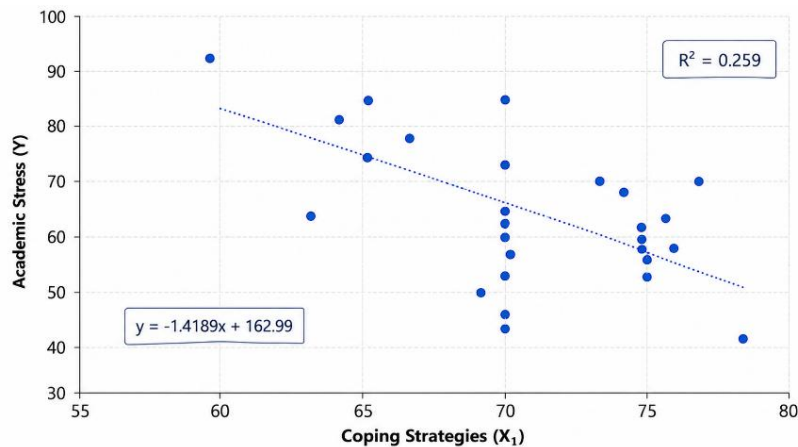


Figure 5. Correlation of coping strategies with academic stress

Coping strategies function as essential adaptive processes that enable students to manage academic demands, including assignment workload, evaluation pressure, and time management during lectures. Consistent with this finding, recent studies have demonstrated that effective coping strategies are associated with reduced academic stress and improved psychological well-being among university students (Oktaviani *et al.*, 2024; Waterhouse & Samra, 2026) and the most commonly used coping strategies among participants were seeking comfort through spiritual practices, such as prayer or meditation (52.6%), and accepting existing conditions while learning to live with them (52.6%) (Aina & Wijayati, 2019).

Furthermore, the distribution of data points demonstrates a generally downward trend, although the relationship is not particularly strong. Therefore, the association can be classified as a negative relationship of moderate strength (Compas *et al.*, 2017; Pascoe *et al.*, 2020). This equation shows that a 1-unit increase in coping strategies reduces academic stress scores by 1.419. This finding confirms the important role of coping strategies as an adaptive mechanism for students in dealing with academic demands, such as assignment load, evaluation pressure, and lecture time management. This finding aligns with quantitative studies that have found a negative relationship between adaptive coping and academic stress levels among students (Ganesan *et al.*, 2018; Alfawair *et al.*, 2025).

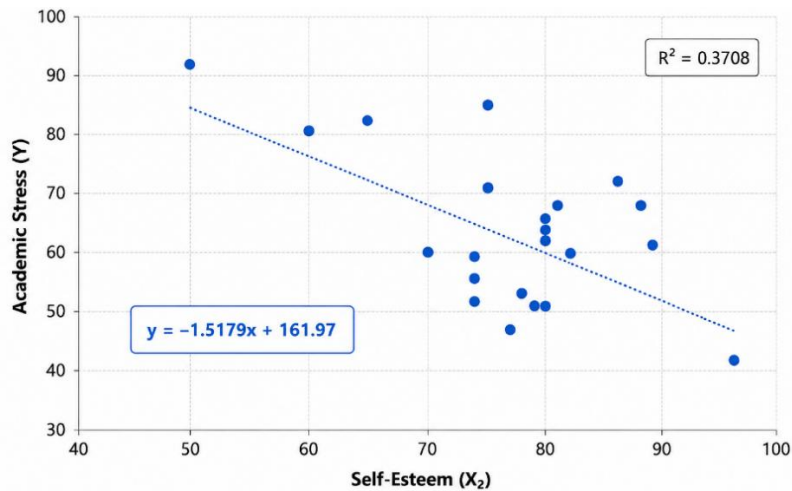


Figure 6. Correlation of self-esteem and academic stress

The Figure 6 demonstrates a negative relationship between self-esteem and academic stress, as indicated by the downward regression line. This suggests that higher levels of coping strategies are associated with lower levels of academic stress among students. The coefficient of determination ($R^2 = 0.3708$) indicates that coping strategies explain approximately 37.08% of the variance in academic stress, while the remaining 62.92% is influenced by other factors outside the model. Compared to previous findings, this value reflects a moderately strong effect. The distribution of data points shows a clearer downward trend, indicating that the relationship between the two variables can be classified as a moderate negative correlation. This implies that coping strategies play a meaningful role in reducing academic stress, although they are not the sole determining factor.

The data obtained shows a significant relationship between self-esteem and academic stress. Adolescents' self-esteem tends to decline when they experience academic stress, which in turn affects their academic performance (Basith *et al.*, 2021; Gobena, 2024). Students with high self-esteem tend to have high self efficacy and experience lower academic stress (Alyami *et al.*, 2017; Komariah *et al.*, 2025). Other research shows that students in the first semester are more likely to experience academic stress due to the transition from high school to university, and being far from family, which can lead to feelings of losing the protection of their first place. In addition, difficulties in forming relationships with new friends, changes in the learning environment, and the many demands of completing college assignments significantly affect students' academic stress (Kariuki *et al.*, 2019; Chorfi *et al.*, 2024).

Self-esteem negatively influences academic stress, as a personal psychological resource, it interacts with behavioral patterns to shape levels of academic stress (Compas *et al.*, 2017; Pascoe *et al.*, 2020). Self-esteem serves as a protective psychological resource that helps individuals cope with stress and emotional distress. High levels of self-esteem enhance students' confidence in managing academic responsibilities, thereby reducing negative self evaluations and improving stress management (Kariuki *et al.*, 2019; Komariah *et al.*, 2025). Testing the relationship between coping strategies and self-esteem among biology education students yielded a significant relationship, as indicated by the regression equation $\hat{Y} = 153.020 + -0.631 X_1 + -0.593 X_2$. From this equation, the value 153.020 is a constant, meaning that if there is no coping strategy (X_1) and no self-esteem (X_2), then academic stress remains 153.020. The regression coefficient of 0.631 indicates that for every increase in X_1 , there is a decrease in Y ; the regression coefficient of 0.196 indicates that for every increase in X_2 , there is a decrease in Y , and vice versa.

Table 3. Results of the correlation analysis

Corelation	Alfa α	Sig.	rx _y	
X ₁ → Y	0.05	0.016	-0.509	There is a negative relationship
X ₂ → Y	0.05	0.003	-0.609	
X ₁ X ₂ → Y	0.05	0.008	-0.631	

Based on Table 3, the results of the correlation test indicate that all variables have a significant relationship with academic stress, as their respective significance values are less than 0.05. The relationship between coping strategies (X₁) and academic stress (Y) has a correlation coefficient value of $r = -0.509$ with a significance value of 0.016, indicating a negative relationship with moderate strength. This means that the better a student's coping skills, the lower their academic stress levels tend to be. This finding is in line with research showing that adaptive coping strategies play a role in reducing stress and improving students' academic adjustment (Carver & Connor-Smith, 2010; Pascoe *et al.*, 2020). In addition, self-esteem (X₂) was significantly associated with academic stress (Y), with a correlation coefficient of $r = -0.609$ ($p = 0.003$), indicating a relatively strong negative relationship. This means that students with higher levels of self-esteem tend to experience lower academic stress.

This finding is supported by studies that state that self-esteem functions as a protective factor against stress and contributes to psychological well-being and individual adaptability (Schoeler *et al.*, 2018; Perwira *et al.*, 2024). Meanwhile, the simultaneous correlation between coping strategies and self-esteem on academic stress (X₁X₂ → Y) yielded an r value of -0.631 with a significance of 0.008, indicating a strong and greater negative relationship than each variable individually. This finding indicates that the combination of coping strategies and self-esteem together has a more optimal role in reducing students' academic stress levels. This is consistent with research showing that the interaction between coping factors and internal psychological resources contributes significantly to students' stress management and mental health (Lolandes *et al.*, 2020; Slykerman & Mitchell, 2021).

CONCLUSION

This study demonstrates that coping strategies and self-esteem are significantly and negatively associated with academic stress among first-year Biology Education students. Students who employ more adaptive coping strategies and possess higher self-esteem tend to experience lower levels of academic stress, with self-esteem showing a stronger relationship than coping strategies. Furthermore, the combined influence of coping strategies and self-esteem provides a greater contribution to reducing academic stress than either variable alone, highlighting the importance of these psychological resources in helping students adapt to academic demands. Nevertheless, the findings also suggest that academic stress is influenced by additional factors beyond the variables examined in this study. Therefore, higher education institutions should promote supportive learning environments by strengthening students' coping skills, fostering positive self-esteem, and providing appropriate psychological support to facilitate successful academic adjustment and well-being. These findings also provide empirical evidence to promote academic success and mental health among first-year university students in Indonesia.

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