



ASSOCIATION BETWEEN ACADEMIC STRESS AND PROBLEM-SOLVING SKILLS AMONG COLLEGE STUDENTS

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ABSTRACT:

The contemporary higher education environment is characterized by heightened academic demands, competitive performance standards, and increasing expectations for self-regulated learning. Within this context, academic stress has emerged as a pervasive psychological concern among college students, influencing not only their emotional well-being but also their cognitive and behavioral functioning (Barbayannis et al., 2022; Pascoe et al., 2020). Academic stress typically arises from multiple sources, including examination pressure, workload, time constraints, and concerns about future career prospects (Reddy et al., 2018). While a moderate level of stress may serve as a motivational force, excessive or chronic academic stress can impair students' ability to function effectively, particularly in domains requiring higher-order cognitive processing (Pascoe et al., 2020).



KEYWORDS: *higher education environment , academic demands, competitive performance standards, and increasing expectations.*

1. INTRODUCTION:

One such domain is problem-solving skills, which are central to academic success and everyday functioning. Problem-solving involves a set of cognitive, behavioral, and emotional processes through which individuals identify, analyze, and resolve challenges or obstacles. In the academic context, effective problem-solving is essential for tasks such as critical thinking, decision-making, and adapting to novel or complex learning situations (Jonassen, 2017; OECD, 2019). These skills are increasingly emphasized in higher education as key competencies required for both academic achievement and future professional success. The relationship between stress and cognitive functioning has been widely examined in recent psychological research. Contemporary models emphasize cognitive appraisal and coping mechanisms as central to understanding stress responses (Folkman, 2017). When individuals perceive academic demands as exceeding their coping resources, stress responses are activated, which may adversely affect cognitive performance (Shields et al., 2016). High levels of stress have been consistently associated with impairments in attention, memory, and executive functioning—core processes underlying effective problem-solving (Vogel & Schwabe, 2016; Almarzouki, 2024).

Empirical evidence suggests that stress can exert both facilitating and debilitating effects on performance, depending on its intensity and duration. While moderate stress may enhance alertness and performance, excessive stress is linked to cognitive overload and reduced efficiency (Diamond, 2017). In academic contexts, students often experience sustained stress, which may hinder their ability

to engage in effective problem-solving processes such as logical reasoning, cognitive flexibility, and solution evaluation (Pascoe et al., 2020). Stress has been shown to disrupt executive functions mediated by the prefrontal cortex, including working memory, inhibitory control, and cognitive flexibility (Arnsten, 2015; Shields et al., 2016). These executive functions are fundamental to problem-solving, as they enable individuals to generate alternative solutions, evaluate consequences, and adapt strategies accordingly. Chronic academic stress may therefore reduce students' capacity to approach problems systematically, leading to maladaptive responses such as avoidance, impulsivity, and ineffective decision-making (Almarzouki, 2024). Individual differences play a significant role in moderating the relationship between academic stress and problem-solving skills. Factors such as emotional regulation, coping strategies, self-efficacy, and resilience can buffer or exacerbate the effects of stress on cognitive functioning (Trigueros et al., 2020; Freire et al., 2020). Students with adaptive coping mechanisms and higher levels of self-regulation are more likely to maintain effective problem-solving abilities under stress, whereas those with maladaptive coping strategies may experience greater cognitive impairment (Pascoe et al., 2020).

Even though there are growing body of literature on academic stress, relatively fewer studies have specifically examined its direct association with problem-solving skills among college students, particularly within diverse cultural contexts. In developing countries such as India, students often face additional stressors, including societal expectations, financial pressures, and intense academic competition, which may further influence both stress levels and cognitive functioning (Deb et al., 2015; Reddy et al., 2018). Understanding how academic stress interacts with problem-solving abilities in such contexts is essential for developing targeted interventions and educational strategies. The present study seeks to address this gap by examining the association between academic stress and problem-solving skills among college students using a quantitative correlational approach. By providing empirical evidence on this relationship, the study aims to contribute to the existing literature and offer insights for educators, mental health professionals, and policymakers in designing effective stress management interventions and enhancing students' cognitive competencies.

2. REVIEW OF LITERATURE

Academic stress has been widely identified as a pervasive issue in higher education, with significant implications for students' psychological and cognitive functioning. It arises when academic demands exceed an individual's perceived coping resources, leading to adverse emotional and behavioral outcomes. Contemporary research indicates that academic stress is strongly associated with negative mental health outcomes such as anxiety, depression, and reduced well-being among college students (Barbayannis et al., 2022). Further evidence suggests that academic stress is not only a psychological burden but also a critical determinant of academic functioning. For instance, Deng et al. (2022) found that both academic and family-related stress significantly impair students' learning outcomes and overall academic performance. Similarly, persistent academic stress has been linked to decreased motivation, poor academic achievement, and increased vulnerability to mental health problems (Pascoe et al., 2020). In addition, demographic variations have been observed in stress experiences, with certain groups—particularly female students—reporting higher levels of academic stress compared to their counterparts (Barbayannis et al., 2022). These findings underscore the widespread and multifaceted nature of academic stress in contemporary educational settings.

Problem-solving is a core cognitive competency involving processes such as reasoning, decision-making, and cognitive flexibility. It is essential for academic success, particularly in tasks that require analytical thinking and adaptation to novel situations. Cognitive research has consistently demonstrated that problem-solving relies heavily on executive functions, including working memory and attention control (Diamond, 2017). Recent research emphasizes that cognitive abilities such as memory, reasoning, and decision-making are closely linked to academic performance and effective problem-solving. Advances in cognitive neuroscience further indicate that efficient executive functioning enhances individuals' ability to solve problems and regulate attention (Diamond, 2017; Arnsten, 2015). In educational contexts, students with strong problem-solving skills demonstrate

greater academic resilience and adaptability. Conversely, deficits in these skills are associated with difficulties in learning, decision-making, and coping with academic challenges.

A growing body of literature has examined how stress affects cognitive functioning, particularly executive processes essential for problem-solving. Stress has been found to impair working memory, attention, and cognitive flexibility—key components required for effective problem-solving (Almarzouki, 2024; Shields et al., 2016). Empirical findings indicate that high levels of academic stress reduce students' ability to concentrate and process information efficiently. Research suggests that increased stress is associated with reduced cognitive engagement and impaired attention, which negatively affects academic performance (Pascoe et al., 2020). Stress can lead to cognitive overload, limiting individuals' capacity to evaluate alternatives and generate effective solutions. Chronic stress has been shown to disrupt higher-order cognitive processes, thereby impairing decision-making and problem-solving abilities (Vogel & Schwabe, 2016). These findings align with cognitive load theory, which posits that excessive psychological burden reduces the mental resources required for complex cognitive tasks.

Although research directly examining the relationship between academic stress and problem-solving is relatively limited, existing studies provide important insights. Empirical evidence indicates that academic stress significantly influences cognitive functioning, including reasoning, decision-making, and problem-solving abilities (Pascoe et al., 2020; Barbayannis et al., 2022). Some studies suggest that students may maintain moderate levels of cognitive functioning despite experiencing stress, particularly when supported by adaptive coping mechanisms and conducive learning environments (Freire et al., 2020). However, excessive and chronic stress generally hampers cognitive efficiency and problem-solving performance. The recent research highlights the role of mediating variables such as emotional regulation, coping strategies, and motivation in shaping the relationship between academic stress and cognitive functioning (Trigueros et al., 2020). This suggests that the relationship between academic stress and problem-solving is complex and influenced by multiple psychological factors.

The reviewed literature clearly indicates that academic stress is a significant predictor of students' psychological well-being and cognitive functioning. While substantial research has examined its effects on mental health and general cognitive processes, relatively fewer studies have specifically focused on problem-solving skills as a distinct cognitive outcome. The existing findings present a nuanced perspective. While excessive stress is generally associated with impaired cognitive functioning, some studies suggest that moderate stress may not necessarily diminish cognitive abilities. This highlights the need for further investigation into the nature and direction of the relationship between academic stress and problem-solving skills. Another important gap lies in the limited research conducted within specific cultural contexts, particularly in developing countries such as India, where academic pressure, socio-cultural expectations, and competitive educational systems may uniquely influence both stress levels and cognitive functioning (Deb et al., 2015; Reddy et al., 2018).

Hypotheses

H₀₁: There is no significant relationship between academic stress and problem-solving skills among college students.

H₀₂: There is no significant difference in academic stress between male and female college students.

H₀₃: There is no significant difference in problem-solving skills between male and female college students.

3. METHODOLOGY

The present study employed a quantitative, cross-sectional correlational research design to examine the association between academic stress and problem-solving skills among college students. This design was considered appropriate as it enables the assessment of the direction and strength of relationships between variables without manipulation, making it suitable for investigating naturally occurring psychological constructs (Creswell & Creswell, 2018). The sample consisted of 100 college

students, including 50 male and 50 female students, selected through a convenience sampling method. The participants were aged between 18 and 25 years, with a mean age of 21.59 years ($M = 21.59$, $SD = 2.31$). Only students who were currently enrolled in undergraduate or postgraduate programs and were able to comprehend the questionnaire were included in the study. Participants with incomplete responses or those who reported severe psychological or neurological conditions were excluded to maintain the quality and reliability of the data.

Problem-solving skills were assessed using the Problem-Solving Inventory (PSI), developed by Heppner and Petersen (1982). The PSI is a widely used self-report instrument designed to measure individuals' perceptions of their problem-solving abilities in real-life contexts. The inventory consists of 32 items rated on a 6-point Likert scale and comprises three dimensions: problem-solving confidence (11 items), approach-avoidance style (16 items), and personal control (5 items). Lower scores on the scale indicate more effective perceived problem-solving ability. The instrument has demonstrated strong psychometric properties, with reported internal consistency coefficients of $\alpha = .85$ for problem-solving confidence, $\alpha = .84$ for approach-avoidance style, $\alpha = .72$ for personal control, and $\alpha = .90$ for the total scale. Additionally, the scale has shown good construct validity, indicating its relevance in assessing modifiable perceptions of problem-solving and its association with personality variables such as locus of control (Heppner & Petersen, 1982; Heppner et al., 2004). Academic stress was measured using the Academic Stress Scale, which is adapted from the Perceived Stress Scale. This scale consists of 10 items rated on a 5-point Likert scale (0–4) and is designed to assess the extent to which students perceive their academic experiences as stressful. Four positively worded items are reverse scored, and higher total scores indicate greater levels of academic stress. The scale has demonstrated satisfactory reliability, with a reported Cronbach's alpha of .81 in college student populations (Sheu et al., 2014).

Data were collected using a questionnaire survey method. Participants were approached in academic settings and were informed about the purpose and nature of the study prior to participation. Informed consent was obtained from all participants, and they were assured of confidentiality and anonymity. The questionnaires were administered in a structured format, and participants were instructed to respond honestly and independently. The average time taken to complete the questionnaire was approximately 15 to 20 minutes. Following data collection, the responses were screened for completeness, and incomplete or inconsistent data were excluded. The collected data were subsequently cleaned, coded, and analyzed using IBM SPSS Statistics 25. Descriptive statistics, including mean and standard deviation, were computed for all variables. The Pearson product-moment correlation was used to examine the relationship between academic stress and problem-solving skills. Additionally, independent samples t-tests were conducted to assess gender differences in both academic stress and problem-solving abilities. All statistical analyses were performed at a significance level of $p < .05$. Ethical principles were strictly adhered to throughout the study. Participation was voluntary, and participants had the right to withdraw at any stage without any consequences. No form of deception or harm was involved, and all data were used solely for academic and research purposes.

4. RESULTS

Table 1
Descriptive Statistics for Study Variables (N = 100)

Variable	Minimum	Maximum	Mean	SD
Academic Stress	14	48	31.84	7.12
Problem-Solving Skills	62	198	124.67	21.35

The present study was conducted on a sample of 100 college students, comprising 50 male and 50 female participants, who were selected using a convenience sampling method. The participants were within the age range of 18 to 25 years, with a mean age of 21.59 years ($M = 21.59$, $SD = 2.31$).

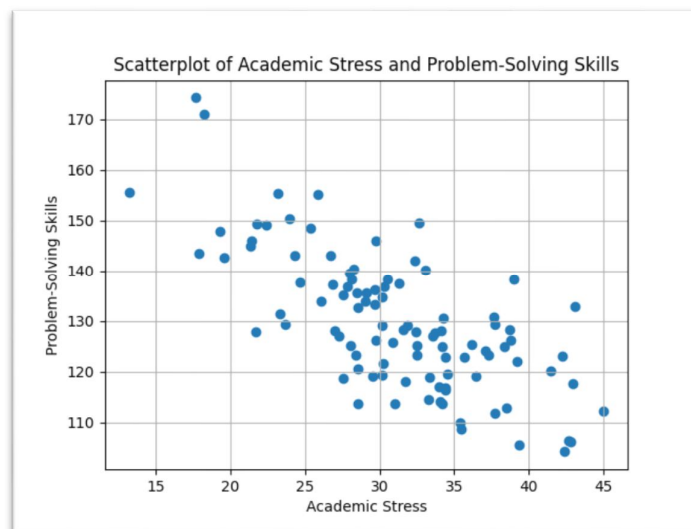
Descriptive statistical analyses were performed to examine the distribution and central tendencies of the key study variables, namely academic stress and problem-solving skills. The obtained scores for both variables were found to fall within their respective theoretical ranges (Academic Stress: 10–50; Problem-Solving Inventory: 35–210), indicating appropriate data distribution and scale utilization. These preliminary analyses suggest that the data were suitable for further inferential statistical procedures. The results indicate that students experienced moderate levels of academic stress, while their problem-solving skills were in the moderate to relatively high range.

Table 2
Pearson Correlation between Academic Stress and Problem-Solving Skills

Variables	1	2
1. Academic Stress	—	
2. Problem-Solving Skills	-.62**	—

Note. $N = 100$. $p < .01$

To examine H_{01} , a Pearson product-moment correlation analysis was conducted to determine the relationship between academic stress and problem-solving skills among college students. The results indicated a statistically significant negative correlation between the two variables, $r(98) = -.62$, $p < .001$. This finding suggests a strong inverse relationship, wherein higher levels of academic stress are associated with lower levels of perceived problem-solving ability. In other words, as students experience increasing academic stress, their capacity to effectively approach and resolve problems tends to decline. The magnitude of the correlation indicates a substantial effect, highlighting the meaningful impact of academic stress on cognitive functioning, particularly in the domain of problem-solving. Based on these findings, the null hypothesis (H_{01}), which stated that there is no significant relationship between academic stress and problem-solving skills, was rejected



The relationship between academic stress and problem-solving skills is visually represented in the scatterplot below. The plot indicates a clear downward trend, supporting the negative correlation observed in the statistical analysis.

Table 3
Independent Samples t-test for Academic Stress by Gender

Gender	N	Mean	SD	t	df	p
Male	50	28.96	6.45			
Female	50	34.72	6.89	-4.27**	98	< .001

To test H_{02} , an independent samples t-test was conducted to examine gender differences in academic stress among college students. The analysis revealed a statistically significant difference in academic stress levels between male and female students, $t(98) = -4.27$, $p < .001$. Specifically, female students ($M = 34.72$, $SD = 6.89$) reported significantly higher levels of academic stress compared to male students ($M = 28.96$, $SD = 6.45$). The magnitude and direction of the mean difference indicate that gender plays a meaningful role in the experience of academic stress, with female students exhibiting greater perceived stress in academic contexts. Based on these findings, the null hypothesis (H_{02}), which stated that there is no significant difference in academic stress between male and female college students, was rejected, confirming the presence of a statistically significant gender difference in academic stress.

Table 4
Independent Samples t-test for Problem-Solving Skills by Gender

Gender	N	Mean	SD	T	df	p
Male	50	131.82	19.44			
Female	50	117.52	21.67	3.46**	98	.001

To test H_{03} , an independent samples t-test was conducted to examine gender differences in problem-solving skills among college students. The analysis revealed a statistically significant difference between male and female students, $t(98) = 3.46$, $p = .001$. Specifically, male students ($M = 131.82$, $SD = 19.44$) demonstrated significantly higher levels of problem-solving skills compared to female students ($M = 117.52$, $SD = 21.67$). The observed difference in mean scores indicates that male students reported more effective problem-solving abilities than their female counterparts. Based on these findings, the null hypothesis (H_{03}), which stated that there is no significant difference in problem-solving skills between male and female college students, was rejected, confirming the presence of a statistically significant gender difference in problem-solving skills.

5. DISCUSSION

The present study aimed to examine the association between academic stress and problem-solving skills among college students, as well as to explore gender differences in both variables. The findings revealed three key outcomes: (a) a significant negative relationship between academic stress and problem-solving skills, (b) significantly higher academic stress among female students compared to male students, and (c) significantly higher problem-solving skills among male students compared to female students. These findings are discussed in relation to contemporary empirical literature and theoretical perspectives. The results of the study demonstrated a significant negative correlation between academic stress and problem-solving skills, indicating that higher levels of academic stress are associated with lower levels of perceived problem-solving ability. This finding is consistent with recent research suggesting that elevated stress impairs cognitive functioning, particularly executive processes such as working memory, attention regulation, and cognitive flexibility (Almarzouki, 2024; Shields et al., 2016). From a theoretical standpoint, this relationship can be explained by contemporary stress-

cognition frameworks, which propose that excessive stress depletes cognitive resources, thereby reducing individuals' capacity to effectively analyze and resolve problems (Vogel & Schwabe, 2016).

Recent empirical studies further support this finding. For instance, Barbayannis et al. (2022) reported that high academic stress is associated with reduced cognitive efficiency and poorer academic outcomes among university students. Similarly, Pascoe et al. (2020) found that chronic academic stress negatively affects students' ability to engage in higher-order cognitive processes, including problem-solving and decision-making. The present findings extend this literature by specifically identifying problem-solving skills as a critical cognitive domain affected by academic stress. The relatively strong magnitude of the correlation ($r = -.62$) observed in this study indicates that academic stress plays a substantial role in shaping students' cognitive functioning. With regard to gender differences, the findings indicated that female students reported significantly higher levels of academic stress than male students. This result is consistent with recent literature demonstrating that female students tend to experience higher levels of stress, anxiety, and academic pressure (Barbayannis et al., 2022; Ramón-Arбуés et al., 2020). Contemporary research suggests that this difference may be attributed to greater emotional sensitivity, higher perceived academic expectations, and increased vulnerability to stress-related psychological outcomes among female students (Beiter et al., 2015; Pascoe et al., 2020). In addition, socio-cultural factors may further explain this finding, particularly in contexts such as India, where gender roles, societal expectations, and academic competition may disproportionately influence female students' stress experiences. The higher academic stress observed among female participants in this study may therefore reflect a combination of psychological, academic, and socio-cultural pressures. These findings highlight the importance of implementing gender-sensitive stress management interventions within educational settings.

The study also revealed that male students demonstrated significantly higher problem-solving skills compared to female students. This finding may be interpreted in light of recent research on cognitive and behavioral responses to stress. Studies suggest that stress can differentially affect cognitive performance across genders, with higher stress levels potentially impairing cognitive efficiency and problem-solving abilities (Almarzouki, 2024; Shields et al., 2016). Given that female students in the present study reported higher academic stress, their comparatively lower problem-solving scores may be partially explained by the cognitive impact of stress. However, it is important to interpret this finding with caution. Recent literature emphasizes that gender differences in cognitive abilities, including problem-solving, are often small and context-dependent (Hyde, 2014; Zell et al., 2015). Moreover, the present study assessed perceived problem-solving ability, which may be influenced by self-evaluation, confidence, and stress levels rather than objective performance. Thus, the observed gender difference may reflect differences in perception and psychological state rather than inherent cognitive ability. Despite its contributions, the study has certain limitations. The use of a cross-sectional correlational design limits causal interpretation of the findings. Additionally, reliance on self-report measures may introduce response bias, particularly in assessing problem-solving abilities. The use of convenience sampling further limits the generalizability of the results. Future research should consider longitudinal designs, objective cognitive assessments, and more diverse samples to enhance the robustness of findings.

6. CONCLUSION

The present study examined the association between academic stress and problem-solving skills among college students, along with gender differences in these variables. The findings revealed a significant negative relationship between academic stress and problem-solving skills, indicating that higher levels of stress are associated with reduced problem-solving ability. This highlights the detrimental impact of excessive academic stress on students' cognitive functioning and their ability to effectively deal with academic and real-life challenges. The study identified significant gender differences, with female students reporting higher levels of academic stress, while male students demonstrated higher levels of problem-solving skills. These findings suggest that gender plays an

important role in shaping both the experience of academic stress and the development or perception of problem-solving abilities.

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