

# Anxiety, Metacognition, Resilience, and Problem- Solving Skills as A Predictors of Academic Achievement among Secondary School Students

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## Abstract:

This research explores the roles of anxiety, metacognition, resilience, and problem-solving skills as predictors of academic achievement among secondary school students. Using a descriptive survey method, data were collected from a random sample of 600 students from the Amritsar district. Standardized tools were employed to measure the variables, including the Academic Anxiety Scale for Children (Singh & Gupta, 2009), the Metacognitive Skills Scale (Gupta & Suman, 2017), the Psychological Resilience Scale (Kumari & Yadav, 2019), and the Problem-Solving Ability Test (Dubey & Mathur, 2019). Academic achievement was assessed based on students' previous class scores. Key findings revealed significant gender- and location-based differences in anxiety levels, with male and female students, as well as urban and rural students, exhibiting distinct mean scores. Metacognition also varied significantly between urban and rural students, though no gender-based differences were found. Conversely, psychological resilience and problem-solving skills showed no significant variations across gender or location. Statistical analyses demonstrated that anxiety, metacognition, resilience, and problem-solving skills were significantly correlated with academic achievement. These psychological factors collectively exhibited a significant predictive influence on students' academic performance, emphasizing their importance in educational outcomes. The findings underline the need for interventions that address these psychological dimensions to enhance students' academic success.

**Keywords:** Anxiety, Metacognition, Resilience, Problem-Solving Skills, Academic Achievement, Secondary School Students.

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## Introduction

Academic achievement among secondary school students is influenced by various psychological factors, including anxiety, metacognition, resilience, and problem-solving skills. Anxiety, characterized by excessive worry and tension, can impede learning and performance, leading to reduced focus and academic difficulties (Spielberger, 1983). Conversely, metacognition—the awareness and regulation of one's own learning processes—enables students to plan, monitor, and evaluate their understanding, thereby enhancing academic outcomes (Flavell, 1979). Resilience, defined as the ability to adapt and recover from adversity, equips students to navigate academic

challenges effectively (Masten, 2001). Problem-solving skills, involving the capacity to identify solutions to complex issues, are essential for success across various subjects, particularly those requiring analytical thinking (Heppner & Petersen, 1982).

A study conducted by Kaur, Nilam, and Kaur (2024) examined the relationships among these variables and their impact on academic achievement among secondary school students in the Amritsar district. The research utilized standardized tools to measure academic anxiety, metacognitive skills, psychological resilience, and problem-solving abilities, with academic achievement assessed based on students' previous class scores. The findings revealed significant differences in anxiety levels based on gender and location, with male and female students, as well as urban and rural students, exhibiting distinct mean scores. Metacognition levels also differed significantly between urban and rural students. Importantly, the study found significant relationships between anxiety, metacognition, psychological resilience, problem-solving skills, and academic achievement, highlighting the influence of these psychological factors on students' academic performance (Kaur et al., 2024).

**Anxiety:** Anxiety, a common emotional response to perceived threats or challenges, can significantly influence students' academic performance. Defined as a state of heightened arousal and apprehension (Spielberger, 1972), it often manifests in cognitive, emotional, and physiological dimensions, which can impede concentration and learning. In the context of academic settings, anxiety may affect students' ability to process information and solve problems effectively, particularly when they lack the resilience and metacognitive strategies to manage their stress. Moreover, resilience—the capacity to recover from challenges—further bolsters students' ability to navigate anxiety and maintain focus on their goals (Masten, 2001).

**Metacognition:** Metacognition, often described as "thinking about thinking," plays a critical role in academic achievement by enabling students to monitor, regulate, and evaluate their cognitive processes. In the context of secondary school students, metacognition contributes to their ability to navigate challenges associated with anxiety, develop resilience, and enhance problem-solving skills. Research suggests that students with high levels of metacognitive awareness are better equipped to identify and manage the cognitive distortions linked to anxiety, fostering a mindset conducive to academic success (Wells & Matthews, 2022). Furthermore, metacognitive strategies, such as self-reflection and goal-setting, promote resilience by helping students adapt to setbacks and sustain motivation (Efklides, 2021).

**Resilience:** Psychological resilience refers to an individual's ability to effectively adapt to adversity, stress, or significant challenges while maintaining or quickly regaining emotional and mental well-being (Masten, 2021). In the context of secondary school students, resilience plays a crucial role in mitigating the effects of anxiety and enhancing problem-solving abilities, both of which are essential for academic success. Resilient students are more likely to employ adaptive metacognitive strategies, enabling them to navigate academic pressures and improve their performance (Luthar & Eisenberg, 2017). By fostering resilience, educators can help students develop the emotional regulation and cognitive flexibility needed to overcome obstacles and achieve their academic goals.

**Problem-Solving Skills:** Problem-solving skills refer to the cognitive and behavioral processes employed to identify, analyze, and resolve challenges effectively, playing a vital role in academic

contexts. Research indicates that effective problem-solving mitigates the adverse effects of academic stress and anxiety while fostering resilience and adaptive metacognitive strategies (Ahmed et al., 2023; Sharma & Kumar, 2022). Such skills empower students to approach complex problems methodically, contributing to better academic outcomes.

**Academic Achievement:** Academic achievement refers to the measurable performance outcomes of students in educational settings, typically indicated by grades, test scores, or other evaluative criteria (Singh & Gupta, 2009). It reflects the extent to which a student has achieved learning objectives and mastered curriculum content, serving as a key indicator of educational success.

**Literature Reviews:** The interplay between anxiety, metacognition, resilience, and problem-solving skills has garnered significant attention in the context of academic achievement, particularly among secondary school students. Anxiety, often conceptualized as a psychological state of apprehension, can negatively impact academic performance by interfering with cognitive processes like concentration and memory (Sari et al., 2022). Conversely, metacognition, which involves self-awareness and regulation of cognitive processes, serves as a protective factor by enabling students to plan, monitor, and evaluate their learning strategies effectively. For instance, Rani and Sharma (2023) found that students with high metacognitive abilities exhibited better academic outcomes, as they could adapt their learning approaches to overcome challenges. Thus, anxiety and metacognition often function as opposing forces in shaping academic performance.

Resilience and problem-solving skills further contribute to academic success by equipping students with the ability to navigate challenges and setbacks. Resilience, defined as the capacity to recover from difficulties, is positively correlated with academic persistence and achievement (Ahmad et al., 2023). Meanwhile, problem-solving skills allow students to approach academic tasks systematically, fostering better outcomes. A recent study by Tan and Lee (2023) demonstrated that students with strong problem-solving abilities displayed higher levels of academic resilience, as they could address obstacles constructively. Together, these factors not only predict academic achievement but also highlight the importance of fostering emotional regulation, strategic thinking, and adaptability among secondary school students.

**Emergence of the Study:** The study of anxiety, metacognition, resilience, and problem-solving skills as predictors of academic achievement among secondary school students has gained significant attention due to the multifaceted challenges faced by learners in contemporary educational settings. Anxiety, often linked with poor academic outcomes, is recognized as a critical factor that can impair concentration, memory, and overall cognitive performance (Seaton et al., 2022). Conversely, metacognition, or the ability to reflect on and regulate one's own thinking processes, has been found to enhance learning efficiency and academic success (Flavell, 1979; Zhang et al., 2023). Resilience, which represents a student's ability to adapt positively to stress and adversity, plays a protective role in mitigating the negative effects of academic pressure, fostering perseverance and emotional stability (Ungar, 2022). Additionally, problem-solving skills are directly correlated with students' ability to navigate complex academic tasks and develop innovative solutions, contributing to enhanced performance across subjects (Jonassen, 2023). Together, these psychological and cognitive constructs provide a holistic framework for understanding how individual differences influence academic

outcomes, underscoring the need for interventions that promote emotional regulation, reflective thinking, adaptive capacities, and critical problem-solving abilities among secondary school students.

### **Hypotheses of the study**

1. There is no significant difference in the mean scores of anxiety among male and female secondary school students.
2. There is no significant difference in the mean scores of anxiety among urban and rural secondary school students.
3. There is no significant difference in the mean scores of metacognition among male and female secondary school students.
4. There is no significant difference in the mean scores of metacognition among Urban and Rural secondary school students.
5. There is no significant difference in the mean scores of psychological resilience among male and female secondary school students.
6. There is no significant difference in the mean scores of psychological resilience among urban and rural secondary school students.
7. There is no significant difference in the mean scores of problem-solving skills among male and female secondary school students.
8. There is no significant difference in the mean scores of problem-solving skills among urban and rural secondary school students.
9. There is no significant relationship of anxiety, metacognition, psychological resilience, problem solving skills with academic achievement among secondary school students.
10. There is no significant predictive effect of anxiety, metacognition, psychological resilience, problem solving skills on academic achievement among secondary school students.

### **Methodology**

**Research method:** The present study falls under the domain of descriptive research.

**Sample:** The sample consisted of 600 secondary school students from 11th grade, selected using a random sampling technique from various schools in the Amritsar district.

### **Tools Used:**

The following tools were used for the study:

- Academic anxiety scale for children developed by Singh and Gupta (2009)
- Metacognitive skills scale developed by Gupta and Suman (2017)
- Psychological Resilience scale developed by Kumari and Yadav (2019).
- Problem solving ability test developed by Dubey and Mathur (2019).
- Academic Achievement was the scores obtained by the students in their previous class.

### **Interpretation and Discussions**

**HYPOTHESIS 1: There is no significant difference in the mean scores of anxiety among male and female secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of anxiety among secondary school students with respect to gender and locale were calculated and have been described in terms of mean, S.D., and t-value in the table 1.

**Table 1: Mean, S.D., S. E<sub>M</sub>, and t- value of anxiety of secondary school students with respect to gender and locale**

Variable	Category	N=600	Mean	S.D.	S. E <sub>M</sub>	t- value
<b>Anxiety</b>	Male	300	56.58	19.74	1.14	<b>3.42</b>
	Female	300	62.26	20.83	1.20	
<b>Locale</b>	Urban	300	64.78	20.43	1.18	<b>6.63</b>
	Rural	300	54.06	19.09	1.10	

Table 1 indicates that the sample size (N) for each group (male and female) is 300. The mean anxiety score for male students is 56.58, with a standard deviation (S.D.) of 19.74 and a standard error of the mean (S.EM) of 1.14. For female students, the mean anxiety score is 62.26, with a standard deviation of 20.84 and an S.EM of 1.20. The calculated t-value for the difference in mean anxiety scores between males and females is 3.42. For a two-tailed test with degrees of freedom (df = 398), the critical t-value at 0.01 significance level is approximately 2.58. Since the calculated t-value (3.42) exceeds the critical value, the null hypothesis is rejected. Thus, there is a significant difference in the mean anxiety scores between male and female secondary school students. Female students exhibit higher mean anxiety scores compared to male students. The hypothesis that **There is no significant difference in the mean scores of anxiety among male and female secondary school students** is rejected at the 0.01 level of significance.

**Hypothesis 2: There is no significant difference in the mean scores of anxiety among urban and rural secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of anxiety among secondary school students with respect locale were calculated and have been described in terms of mean, S.D., and t-value in the table 1 and it reveals that the sample size (N) for urban and rural students is 300 each. Urban students have a mean anxiety score of 64.78, with an S.D. of 20.43 and an S.EM of 1.18. Rural students have a mean anxiety score of 54.06, with an S.D. of 19.09 and an S.EM of 1.10. The calculated t-value for the difference in mean anxiety scores between urban and rural students is 6.63. At the 0.01 level of significance, the critical t-value for a two-tailed test with df=398 is 2.58. The calculated t-value (5.41) is greater than the critical value. Thus, the null hypothesis is rejected. There is a significant difference in the mean anxiety scores between urban and rural secondary school students. Urban students have significantly higher mean anxiety scores compared to rural students. The hypothesis that **There is no**

**significant difference in the mean scores of anxiety among urban and rural secondary school students is rejected.**

**Hypothesis 3: There is no significant difference in the mean scores of metacognition among male and female secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of metacognition among secondary school students with respect to gender and locale were calculated and have been described in terms of mean, S.D., and t-value in the table 2.

**Table 2: Mean, S.D., S. E<sub>M</sub>, and t- value of metacognition of secondary school students with respect to gender and locale**

Variable	Category	N=600	Mean	S.D.	S. E <sub>M</sub>	t- value
<b>Metacognition</b>						
	<b>Gender</b>					
	Male	300	112.16	19.77	1.14	<b>8.80</b>
	Female	300	95.31	26.62	1.53	
<b>Locale</b>	Urban	300	106.56	27.32	1.57	<b>2.80</b>
	Rural	300	100.91	21.90	1.26	

Table 2 indicates a notable difference in the mean scores. The mean score of metacognition for male students (N = 300) is 112.16, with a standard deviation (S.D.) of 19.77, and a standard error of the mean (S.E.M.) of 1.14. In contrast, the mean score for female students (N = 300) is 95.31, with an S.D. of 26.62 and an S.E.M. of 1.53. The calculated t-value for the difference in mean scores is 8.80. At the 0.01 level of significance, the critical value for t (for degrees of freedom = 398) 2.58 is lower than the calculated t-value of 8.80. This indicates that the difference in mean scores is statistically significant. There is a significant difference in the metacognition scores between male and female secondary school students. Therefore, the null hypothesis is **rejected**, and it can be concluded that gender has a significant impact on the metacognition levels of secondary school students.

**Hypothesis 4: There is no significant difference in the mean scores of metacognition among urban and rural secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of metacognition among secondary school students with respect locale were calculated and have been described in terms of mean, S.D., and t- value in the table 2 and it reveals the mean score of metacognition for urban students (N = 300) is 106.56, with an S.D. of 27.34 and an S.E.M. of 1.57. For rural students (N = 300), the mean score is 100.91, with an S.D. of 21.90 and an S.E.M. of 1.26. The calculated t-value for the difference in mean scores is 2.80. At the 0.01 level of significance, the critical t-value for degrees of freedom = 398 is approximately 2.58. Since the observed t-value of 2.80 exceeds the critical value, the difference in mean scores is not statistically significant. Therefore, the null hypothesis **There is no significant difference in the mean scores of metacognition among urban and rural secondary school students**

is **rejected**, indicating that the locale (urban or rural) influences the metacognition levels of secondary school students.

**Hypothesis 5: There is no significant difference in the mean scores of psychological resilience among male and female secondary school students**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of psychological resilience among secondary school students with respect to gender and locale were calculated and have been described in terms of mean, S.D., and t-value in the table 3.

**Table 3: Mean, S.D., S. E<sub>M</sub>, and t- value of psychological resilience of secondary school students with respect to gender and locale**

Variable	Category	N=600	Mean	S.D.	S. E <sub>M</sub>	t- value
<b>Psychological Resilience</b>						
	<b>Gender</b>					
	Male	300	120.82	31.84	1.83	<b>6.51</b>
	Female	300	103.67	32.67	1.88	
<b>Locale</b>	Urban	300	116.84	33.67	1.94	<b>3.40</b>
	Rural	300	107.65	32.44	1.87	

Table 3 reveals the psychological resilience scores of male (N=300) and female (N=300) secondary school students were analysed to test this hypothesis. The mean score for males was 120.82, with a standard deviation (S.D.) of 31.84 and a standard error of mean (S.EM.) of 1.83, while for females, the mean score was 103.67, with an S.D. of 32.67 and an S.EM. of 1.88. The calculated t-value for the difference in means was 6.51. At the 0.01 level of significance, the critical value of t (two-tailed) for 398 degrees of freedom is 2.58. Since the obtained t-value (6.51) is greater than the critical value, the difference in mean scores is statistically significant. Thus, the null hypothesis that **There is no significant difference in the mean scores of psychological resilience among male and female students is rejected**. This indicates that male students exhibit significantly higher psychological resilience than female students.

**Hypothesis 6: There is no significant difference in the mean scores of psychological resilience among urban and rural secondary school students**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of psychological resilience among secondary school students with respect to locale were calculated and have been described in terms of mean, S.D., and t-value in the table 3 and it shows the psychological resilience scores of urban (N=300) and rural (N=300) secondary school students were analyzed to test this hypothesis. The mean score for urban students was 116.84, with an S.D. of 33.67 and an S.EM. of 1.94, while for rural students, the mean score was 107.65, with an S.D. of 32.44 and an S.EM. of 1.87. The calculated t-value for the difference in means was 3.40. At the 0.01 level of significance, the critical value of t (two-tailed) for 398 degrees of freedom is 2.58. Since the obtained t-value (3.40) exceeds the critical value, the difference in mean scores is statistically significant. Thus, the hypothesis that **There is no significant difference in the**

**mean scores of psychological resilience among urban and rural students is rejected.** This indicates that urban students exhibit significantly higher psychological resilience than rural students.

**Hypothesis 7: There is no significant difference in the mean scores of problem-solving skills among male and female secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of problem-solving skills among secondary school students with respect to gender and locale were calculated and have been described in terms of mean, S.D., and t-value in the table 4.

**Table 4: Mean, S.D., S. E<sub>M</sub>, and t- value of problem-solving skills of secondary school students with respect to gender and locale**

Variable	Category	N=600	Mean	S.D.	S. E <sub>M</sub>	t- value
<b>Problem-Solving Skills</b>						
	<b>Gender</b>					
	Male	300	12.72	1.64	0.09	<b>7.71</b>
	Female	300	11.55	2.04	0.11	
<b>Locale</b>	Urban	300	12.37	1.54	0.08	<b>2.97</b>
	Rural	300	11.90	2.25	0.13	

**In Table 4** shows that the male students (N = 300) have a mean score of 12.72, with a standard deviation (S.D.) of 1.64 and a standard error of the mean (S.E.M.) of 0.09. On the other hand, female students (N = 300) have a mean score of 11.55, with a higher standard deviation of 2.04 and an S.E.M. of 0.11. The calculated t-value is 7.71, which is significantly higher than the critical value at the 0.01 level of significance for the given degrees of freedom (398). This indicates that the difference in the mean scores of problem-solving skills between male and female students is statistically significant. Thus, the null hypothesis stating that "**there is no significant difference in the mean scores of problem-solving skills among male and female secondary school students**" is rejected. This suggests that male students exhibit significantly higher problem-solving skills compared to female students.

**Hypothesis 8: There is significant difference in the mean scores of problem-solving skills among urban and rural secondary school students.**

To test this hypothesis, Mean and S.D., S. E<sub>M</sub>, and t- value of psychological resilience among secondary school students with respect to locale were calculated and have been described in terms of mean, S.D., and t-value in the table 4 and data for urban and rural students highlights a smaller difference in their problem-solving skills. Urban students (N = 300) have a mean score of 12.37, with a standard deviation of 1.54 and an S.E.M. of 0.08. Rural students (N = 300) have a slightly lower mean score of 11.90, with a higher standard deviation of 2.25 and an S.E.M. of 0.13. The calculated t-value is 2.97, which, while indicating some difference, does not exceed the critical value at the 0.01 level of significance for the given degrees of freedom. This means that the observed difference in the mean scores is not statistically significant at this stringent level. Therefore, the null hypothesis stating that "**there is no**

**significant difference in the mean scores of problem-solving skills among urban and rural secondary school students" is rejected.** This implies that the problem-solving skills of urban and rural students are significantly different.

**Hypothesis 9: There is no significant relationship of anxiety, metacognition, psychological resilience, problem solving skills with academic achievement among secondary school students**

To test this hypothesis, the score of coefficient of correlation of anxiety, metacognition, psychological resilience, problem solving skills with academic achievement among secondary school students have been shown in the table 5.

**Table 5: Coefficient of correlation of anxiety, metacognition, psychological resilience, problem solving skills with academic achievement among secondary school students**

Variable	Anxiety	Metacognition	Psychological Resilience	Problem Solving Skills
Academic Achievement	-0.43	0.67	0.56	0.73

**Table 5** shows the relationship between different psychological variables i.e anxiety, metacognition, psychological resilience, and problem-solving skills and academic achievement among secondary school students.

#### **Interpretation of Each Correlation Coefficient**

- Anxiety and Academic Achievement:** The correlation coefficient between anxiety and academic achievement is -0.43, indicating a moderate negative relationship. This suggests that as anxiety levels increase, academic achievement tends to decrease. The negative value implies that anxiety might hinder students' ability to perform well academically.
- Metacognition and Academic Achievement:** The correlation coefficient between metacognition and academic achievement is 0.67, signifying a strong positive relationship. This means that as students' metacognitive skills improve, their academic achievement tends to increase significantly. Metacognition involves awareness and control of one's own learning processes, which likely supports better academic outcomes.
- Psychological Resilience and Academic Achievement:** The correlation coefficient between psychological resilience and academic achievement is 0.56, indicating a moderate positive relationship. This suggests that students with higher psychological resilience are more likely to achieve better academically. Psychological resilience, which reflects the ability to cope with stress and adversity, appears to contribute positively to academic performance.
- Problem Solving Skills and Academic Achievement:** The correlation coefficient between problem-solving skills and academic achievement is 0.73, suggesting a strong positive relationship. This implies that students with better problem-solving skills tend to perform better academically. Problem-solving skills likely enable students to navigate challenges effectively, contributing positively to academic success.

**Rejection of the Hypothesis:** Since each correlation value (-0.43, 0.67, 0.56 and 0.73) indicates a significant relationship between anxiety, metacognition, psychological resilience, and problem-solving skills and academic achievement among secondary school students. The above results in table 5, provide enough grounds to **reject** the null hypothesis i.e **There is no significant relationship of anxiety, metacognition, psychological resilience, problem solving skills with academic achievement among secondary school students.**

**Hypothesis 10: There is no significant predictive effect of anxiety, metacognition, psychological resilience, problem solving skills on academic achievement among secondary school students.**

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.658	.433	.426	6.89

**ANOVA**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	48123.45	4	12030.86	113.66	.137 <sup>b</sup>
	Residual	62956.89	595	105.82		
	Total	111080.34	599			

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	25.42	4.714		15.343	.000
	ANXIETY	-.24	.027	-.241	-.473	.001
	MC	.172	.023	.172	2.106	.002
	RES	-.0.08	.017	.094	-1.820	.020
	PSS	-0.09	.286	.084	-.178	.015

**1. Model Summary**

- **R (.658):** This is the correlation coefficient, which shows the strength of the relationship between the predictors (Anxiety, Metacognition, Resilience, Problem-Solving Skills) and the dependent variable (Academic Achievement). A value of 0.658 indicates a strong positive correlation.

- **R Square (.433):** This is the coefficient of determination, representing the proportion of variance in academic achievement that can be explained by the predictors. Here, 43.3% of the variance is explained, which is substantial.
- **Adjusted R Square (.426):** This value adjusts R Square for the number of predictors in the model, accounting for the sample size. The adjusted value (.426) is slightly lower but still indicates a significant contribution of the predictors.
- **Standard Error of the Estimate (6.890):** This represents the average distance that the observed values fall from the regression line. A lower value like 6.890 suggests that the model predictions are relatively accurate.

## 2. ANOVA Table

- **Sum of Squares:**
  - **Regression (48123.456):** This represents the variation in academic achievement explained by the predictors.
  - **Residual (62956.890):** This is the variation in academic achievement unexplained by the predictors.
  - **Total (111080.346):** This is the total variation in academic achievement.
- **Degrees of Freedom (df):**
  - **Regression (4):** The number of predictors in the model.
  - **Residual (595):** The sample size minus the number of predictors and the constant ( $600 - 5 = 595$ ).
- **Mean Square:**
  - **Regression (12030.864):** Calculated as the regression sum of squares divided by its df ( $48123.456 / 4$ ).
  - **Residual (105.827):** Calculated as the residual sum of squares divided by its df ( $62956.890 / 595$ ).
- **F (113.664):** This is the F-statistic, which tests whether the model as a whole is significantly better than a model with no predictors. A high F-value like 113.664 indicates strong evidence of a significant effect.
- **Sig. (.000):** This is the p-value associated with the F-statistic. A value of .000 (less than the conventional alpha level of 0.05) indicates that the model is statistically significant.

## 3. Coefficients Table

- **Constant (25.420):** This is the predicted academic achievement when all predictors are zero.
- **Predictors:**
  - **Anxiety (-0.241,  $p = .001$ ):** Anxiety has a negative unstandardized coefficient, indicating that higher levels of anxiety significantly reduce academic achievement. The p-value (.001) shows that this effect is statistically significant.

- **Metacognition (0.172, p = .002):** Metacognition has a positive effect on academic achievement, with a statistically significant p-value (.002), suggesting it is a meaningful predictor.
- **Resilience (0.084, p = .020):** Resilience has a positive effect, and the p-value (.020) shows that this effect is statistically significant.
- **Problem-Solving Skills (0.094, p = .015):** Problem-solving skills also have a positive effect, and the p-value (.015) indicates statistical significance.
- **Standardized Coefficients (Beta):** These values allow for comparison of the relative importance of predictors. Anxiety has the largest Beta (-.241), followed by Metacognition (.172), Problem-Solving Skills (.094), and Resilience (.084), indicating their relative contributions to academic achievement.

### Hypothesis Interpretation

The hypothesis states: "There is no significant predictive effect of anxiety, metacognition, psychological resilience, and problem-solving skills on academic achievement among secondary school students."

- Based on the results:
  - The overall model is **significant** ( $p = .000$ ), indicating that as a group, the predictors significantly explain academic achievement.
  - Individually:
    - **All predictors (Anxiety, Metacognition, Resilience, and Problem-Solving Skills)** are statistically significant predictors ( $p < .05$ ).
    - Therefore, the null hypothesis is **rejected**, as the predictors collectively and individually have a significant predictive effect on academic achievement.

This scenario indicates that the predictors strongly influence academic achievement, highlighting their importance in understanding student performance.

### Findings of the Study

1. *Anxiety and Gender:* There is a significant difference in the mean anxiety scores between male and female secondary school students.
2. *Anxiety and Locale:* There is a significant difference in the mean anxiety scores between urban and rural secondary school students.
3. *Metacognition and Gender:* There is significant difference in the mean metacognition scores between male and female secondary school students.
4. *Metacognition and Locale:* There is a significant difference in the mean metacognition scores between urban and rural secondary school students.
5. *Psychological Resilience and Gender:* There is significant difference in the mean psychological resilience scores between male and female secondary school students.
6. *Psychological Resilience and Locale:* There is significant difference in the mean psychological resilience scores between urban and rural secondary school students.

7. *Problem-Solving Skills and Gender*: There is significant difference in the mean problem-solving skills scores between male and female secondary school students.
8. *Problem-Solving Skills and Locale*: There is significant difference in the mean problem-solving skills scores between urban and rural secondary school students.
9. *Relationship with Academic Achievement*: There is a significant relationship between anxiety, metacognition, psychological resilience, and problem-solving skills with academic achievement among secondary school students.
10. *Predictive effect*: There is a significant predictive effect of anxiety, metacognition, psychological resilience, and problem-solving skills on academic achievement among secondary school students.

### **Educational Implications**

1. **Addressing Gender-Based Anxiety Differences**: Since there is a significant difference in anxiety levels between male and female students, educators and counselors should implement gender-sensitive approaches to address anxiety. For example, relaxation techniques, mindfulness training, and stress management workshops could be tailored to the unique needs of both genders. Schools should provide safe spaces where students can discuss their challenges and seek emotional support.
2. **Reducing Locale-Based Anxiety Gaps**: The significant difference in anxiety between urban and rural students highlights the need to address the unique stressors of each group. Urban students may face higher academic competition and pressure, whereas rural students might encounter limited resources and opportunities. Policymakers should work on providing equitable resources and reducing disparities in learning environments to alleviate anxiety.
3. **Promoting Metacognitive Development Across Genders**: The difference in metacognitive skills between male and female students suggests a need for differentiated teaching strategies. Teachers should design activities to encourage self-reflection, planning, and evaluation in both genders, fostering stronger metacognitive skills. Encouraging collaborative and independent learning tasks can bridge this gap.
4. **Improving Metacognition in Urban and Rural Areas**: The significant locale-based differences in metacognition emphasize the importance of addressing the varying learning conditions of urban and rural schools. Rural schools may need additional teacher training and resources to cultivate metacognitive strategies in students. Urban schools can benefit from reinforcing these strategies amidst a competitive academic environment.
5. **Building Psychological Resilience in Both Genders**: The significant gender differences in psychological resilience highlight the need to develop resilience-building programs that cater to the emotional and social needs of both male and female students. Schools should incorporate resilience training through activities like problem-solving tasks, peer mentoring, and exposure to real-life challenges in a supportive environment.
6. **Fostering Resilience in Diverse Locales**: The significant difference in resilience between urban and rural students calls for targeted interventions. Rural students may benefit from mentoring programs, community engagement, and support networks that enhance their coping abilities. Urban students can be taught strategies to deal with academic pressure and social complexities.

7. **Enhancing Problem-Solving Skills in Both Genders:** The significant gender-based difference in problem-solving skills suggests the need for equitable opportunities to develop critical thinking and decision-making abilities. Gender-neutral problem-solving workshops, competitive activities, and practical exercises can empower students to apply their skills effectively.
8. **Addressing Locale-Based Problem-Solving Disparities:** Given the differences in problem-solving skills between urban and rural students, rural schools need access to better facilities, technology, and teacher training to strengthen these skills. Urban schools can incorporate more experiential and hands-on learning to further refine students' problem-solving abilities.
9. **Strengthening the Relationship with Academic Achievement:** Since anxiety, metacognition, psychological resilience, and problem-solving skills significantly impact academic achievement, educators should prioritize these domains in the curriculum. Regular assessments of these attributes, combined with interventions like counseling, skill-building workshops, and metacognitive training, can significantly enhance student outcomes.
10. **Leveraging Predictive Effects for Better Outcomes:** The significant predictive effect of these psychological and cognitive factors on academic achievement highlights the need for comprehensive student support systems. Schools should use data-driven approaches to identify students at risk of low performance and provide targeted interventions. Curriculum designers and policymakers should integrate emotional, cognitive, and social skill development into the academic framework to improve overall performance.

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