

A Study on Mathematics Anxiety among Secondary School Students of Balangir District

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Abstract

Mathematics is widely recognized as a fundamental subject crucial for academic and societal progress; however, it frequently induces fear, tension, and anxiety among learners. This research paper investigates the level of mathematics anxiety among secondary school students in the Balangir district of Odisha. Employing a descriptive survey research design, a sample of 320 secondary school students (equally distributed across gender, locality, and school type) was selected using a stratified random sampling technique. Data were collected using the standardized Mathematics Anxiety Scale developed by C. Lalsangpuii (2024), consisting of 38 items across cognitive, emotional, and behavioral dimensions. The collected data were analyzed using descriptive statistics (mean, standard deviation) and inferential statistics (independent samples t-test) via SPSS. The findings reveal statistically significant differences in mathematics anxiety based on gender, locality, and school type, with male students, rural students, and government school students exhibiting higher levels of anxiety. The paper concludes with educational implications and targeted recommendations for reducing anxiety and improving learning outcomes.

Keywords: Mathematics Anxiety, Secondary School Students, Gender Differences, Locality, School Type, Descriptive Survey

INTRODUCTION

Education is essential for individual development and societal advancement, with mathematics occupying a central role as the foundation of science, technology, engineering, and various fields of knowledge. Despite its significance, mathematics is frequently perceived as one of the most challenging subjects, triggering negative emotional reactions such as fear, tension, nervousness, and anxiety. Mathematics anxiety is defined as a feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematical problems across academic and everyday situations (Richardson & Suinn, 1972). At the secondary school level, mathematics becomes increasingly abstract and complex, introducing advanced topics such as algebra, geometry, trigonometry, and statistics. The pressure of board examinations, competitive environments, and traditional teaching methods often exacerbates student apprehension. In districts like Balangir, located in western Odisha, diverse socio-economic backgrounds and varied access to educational resources further influence students' learning experiences.

OBJECTIVES OF THE STUDY

- To study the level of mathematics anxiety between male and female secondary school students.
- To study the level of mathematics anxiety among urban and rural secondary school students.
- To study the level of mathematics anxiety among students studying in government and private schools.

HYPOTHESES OF THE STUDY

H01: There is no significant difference in mathematics anxiety between male and female secondary school students.

H02: There is no significant difference in mathematics anxiety between urban and rural secondary school students.

H03: There is no significant difference in mathematics anxiety between students of government schools and private schools.

REVIEW OF RELATED LITERATURE

The present chapter reviews various research studies related to mathematics anxiety, particularly those focusing on school students. The literature reviewed includes both international and Indian studies that examine factors influencing mathematics anxiety, its relationship with academic achievement, and differences in anxiety levels among students.

Khuda, Ikram (2021) conducted a study on “An investigation into the understanding of anxiety about mathematics learning in the graduating students of Karachi.” For this purpose, survey-based research and questionnaire was used for data collection. A sample of 360 students from Electronic Engineering, Business and Media Sciences were taken and data was evaluated using principal component analysis and regression statistics. Results revealed that two factors are predominantly contributing towards mathematics anxiety in Pakistan; one is inability of students to correlate mathematics with practical life and another one is the student's emotional instability towards the subject.

Altakhneh (2020) conducted a study on “The effect of mathematics anxiety on the achievement of middle school students in Amman.” This study aims to investigate whether student anxiety about the subject of mathematics has any effect on the achievement of middle-school students in Amman, Jordan. The study sample consists of 180 seventh grade students enrolled in Amman public schools during the 2018/2019 academic year. The results revealed that there are statistically-significant differences in achievement between the middle level of math anxiety and the two other extremes.

Mann, Walshaw (2019) conducted a study on “Mathematics anxiety in secondary school female students: Issues, influences and implications”. It reports on the prevalence of mathematics anxiety in adolescents and investigates the factors that influence students' mathematics anxiety in mathematics classrooms. Participants in the study were Year 9 students (N = 415) from seven secondary schools in New Zealand. Statistical analyses confirmed that girls report higher levels of mathematics anxiety than boys.

Puteh, Khalin (2016) conducted a study on “Mathematics anxiety and its relationship with the achievement of secondary students in Malaysia”. This study aims to identify the mathematics anxiety and its relationship with the achievement of Form Four Students in Perak Tengah district, Malaysia. The design of the study is using a quantitative method and the data was collected by using a questionnaire of Student Math Anxiety Scale (SKMP). A total of 190 Form Four students were selected as a research

sample. The results showed that the level of mathematics anxiety of the students were at a moderate level and gender show that there is no significant difference between the level of mathematics anxiety of female students compared to the male students.

Sule, Hussaini, Bashir, Garba (2016) conducted a study on “Mathematics phobia among senior secondary school students: implication for manpower development in science education in Nigeria.” It is a correlational design comparing performance of students with phobia and those without in Mathematics. A sample of eighty (80) SSII students was chosen at random from two secondary schools in Bauchi state. Questionnaire was used for data collection. An achievement test consisting of 15 items was used to measure the performance of students with Mathematics phobia and those without. The result of the study revealed that students without phobia achieved more in Mathematics than those with phobia and a significant difference between male and female in the performance of students with mathematics phobia was observed in favor of the male.

Pourmoslemi, Erfani, Firoozfar (2013) conducted a study on “Mathematics anxiety, mathematics performance and gender differences among undergraduate students”. This study aimed to investigate the level of mathematics anxiety and the relationship between mathematics anxiety and mathematics performance among undergraduate students. The sample of the study consisted of 275 (162 women and 113 men) undergraduate students of various fields of study. To measure the mathematics anxiety level, the participants responded to the 24 Items of The Revised Mathematics Anxiety Rating Scale (RMARS). The data were analyzed by One-way ANOVA and independent-samples t-tests using the Statistical Procedures for Social Sciences (SPSS 11.5). The results showed significant differences between men and women’s evaluation anxiety and no significant difference was observed concerning field of study.

Bhansali (2024) conducted a study on “I Don’t Teach Maths, I Teach Children: Mathematics Teachers in a Holistic School in India”. Semi-structured interview was used as data collection tool. The data were analyzed in two ways, the first round of data analysis happened simultaneous to data collection through a contemplative practice of Astachal which was a ritual at Sahyadri, and the second round of data analysis was conducted through formal coding and categorizing methods post the data collection period.

Dwivedi, Singh (2023) conducted a study on “Redefining Mathematical Jitters: Pioneering A Scale for Children's Anxiety in Numerical Contexts.” In this study, a Mathematical Anxiety Scale was developed to evaluate mathematical anxiety among primary school students aged between 8 to 10 years. The scale contains twenty-four items that measure mathematical anxiety in six domains. The validation of the scale was done using the data of 250 girls and 237 boys’ participants. The frequency analysis using SPSS shows moderate math anxiety, low math anxiety, and extremely low math anxiety respectively.

RESEARCH METHODOLOGY

The study adopted a descriptive survey method, allowing the researcher to examine existing conditions and compare anxiety levels across distinct demographic groups without variable manipulation.

Variables

Independent Variables: Gender (Male/Female), Locality (Urban/Rural), Type of School (Government/Private).

Dependent Variable: Mathematics Anxiety among Secondary School Students.

Population , Sample and Sampling technique

The population comprised all secondary school students (Classes IX and X) in Balangir district. Using a stratified random sampling technique, a representative sample of 320 students (160 male, 160 female; balanced across urban/rural and government/private settings) was selected.

Data collection

Data were collected using the Mathematics Anxiety Scale developed by C. Lalsangpuii (2024), featuring 38 negative statements on a 5-point Likert scale (Strongly Agree = 5 to Strongly Disagree = 1). The scale measures three dimensions: Cognitive, Emotional, and Behavioral. The tool's reliability coefficient was established at $r = 0.84$ using Pearson's Product Moment Correlation method, and validity was verified through content and concurrent validity ($r = 0.82$).

Data Analysis

Data were analyzed using SPSS software via:

- Mean
- Standard Deviation
- Independent Samples t-test (tested at the 0.05 level of significance)

FINDINGS

Data Analysis Using t-test

The collected data were analyzed using the Independent Sample t-test to examine whether there were significant differences in mathematics anxiety among different groups of students.

The results of the analysis are presented below.

1. Gender Comparison

Objective 1: To study the level of mathematics anxiety between male and female secondary school students

Gender	Mean Score	t-value	Level of Significance
Male	144.31	7.902	Significant
Female	131.01		

2. Locality Comparison

Objective 2: To study the level of mathematics anxiety among urban and rural secondary school students

Locality	Mean Score	t-value	Level of Significance
Urban	127.54	-4.777	Significant
Rural	134.74		

3. Type of School Comparison

Objective 3: To study the level of mathematics anxiety between students studying in government and private schools

School Type	Mean Score	t-value	Level of significance
Government	131.37	5.304	Significant
Private	121.08		

Analysis Based on Gender

H1: There is no significant difference in mathematics anxiety between male and female secondary school students.

Comparison of Mathematics Anxiety between Male and Female Students

Gender	N	Mean	Std. Deviation	Std. Error Mean
Male	160	144.31	14.991	1.185
Female	160	131.01	15.130	1.196

The difference between the mean scores suggests that male students exhibit slightly higher mathematics anxiety scores compared to female students. There exists a significant difference in mathematics anxiety between male and female secondary school students.

Analysis Based on Locality

H2: There is no significant difference in mathematics anxiety between urban and rural secondary school students.

Comparison of Mathematics Anxiety between Urban and Rural Students

Locality	N	Mean	Std. Deviation	Std. Error Mean
Urban	160	127.54	13.63	1.078
Rural	160	134.74	13.31	1.053

The standard deviation values suggest that the variability of scores is almost similar in both groups. The null hypothesis is rejected, and it can be concluded that there is a significant difference in mathematics anxiety between urban and rural students. Rural students tend to experience higher mathematics anxiety compared to urban students.

Analysis Based on Type of School

H3: There is no significant difference in mathematics anxiety between government and private school students.

Comparison of Mathematics Anxiety between Government and Private School Students.

School Type	N	Mean	Std. Deviation	Std. Error Mean
Government	160	131.37	10.95	0.866
Private	160	121.08	21.96	1.736

This indicates that the difference between government and private school students is statistically significant. The null hypothesis is rejected, indicating that there is a significant difference in mathematics anxiety between government and private school students. Government school students tend to show higher mathematics anxiety levels than private school.

DISCUSSION

The findings of the present study are consistent with several previous research studies conducted in the field of mathematics education. The significant difference found between male and female students in mathematics anxiety indicates that gender may influence students' emotional responses toward mathematics. Some studies have suggested that differences in confidence levels, learning experiences, and social expectations may contribute to variations in

mathematics anxiety between male and female students. The higher level of mathematics anxiety observed among rural students may be attributed to differences in educational resources, infrastructure, and learning opportunities. Urban schools often have better facilities, access to modern teaching aids, and additional academic support, which may help students develop greater confidence in mathematics learning.

Rural schools, on the other hand, may face challenges such as limited instructional resources, shortage of trained teachers, and lack of supplementary learning materials. These factors may contribute to increased anxiety among rural students while learning mathematics. The finding that government school students exhibit higher mathematics anxiety compared to private school students may be influenced by differences in classroom environment, teaching strategies, and institutional support. Private schools often maintain smaller class sizes, provide more individualized attention, and use modern teaching techniques that encourage student participation. These factors may help students develop a more positive attitude toward mathematics. Government schools, however, may face issues such as overcrowded classrooms and limited teaching resources, which may affect the quality of instruction and increase students' anxiety levels.

CONCLUSION

This study establishes that mathematics anxiety is a prominent psychological barrier among secondary school students in the Balangir district. Empirical findings confirm that anxiety levels vary significantly across gender, geographical locality, and institutional type. Addressing this issue is critical, as heightened anxiety restricts cognitive capacity, impairs academic achievement, and limits future career trajectories in STEM fields. Mitigating mathematics anxiety requires systemic interventions from educators, school administrators, and policymakers.

RECOMMENDATIONS

- **Adoption of Innovative Pedagogy:** Teachers should transition away from rote memorization toward activity-based learning, interactive problem-solving, and real-life practical applications.
- **Supportive Classroom Environments:** Cultivating a low-stress, encouraging atmosphere where students can ask questions freely without fear of harsh criticism is vital.
- **Remedial Support Systems:** Schools must institute remedial coaching and peer-tutoring programs to bridge foundational learning gaps.
- **Targeted Resource Allocation:** Special administrative focus and infrastructure upgrades should be directed toward rural and government schools to bridge the resource gap and lower student anxiety.

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