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AN EXPLORATORY STUDY ON HOW MALE SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE CONNECT TO THEIR MATHEMATICS ANXIETY

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Abstract
Given that it is a required subject in both elementary and postsecondary education, mathematics has been identified by some students as being challenging. Numerous studies have been conducted on various facets of mathematics. However, further research on the psychological characteristics of males in math classes in secondary schools in Delta State is needed, which is why this study was conducted. The study aimed to determine if test anxiety levels among male secondary school students and their academic performance in mathematics are related. Two research questions and two hypotheses were used in the study. The study's design was a correlation. The research population consisted of all 1650 senior secondary year two (SS2) math students in Delta State. A sample of 771 male students was selected using a multistage sampling process. The Mathematics Test Anxiety Questionnaire (MTAQ), which was validated by three experts, was the instrument used to collect data. The reliability coefficient, calculated using Cronbach's alpha, was 0.69. The students' mathematics scores represent their academic performance. To analyze the data, Pearson product-moment correlation was employed. The study's findings demonstrated that test anxiety levels did not correlate academic performance of male students in secondary school mathematics. Furthermore, there was a sizable gap among male secondary students who had high and low anxiety in math.

Keywords: male, mathematics, performance, students, test anxiety

Introduction
Understanding mathematics is essential for educating students for their present and future professional careers since it forms the foundation for numerous other subjects, especially the sciences. Therefore, according to Dimarakis, Bobis, Way, and Anderson (2014), the mathematics curriculum provides students with the core abilities and information necessary for success both within and outside of the classroom. Mathematics is viewed as a scientific discipline that deals with numbers and mathematical operations as well as calculation, computation, and problem-solving (Roohi, 2012). Mathematics is the study of quantity, space, and structure, said Roohi. Casinillo et al. (2022) mention that "Mathematics is one of

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the subjects in senior high level with a high demand of complexity and difficulty as well as in the form of abstraction". It also displays the fundamental patterns that enable us to understand the environment. Consequently, math has been viewed as the basis for learning sciences, technology, and other calculation-related fields (Onoshakpokaiye, 2023b).

Many students experience tension or anxiety before an exam. However, the phrase "test anxiety" refers to the excessive amount of agony that students feel when it impairs their performance on an exam (Kendra, 2020). Test anxiety is one psychological factor that affects students' academic performance. A student's success is determined by their test or exam scores, and many students feel anxious or tense before, during, and after exams. Test anxiety of this kind might be a powerful motivator (Myrna & Aida, 2015).

Test anxiety is defined by a tense cognitive, physiological, emotional, and behavioral reaction to expecting failure in formal testing circumstances (Chapell et al., 2005; Kitsantas, Winsler, & Huie, 2008; Onoshakpokaiye, 2023a). Trembling, tension, and worry about probable failure or poor performance for the period of the test or an exam are test anxiety characteristics. Test anxiety is one of life's emotional issues. It occurs when a person feels helpless over their life and suffers from excessive anxiety (Okigbo & Onoshakpokaiye, 2023). This makes test anxiety, with its corresponding physical, emotional, and social symptoms, a widespread mental problem.

Olatoye (2009) defined test anxiety as a psychological illness that emotionally impacts people and manifests as tension and agitation in daily activities. Barrows, Dunn, and Lloyd (2013) assert that students who do poorly could perceive difficult circumstances as threats and attribute their failures to internal negative qualities. Students of all academic levels regularly feel test or exam anxiety. There is a possibility of high, moderate, or low. Since it is believed that every endeavor undertaken by a human being is accompanied by some level of anxiety, it is beneficial to have some level of worry before doing any big activities. Test anxiety makes students more prone to procrastinate and resort to repetitive memory tricks, both of which could negatively impact students' academic performance (Denwigwe & Jacks, 2020). Additionally, they are more inclined to employ less effective study methods.

According to Zakaria, Zain, Ahmad, and Erlina (2012), students' math performance is impacted by their test or mathematics anxiety. According to Zakaria et al. (2012), anxiety related to math exams is characterized by feelings of fear, avoidance, and dread while dealing with any math-related subject. The above authors as well observed that most math-challenged students worry about the test when attempting to apply their knowledge to a problem. Their study uses students' responses to hypothetical mathematical exam situations to identify test anxiety. Their entire perspective on the subject may affect how well students do in mathematics.

Ogheneakoke, Obro, and Diokpala (2021) conducted a study in Abraka, Ethiope East local government area, Delta state, Nigeria, to look at test anxiety and upper basic Social Studies students' learning outcomes. The findings showed a significant connection between gender and the academic achievements of students. This revealed that there exists a significant link between gender and the

achievement of students. The researchers concluded that the achievement of students is controlled by both gender and exam anxiety.

Okorodudu and Ossai (2012) performed a study in a psychology course for first-year Diploma students at Delta State University, Abraka, Nigeria, on the relationship between test anxiety and students' academic achievement, their study indicated that there was no statistically significant association between test anxiety of students and academic accomplishment in a psychology course. Furthermore, neither the students' gender nor the level of the study had a significant effect on their academic performance in the psychology course.

Yakubu, Bisandu, and Datiri (2019) performed a study in Kafanchan Educational Zone, Kaduna State, Nigeria to examine the connection between senior secondary school (SS3) students' test anxiety and performance. The results revealed a negative connection between test anxiety and students in mathematics. Owan (2020) investigated the effects of gender test anxiety and test item scrambling on students' mathematics performance among SS3 students in the Ikom Education Zone of Cross River State, Nigeria. A quasi-experimental investigation was used. Four hypotheses and four research questions guided the study. 1358 students were chosen from the SS3 sample using a proportionate sampling method. The findings indicated that there exists no significant difference among the gender's performance and test anxiety.

Okoh (2016) conducted a study to better understand the relationships between secondary students in public schools, in Delta Central Senatorial District, Delta State, Nigeria between anxiety, self-concept, motivation, and achievement. It made use of a correlation survey design. Six hypotheses and six research questions guided the study. A sample of 240 students was chosen from six secondary schools located in three Local Government areas through a simple random selection procedure. The instruments used to gather the data were the Test Anxiety, Self-Concept, Motivation Questionnaire, and students' final test results in English language and mathematics. The gathered data were examined using regression and multivariate analysis. The results indicated no connection between students' test anxiety and their academic performance at secondary public schools. The results further revealed that gender had no significant effect on test anxiety and academic performance.

Esuong, Uwase, and Udo, (2022) cited research by Vogel and Collins (2002) that examined the impact of anxiety on performance. The results demonstrated that both students who experienced moderate and severe exam anxiety underperformed academically. The findings also pointed out that student who experienced low test anxiety performed better on their math examinations. Additionally, Syokwaa, Aloka, and Ndunge's (2014) study revealed a connection between academic performance and levels of anxiety as well as evidence that high anxiety levels hurt the caliber of academic results reported by students.

Many researches have been conducted on the different areas of mathematics in different parts but none was carried out in the area of male secondary school students' test anxiety in Delta State. Considering the foregoing, it is crucial to determine if test anxiety impacts male students' academic performance in secondary school mathematics in Delta State of Nigeria.

The study specifically set out to look into:

1. The connection between secondary school male students' test anxiety and academic performance in mathematics in Delta State.
2. Whether there is a difference between the academic performances of secondary school male students with high and low test anxiety levels in mathematics in Delta State.

Statement of the problem

Despite Federal and State government attempts to enhance math education and learning, male secondary school students routinely and adversely do badly in mathematics. Numerous factors, like a lack of classroom space, a shortage of math teachers with the necessary training, student learning capabilities, and others, have been related to this poor student performance in math. Information from the National Bureau of Statistics (2016-2021) report on West African Examination Council (WAEC) results for Delta State, Nigeria shows that students' math proficiency has not improved. This may be a result of the students' dislike, fear, or aversion to mathematics. Many secondary school male students decide not to study or attend math lessons for different of reasons. They thus under-prepare for math tests, which negatively affects their mathematics performance.

Research Questions

The following research questions guided the study:

1. Is there a connection between math test anxiety and secondary school male students' academic performance in Mathematics?
2. Is there a difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics?

Hypotheses

The following hypotheses were tested at a 0.05 level of significance:

1. There is no significant connection between math test anxiety and secondary school male students' academic performance in Mathematics.
2. There is no significant difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics.

Method

The correlation survey design was adopted in this investigation. The population of the study consisted of 1650 senior secondary two (SS 2) students studying mathematics in 22 government secondary schools at Delta State. 771 male senior secondary school students were chosen from 22 secondary schools two (SS2) using the four Multi-stage Sampling method. The Mathematics Test Anxiety Questionnaire (MTAQ) was the instrument used to gather data. The (MTAQ) is a test anxiety measure that was modified by Dawood, Al Ghadeer, Mitsu, Almutary, and Alenezi (2016). This was designed such that in answer, the participants may select from four response categories: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).

The mathematical performance of the students was evaluated using the three terms of the 2021–2022 academic session results. Three professionals verified the tool. A comparable sample of 150 students from Delta State secondary schools who were not included in the study were given the MTAQ. The reliability of the

MTAQ items was evaluated using Cronbach alpha statistics, and the alpha coefficient value was 0.69. A Pearson product-moment correlation was utilized for the analysis of the data. The t-test of relationship analysis was utilized to test the null hypotheses.

Findings and Discussion

Findings

Is there a connection between math test anxiety and secondary school male students' academic performance in Mathematics?

Table 1. Pearson product-moment statistics showing the relationship between male secondary school students' test anxiety and their academic performance

Variable	N	R	r^2	r^2%	sig(2-tail)
Male student's anxiety-academic performance	771	-0.064	0.0041	0.41	0.380

Test anxiety male students and mathematics academic performance have a moderately negative association, according to Table 1. The result indicates that the correlation coefficient between the two variables is -0.064, indicating a moderately negative association between male students' anxiety and mathematics performance. Test anxiety has a 0.41% impact on academic performance as shown in Table 1.

Is there a difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics?

Table 2. Independent t-test analysis of male students' levels of anxiety, percentages, and mathematics academic performance (N = 771)

Levels	N	Percentage	t-value	P-value
High test anxiety	582	75.49		
			5.64	0.000
Low test anxiety	189	24.51		
Total	771	100		

Table 2 shows those 189 students, or 24.51% of the class, experienced low mathematics test anxiety, compared to 582 students, or 75.49% of the class, who reported severe test anxiety. This reveals that exam anxiety for mathematics was quite high for the majority of the secondary school male students.

Hypothesis 1: There is no significant connection between math test anxiety and secondary school male students' academic performance in Mathematics

To establish if there exists a significant correlation in hypothesis one, Pearson product-moment correlation statistics was used. The results are shown in table 1. There is no significant connection between math test anxiety and secondary school male students' academic performance in Mathematics since the significant value (Sig.2-tailed) of 0.380 is bigger than the significant value of 0.05. Therefore, it implies that there is no significant connection between math

test anxiety and secondary school male students' academic performance in Mathematics.

Hypothesis 2: There is no significant difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics.

Since the p-value (0.000) in Table 2 is lower than the value of 0.05, there exists a significant difference. The null hypothesis, which states there is no significant difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics, is therefore rejected. The findings indicated that students with high and low levels of mathematical anxiety differed significantly in their academic performance (t =5.64; p 0.05). This suggests that students with lower levels of anxiety performed better in math than male students with higher anxiety levels.

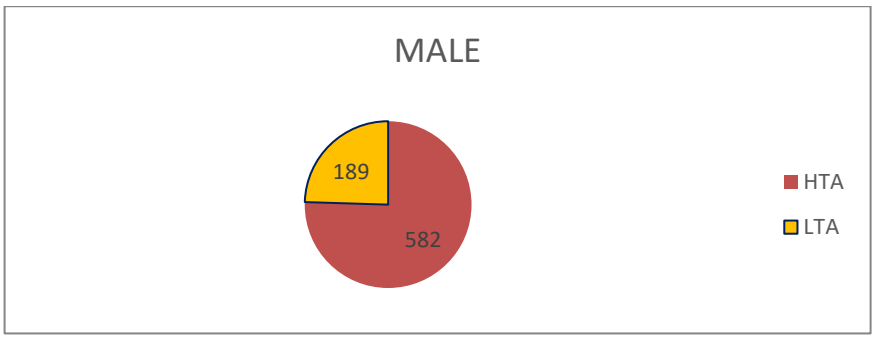


Figure 1. A pie chart of male students with low and high anxiety in math

*Note:
HTA: High Test Anxiety
LTA: Low Test Anxiety

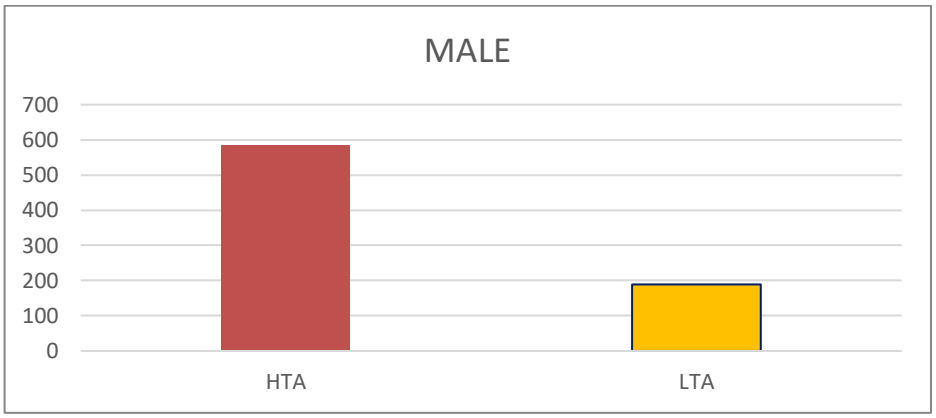


Figure 2. A bar chart of male students with low and high math anxiety

Figure 1 and Figure 2 depict the number of male students who had high and low test anxiety in mathematics.

Discussion

The connection between math test anxiety and secondary school male students' academic performance in Mathematics.

There was no significant connection between math test anxiety and secondary school male students' academic performance in Mathematics, according to Table 1, which revealed that there was no correlation between male students' test anxiety and their mathematics academic performance. It is implied that test anxiety has no impact on male students' academic performance since there was no significant correlation between male students' test anxiety and their math performance.

Contrary to the findings results of this study, Ementa and Onokpaunu's (2017) findings showed a strong link between male test students' anxiety and secondary school academic performance. Since there was no significant correlation between male students' performance in the mathematics exam and their test anxiety, test anxiety does not impair their mathematics academic performance. The findings of Okoh (2016) supported the study's findings since they demonstrated that there was no significant association between male students' test anxiety and their performance. This shows that gender does not significantly affect the anxiety level and math students' academic performance.

The study's results are consistent with those of Ndirangu, Muola, Kithuka, and Nassiuma (2008), who found no link between male students' academic success and test anxiety. This implies that factors like IQ, school resources, and discipline have a greater impact on academic accomplishment than traits like test anxiety. The results of the present study, which demonstrate that there was no significant correlation between test anxiety among male students in secondary school and their mathematics academic performance, are consistent with the results of Owan's (2020) study on the effects of test anxiety, gender and scrambling on students' mathematics performance, which revealed that there was no significant gender difference on performance and test anxiety. This implies that the correlation between their arithmetic ability and their test anxiety and gender is unrelated. Because of this, it appears that male students who are unconcerned about tests can nonetheless perform well in math.

Chukwu's (2014) research on senior secondary school students' test anxiety and academic performance contradicts the findings, indicating a modestly favorable association between male students' test anxiety and the academic achievement of students in geometry. Okorodudu and Ossai's (2012) findings concur with the present study that there was no significant difference between the genders of the students in the relationship between their test anxiety and academic performance. Hasimu (2016) found a relationship between the level of anxiety displayed and mathematics performance. This recommends that the score gained is inversely correlated with anxiety level: the lower the anxiety level, the higher the score.

Difference between the academic performances of secondary school male students with high and low math test anxiety levels in mathematics.

The null hypothesis, which contends that there is no significant difference between the academic performances of secondary school male students with high and low mathematics test anxiety levels, is rejected because Table 2 demonstrates

that there is a significant difference between male students with high and low test anxiety levels and their mathematics academic performance. It implies that there was a sizable gap between the academic performances of male secondary school students in mathematics who had high and low test anxiety levels. Students with significant test anxiety and those with moderate anxiety indicated deprived academic performance, according to Vogel and Collins (2002) research on the impact of anxiety on academic performance in Esuong, Uwase, and Udo (2022). Their findings, which are consistent with the results of this present study, also revealed that male students who reported little test anxiety performed better on mathematics exams.

The findings corroborate Kitsantas, Winsler, and Huie's (2008) findings that students with higher levels of test anxiety performed less than those with lower levels of anxiety. The findings revealed that male students with low test anxiety perform better in mathematics than those with high test anxiety. In contrast to the results of this present study, a study by Ozgan, Karaklç, Binici, Ustaoglu & Ayhan (2019) that looked at the correlation between university students' test anxiety and academic performance found that high levels of anxiety among male students not connected to academic performance.

The findings of Owonwami, Sakiyo, and Filgona (2017) on the effect of test anxiety on the academic performance of senior secondary school students in mathematics in the Dala educational zone of Kano state, Nigeria, showed a significant disparity in academic performance between male students with high and low levels of anxiety, which was consistent with the study's findings.

Conclusion

The study's results convinced the researcher that test anxiety among male students in secondary school and academic performance were connected. Additionally, it was revealed that male students with high test anxiety levels and low-test anxiety levels performed significantly differently academically in mathematics.

Recommendations

Based on the findings the following recommendations are made: Mathematics instructors should make sure that test conditions are comfortable for secondary school students to reduce cognitive examination anxiety.

The teacher should look at other potential reasons for the students' poor mathematics performance as there was no moderate or positive link between male students' test anxiety and academic performance.

Parents, guardians, and school administration should work together to lessen test anxiety in students, which is usually accompanied by higher anxiety and poor math performance among male secondary school students.

To lower test anxiety and increase students' confidence in mathematics, mathematics teachers should be provided with the materials they require through training. This would enhance the student’s academic performance. Appropriate workshops and seminars should be prepared for the student's benefit to help them manage their exam anxiety.

Teachers, parents, and all stakeholders should make it a point of obligation to treat the students' test anxiety as being incredibly crucial since engaging with the children will assist reduce the test anxiety of the students in mathematics.

The male students' high levels of anxiety before and during exams should be addressed by the math teachers. The male students who have unfavorable attitudes about mathematics should be checked by the math teachers, who should support and encourage them.

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