



Mathematics anxiety and academic achievement among Junior High School students in the Sagnarigu Municipality

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Abstract

Students' anxiety with mathematics and its impact on their academic performance is a widespread problem all over the world. This study sought to examine the mathematics anxiety of Junior high school (JHS) learners and its effects on their mathematics achievement in selected Junior High Schools in Sagnarigu Municipality. The study used a descriptive survey research design using a quantitative approach. The study was conducted on 144 JHS students randomly selected in the chosen schools. The data collection instrument used was a structured questionnaire. Descriptive and inferential statistical techniques were used in the analysis of data. The results showed that students have experienced mathematics anxiety at a high level, especially when experiencing problems in mathematics performance and fear of failing tests. Fear of failure on mathematics tests and lack of understanding of mathematics were the most important factors that contributed to mathematics anxiety. Students' mathematics achievement also negatively correlated with mathematics anxiety. Girls had a significantly higher level of mathematics anxiety than boys, and there was no significant difference in anxiety based on age. Effective interventions to alleviate mathematics anxiety that were identified include providing regular feedback and positive reinforcement from teachers, the use of visual aids and hands-on activities, supportive classrooms, and additional mathematics practice. The study concludes that deliberate steps of teachers, parents, and school leaders to establish a supportive learning environment, to involve students actively in mathematics learning, and to boost students' belief in their own mathematical ability are essential to reduce mathematics anxiety.

Keywords

Mathematics anxiety; academic achievement; Junior High School; students; mathematics performance; mathematics education



1. Introduction

Mathematics is considered a basic subject in school, as it forms the basis for logical reasoning, problem solving and critical thinking. Anxiety towards the subject, however, is common among learners at all levels of education such as the Junior High School (JHS). The phenomenon, which is also termed as Mathematics anxiety, is described as tension, apprehension or fear that negatively affect student's performance in mathematics (Rada & Lucietto, 2022). This is not only a disinterest or dislike, but an emotional blockage which could be a major obstacle to a student's success or overall attitude toward the subject.

Mathematics anxiety among students has been investigated recently in many studies. For example, a study carried out in a number of junior high schools in different regions showed that quite a number of students had moderate to severe anxiety in the process of doing mathematics tasks (Omar et al., 2022). This anxiety can be experienced physically as fast heart rate and sweating and/or psychologically as helplessness and avoidance of the situation. These emotional reactions may be a barrier for students to working with mathematics and impact their learning outcomes.

Research suggests that mathematics anxiety can have a profound impact on students' learning outcomes. High levels of anxiety negatively impact student mathematics assessment performance relative to those who experience lower levels of anxiety (Quintero et al., 2022). High anxiety levels can affect students' performance and can create a vicious circle of frustration and sub-optimal learning outcomes. These patterns have an impact on individual students, as well as on the performance of the schools in the district. The relationship between mathematics anxiety and achievement among JHS students in Sagnarigu Municipality is crucial as it will help to design effective interventions. Trying to increase student success in mathematics without tackling the emotional issues that could be present will be unsuccessful. The purpose of this study is to find how extensive mathematics anxiety is among students and its correlation with academic performance, which would provide insights to educators and policymakers to implement effective strategies to create an anxiety free and supportive environment.

There are multiple empirical studies which investigated mathematics anxiety and how it affects students' achievement in various educational settings. All of these studies have found evidence of how mathematics anxiety can impact students' confidence, participation and performance in mathematics. For instance, mathematics anxiety is examined in relation to students' performance in mathematics by Ma and Sun (2025) and they found that high mathematics anxious students had poorer working memory capacity during mathematical tasks, which affected their academic performance. The researchers noted that the students who were suffering from anxiety have difficulty processing the information when dealing with mathematical problems, as their cognitive resources were being used for anxiety. The results also showed that students who had a high level of mathematics anxiety were more likely to avoid doing tasks or activities related to mathematics. Likewise, in the study by Putwain and Wood (2022) on the impact of mathematics anxiety on the achievement of students in JHS, it was concluded that mathematics anxiety significantly predicted mathematics achievement among students in JHS. A quantitative survey design with students from different schools was used in the study. The results revealed that the students who said that they were afraid in the mathematics lessons and examination had lower results than the students who were in low anxiety level. The researchers have come to the conclusion that mathematics anxiety plays significant role in the poor academic performance and it has an impact on the students' interest in mathematics-related career. Szczygieł and Pieronkiewicz (2022) performed research on the factors that affect the development of mathematics anxiety among adolescents. The researchers determined that mathematics anxiety had several significant causes, such as fear of failure, negative experiences in the classroom, attitudes of teachers, and parental pressure. The study also found that those pupils who had no support from

parents or teachers were more anxious. The researchers suggested using supportive teaching strategies and positive reinforcement to alleviate anxiety among students.

Danan and Ashkenazi (2022) examined gender differences in mathematics anxiety and academic performance in another study. The results indicated that generally, female students' mathematics anxiety was higher than that of male students despite having similar performances. The study clarified that a reason behind the high level of anxiety among female students was their societal expectations and stereotypes about their mathematics ability. The researchers stressed that teachers must establish a classroom atmosphere where everyone is welcome and feels confident to participate.

Mathematics anxiety studies have also been given a lot of attention in Ghana. Abubakar (2023) carried out a study in the Northern Region to among JHS learners with the findings that the subject of mathematics was perceived as difficult by the students because of fear, lack of confidence, and past poor performance. The findings from the study indicated that mathematics anxiety was negatively related to academic achievement. Students with high levels of anxiety were found to have poor performance in mathematics tests. The researcher advised that students should be encouraged continually, taught effectively and given opportunities for further practice to enhance their confidence and achievement in mathematics.

Likewise, Vakili et al. (2024) studied the influence of classroom environment on mathematics anxiety of students in some junior high schools. The results indicated that the classroom size, unkind treatment of teachers and lack of teaching resources were factors that led to students' anxiety. The study found that by creating supportive classroom atmosphere and using learner-centered instructional methods, learning attitudes in mathematics learning may be improved and students' learning anxiety may be reduced. Subiantoro et al. (2025) studied interventions that could be implemented to overcome mathematics anxiety in basic school students. The researchers concluded that using visual aids, peer learning activities, frequent feedback and examples from real life cases were highly effective in alleviating fear and tension of students in mathematics classes. Those who were encouraged and actively engaged in class activities had higher confidence and higher achievement in learning. The study recommended interactive and supportive teaching methods to be used by the mathematics teachers to improve the learning process of the students.

Moreover, Hernández de la Hera et al. (2023) studied the relationship between students' attitude towards mathematics and mathematics anxiety in some selected Senior High Schools in Ghana. The study used descriptive survey design research design with male and female students. The results showed that students with negative attitudes towards mathematics were more prone to have high mathematics anxiety. The study also showed that negative experiences in previous mathematics lessons negatively affected students' confidence and engagement in lessons. The researchers found that a positive attitude towards mathematics would be beneficial in reducing mathematics anxiety and improving academic achievement. Another study that was carried out was by Dwijayanti (2026) which focused on the effect of teacher's instructional method on student's mathematics anxiety revealed that teacher-oriented teaching styles were significant factors to students' mathematics anxiety. Students reported that lessons spent primarily on memorization and/or routine procedures fueled the fear and confusion in mathematics lessons.

Another research conducted by Li et al. (2021) also investigated the role of parents in the case of JHS students' mathematics anxiety. It was observed that students whose parents actively supported their learning activities exhibited lesser level of mathematics anxiety than students whose parents did not support their learning activities. The researchers stated that the influence of the parents in encouraging students' mathematics learning made students feel confident and motivated. The study also found that children whose parents/guardians discussed the assignment with them had positive

attitudes towards mathematics and improved their academic achievement. Internationally, Antoniou et al. (2025) conducted a study to examine how test anxiety affects students' mathematics achievement. The study revealed that students who faced anxiety while taking examination are prone to forget the mathematical procedure and formula even though they are well prepared. The researchers found that students' concentration and memorization are affected by anxiety in mathematics tests. The study suggested offering counselling and anxiety management techniques in schools to help students cope with mathematics-related stress.

In the same vein, Quintero et al. (2022) investigated the connection between classroom engagement and mathematics anxiety among students. The results revealed that high level anxiety students were less likely to ask questions, answer activities and actively engage in mathematics class. Students' reluctance to involve themselves in class discussions was attributed to the fear of getting it wrong, the researchers explained. Eventually, students' engagement with mathematics was affected and their performance was lowered due to the lack of participation.

Bendol and Dalayap (2025) studied the effect of self-confidence on mathematics anxiety of students. The results showed that students with high self-confidence had low anxiety level in mathematics. The researchers described pupils who were confident as having positive attitudes towards mathematical tasks and persevering with challenging tasks. The study suggested that teachers need to be continually motivated and give positive encouragement to students in mathematics learning to build students' confidence in learning mathematics.

Similarly, Subiantoro et al. (2025) conducted a study on peer influence and mathematics anxiety of JHS students. The study revealed that students who had peer interactions in supportive situations in mathematics lessons experienced improved understanding and lower levels of anxiety. Students were able to freely share their ideas and ask for help in discussions with peers and through collaborative learning tasks. The study found that cooperative learning (CL) atmosphere could be very effective for students in reducing mathematics anxiety and enhancing their academic achievement.

Ersozlu (2024) conducted another empirical study on the effect of using technology in instruction on mathematics anxiety. They discovered that the use of educational technology, like interactive software, videos, and mathematics games on the Internet, improved the engagement and fear of mathematics classes among the students. Those exposed to technology-based instruction had higher percentage of participation and confidence in mathematics learning activities. The study suggests the inclusion of the modern technological tools in the mathematics teaching process to render it more interesting and less stressful.

In a study conducted by Kadonsi (2025) on mathematics anxiety among rural and urban students, rural students were found to suffer from higher mathematics anxiety level as they had less access to learning resources, less mathematics teachers' support, and poor classroom conditions. However, the anxiety level was relatively low for urban students due to their greater access to teaching materials and academic support systems. The researchers highlighted the importance of equal distribution of education resources to tackle the achievement gap in mathematics.

The empirical studies reviewed in this paper provide evidence that mathematics anxiety continues to be an important problem in students' learning. The literature also shows that students' negative learning experiences, poor teaching practices, lack of self-confidence, inadequate parental support, and poor learning environments are among the factors that cause mathematics anxiety. The studies also indicate that students' anxiety can be reduced and students' performance in math improved by supportive classroom atmosphere, positive teacher attitudes, interactive teaching, peer support, parental involvement, counseling services, and technology-assisted instruction. Although the amount



of literature that has been published on Mathematics Anxiety has increased, few studies have focused on the impact of mathematics anxiety amongst JHS students in the Sagnarigu Municipality.

The present study thus attempts to fill up the above-mentioned gap by examining mathematics anxiety and academic performance of JHS students in Sagnarigu Municipality. Specifically, the study is directed at finding out the level of mathematics anxiety among JHS students, the factors that contribute to the mathematics anxiety and the relationship between mathematics anxiety and academic achievement. It also examined mathematics anxiety of the students based on gender and age and strategies that could reduce students' mathematics anxiety. Based on these objectives the following research questions have been explored.

Research Questions

1. What is the level of mathematics anxiety among JHS students in the Sagnarigu Municipality?
2. What are the factors that contribute to mathematics anxiety among JHS students?
3. What is the relationship between mathematics anxiety and academic achievement among the students in the Sagnarigu Municipality?
4. Are there differences in mathematics anxiety based on gender and age?
5. What strategies can help reduce mathematics anxiety and improve students' performance in mathematics?

2. Methodology

2.1 Research Design

The study adopted a descriptive survey research design which was deemed appropriate because it allows data to be collected from a large sample to describe existing conditions without manipulating variables. According to Creswell and Creswell (2023), descriptive survey designs are effective for studying relationships among variables in educational research.

2.2 Sample

The study adopted simple random sampling technique to select 144 from a population of 160 junior high school students in four (4) selected JHS schools in the Sagnarigu municipality. The selected schools consisted of 2 Public and 2 private Junior High Schools.

Demographic Characteristics of Respondents

Table 1 shows the demographic characteristics of the respondents based on gender, school type, age, and class level.

Table 1: Demographic Characteristics of Respondents

Variable	Category	Frequency	Percent (%)
Gender	Male	77	53.5
	Female	67	46.5
	Total	144	100.0
School Type	Public JHS	74	51.4
	Private JHS	70	48.6
	Total	144	100.0
Age (Years)	12–13	41	28.5
	14–15	68	47.2
	16–17	35	24.3
	Total	144	100.0
Class Level	JHS 1	46	31.9
	JHS 2	51	35.4
	JHS 3	47	32.7
	Total	144	100.0

From Table 1, it can be noted that out of a total of 144 participants, 77 (53.5%) were male, whereas 67 (46.5%) were female, indicating that a higher proportion of males participated in the study compared to females. The table further shows that 74 (51.4%) of the respondents were selected from public Junior High Schools, while 70 (48.6%) were from private Junior High Schools, indicating fair representation from both school types. Regarding age distribution, the majority of the students, 68 (47.2%), were within the 14–15 years age range, followed by 41 (28.5%) students aged 12–13 years and 35 (24.3%) students aged 16–17 years. In terms of class level, 46 (31.9%) respondents were in JHS 1, 51 (35.4%) were in JHS 2, while 47 (32.7%) were in JHS 3, showing a fairly balanced representation across the three class levels.

2.4 Instrument

A structured questionnaire adapted from Omar et al. (2022) on mathematics anxiety and students' academic achievement was used for this study. The instrument was adapted into five sections: Demographic Characteristics, Level of Mathematics Anxiety, Factors that lead to Mathematics Anxiety, Students' Performance in mathematics and strategies to alleviate Mathematics Anxiety. Overall, there were 30 questions in the questionnaire, each with a four-point Likert scale from Strongly Agree (4) to Strongly Disagree (1). In previous studies, the instrument obtained good internal consistency reliability with values which were over the required level of 0.70. Content and face validity was



determined by an expert review by experts in educational psychology and mathematics education. The questionnaire was further validated through pilot testing by students having similar characteristics with the target population to ensure that the items are clear, relevant and appropriate to the target population. The Cronbach's alpha reliability coefficient in the present study was 0.81, which means that the instrument used for collecting data was reliable.

2.5 Data Collection Method

The researchers used an explanatory letter from the Sagnarigu education office to get the headteachers' permission in the selected schools. The headteachers were then asked to send the researchers to the relevant staff to assist in administering the questionnaires.

The researcher developed rapport with the participants to foster trust and cooperation in responding to the questionnaire. There was a clear explanation of the purpose of the study to the respondents and they were assured of anonymity and confidentiality. The questionnaires were all sent out at once, and 100% were returned.

2.6 Data Analysis

The data were analyzed using descriptive (means, frequencies, and standard deviations) and inferential statistical techniques (Pearson correlation and ANOVA). The descriptive statistics were used to summarize the data on mathematics anxiety while the inferential statistical techniques were used to examine the relationship between mathematics anxiety and academic achievement and to test differences based on selected variables.

3. Results

The results of the study are presented systematically in the following paragraphs based on the research questions of the study aimed at providing answers to the research questions.

Research Question One

What is the level of mathematics anxiety among Junior High School students in the Sagnarigu Municipality?

This objective sought to investigate Junior high school students' anxiety level in Mathematics in the Sagnarigu Municipality. To accomplish this, participants were asked to respond to questions with options ranging from "Strongly Disagree" (SD) to Strongly Agree (SA) with a series of 5 statements related to their anxiety level in Mathematics. The responses were recorded using a five-point Likert scale, with options ranging from "Strongly agree" (5), "agree" (4), "Neutral (3)", "disagree (2)", and "strongly disagree" (1). The criterion value for the scale was set at 3.0, which was calculated by adding the values of all four scales on the Likert scale ($5+4+3+2+1=15$) and dividing it by 5 ($15/5=3.0$) since the Likert scale has five scales (Omar et al., 2022). This criterion value was utilized to determine whether participants' responses fall within the range of strongly agree or strongly disagree with the statements presented. The results are as presented on Table 2.

Table 2: Descriptive results on students' anxiety level in Mathematics (N = 144)

Items	Mean	Std. Deviation
1. I feel nervous when I think about taking a mathematics test.	3.03	1.453
2. often worry about my performance in mathematics classes.	3.62	1.379
3. I feel tense when solving mathematics problems in class.	2.74	1.429
4. I feel worried when preparing for a mathematics test or exam	3.26	1.389
5. I avoid mathematics-related tasks because they make me feel uncomfortable.	2.35	1.446

From table 2, the findings reveals that participants generally agreed with most statements regarding their anxiety level, as almost all the mean scores exceed the cutoff value of 3.0. This indicates a positive inclination toward aligning their performance with mathematics anxiety.

Specifically, participants strongly agreed with statements such as “I often worry about my performance in mathematics classes” (M= 3.62, SD= 1.379), “I feel worried when preparing for a mathematics test or exam” (M= 3.26, SD = 1.389), and “I feel nervous when I think about taking a mathematics test” (M= 3.03, SD= 1.453), indicating that students frequently worry about their mathematics performance. These findings are in line with Gabriel et al., (2020) study which revealed that, students getting worried about their scores in mathematics affect their performances on the subject.

Similarly, the data suggest that students feel tense when solving mathematics problems in class (M= 2.74, SD= 1.429), and avoid mathematics-related tasks because they make them feel uncomfortable (M= 2.34, SD= 1.446). These behavior avoidances are key factors that hinder students' performance in mathematics, and is consistent with findings by Schmitz et al., (2023). In general, the findings suggest that Junior High School students in the Sagnarigu Municipality experience a level of mathematics anxiety, particularly concerning worry about their performance and test preparation.

Research Question Two

What are the key factors that contribute to mathematics anxiety among Junior High School students?

This research question aimed at investigating the factors that contribute to JHS students' Mathematics anxiety in the Sagnarigu Municipality. Descriptive results of these factors are as presented in Table 3.

Table 3: Results on factors that contribute to JHS students Mathematics anxiety (N= 144)

Items	Mean	Std. Deviation
1. Fear of failing mathematics tests causes my anxiety	3.30	1.506
2. Lack of confidence in my mathematical abilities increases my anxiety.	2.84	1.447
3. Negative experiences with mathematics in the past contribute to my anxiety.	2.79	1.399
4. Pressure from teachers or parents makes me anxious about math	2.74	1.485
5. Difficulties understanding math concepts lead to feelings of anxiety	3.19	1.493

From Table 3, the results reveals that participants greatly agreed to some statements regarding the contributing factors of mathematics anxiety, some of the mean scores exceed the cutoff value of 3.0. This indicates a positive inclination toward aligning to the factors contributing to mathematics anxiety.

Fear of failing tests has the highest mean (3.30), indicating that this is a primary concern among students and a significant contributor to their anxiety. Difficulties understanding math concepts also shows a relatively high mean (3.19), suggesting that conceptual challenges are a major source of anxiety. Other factors like lack of confidence, negative past experiences, and pressure from external sources have means slightly below 3.0, indicating moderate influence. The data indicates that internal fears (fear of failure, understanding difficulties) are more prominent in contributing to students' mathematics anxiety than external pressures (teacher or parent pressure).

Research Question Three

What is the relationship between mathematics anxiety and academic achievement among Junior High School students in the Sagnarigu Municipality?

Another aim of this research was to test the relationship between mathematics anxiety and students' mathematics achievement. To achieve this, Pearson Correlation was used for the analysis. To obtain the scores for students' level of mathematics anxiety and mathematics achievement, all the items measuring these constructs on the questionnaire were computed into mean scores. The correlation results are as presented in Table 4.

Table 4: Pearson Correlation results of mathematics anxiety and academic achievement (N= 144)

Variables	Pearson correlation	Sig. (2-tailed)
Student level of mathematics anxiety	-.241	.004
Mathematics achievement	-.241	.004

The Pearson correlation result as presented on Table 3 revealed a significant negative correlation ($r = -.241$, $p = .004$) between students' level of mathematics anxiety and Mathematics achievement This suggests that as one variable increases, the other tends to decrease. Specifically, mathematics anxiety negatively impacted mathematics achievement.

Research Question Four

Are there differences in mathematics anxiety based on gender and age among JHS students?

The aim of this research question was to investigate the differences in mathematics anxiety based on gender and age among the students. Descriptive statistics (means and standard deviations) and the independent sample t-test was used to analyse gender differences in mathematics anxiety. The results are shown in Table 5.

Table 5: Descriptive statistics and t-test result of mathematics anxiety scores for males and females

Dependent Variable	Gender	N	Mean	SD	t	df	P
Mathematics anxiety	Males	77	2.61	0.54	1.739	143	0.038
	Females	67	2.89	0.51			

As displayed in Table 5, the mean (2.89), SD = 0.54, for females was slightly higher than that of Males (2.61), SD = 0.51. To examine whether the mean differences was significant, the independent sample t-test result in the same table revealed a significant difference between males and females in their experience of mathematics anxiety [$t(143) = 1.739$, $p < 0.05$ (two-tailed)]

Differences in mathematics anxiety based on age

To determine differences in the experience of mathematics anxiety based on age category, descriptive statistics and ANOVA were used to analyse the data as displayed in Table 6.

Table 6 Descriptive statistics and ANOVA result of mathematics anxiety by Age category

Variable	Category	N	Mean	SD	df	F	P
Age	12-13	41	2.73	0.55	140	0.958	0.515
	14-15	68	2.77	0.52	140		
	16-17	35	2.70	0.56	140		

As shown in Table 6, the descriptive statistics (means and Standard deviations) indicated minimal variations of levels of mathematics anxiety among various age categories of the students. The ANOVA result conducted to determine whether these differences were significant revealed statistically insignificant differences among the age categories ($F = 0.958$, $P > .05$).

Research Question Five: What strategies can help reduce mathematics anxiety and improve students' performance in mathematics?

The aim of this question was to explore the interventions that can help reduce JHS students Mathematics anxiety in the Sagnarigu Municipality. To accomplish this, participants were asked to answer questions with options ranging from "Strongly Disagree" (SD) to Strongly Agree (SA) with a series of 4 statements related to interventions that can help reduced Mathematics anxiety among Junior high school students. The responses were recorded using a five-point Likert scale, with options ranging from "Strongly agree" (5), "agree" (4), "Neutral (3)", "disagree (2)", and "strongly disagree" (1). The criterion value for the scale was set at 3.0, which was calculated by adding the values of all five scales on the Likert scale ($5+4+3+2+1=15$) and dividing it by 5 ($15/3=3.0$) since the Likert scale has five scales. This criterion value was utilized to determine whether participants' responses feel within the range of strongly agree or strongly disagree with the statements presented. The results are as shown in Table 7.

Table 7: Results on interventions to reduce JHS students Mathematics anxiety (N = 144)

Items	Mean	Std. Deviation
1. Participating in additional math practice helps reduce my anxiety	3.03	1.474
2. Learning math in a supportive environment improves my attitude towards the subject	3.26	1.378
3. Using visual aids and hands-on activities can help lessen my math anxiety.	3.66	1.380
4. Regular feedback and positive reinforcement from teachers help me feel more comfortable with math	4.06	1.178

From table 7, the findings reveals that participants greatly agreed to some statements regarding the interventions to reduce mathematics anxiety, some of the mean scores exceed the cutoff value of 3.0. This indicates a positive inclination toward aligning to the interventions to reduce mathematics anxiety. Regular feedback and positive reinforcement from teachers help me feel more comfortable with math has the highest mean score ($M = 4.06$, $SD = 1.178$), indicating that this is a primary concern among students and a significant intervention to reduce their Mathematics anxiety. Using visual aids and hands-on activities can help lessen my math anxiety also shows a relatively high mean (3.66 , $SD = 1.380$), suggesting that using visual aids during teaching will help reduced students Mathematics anxiety level. Other factors like Learning math in a supportive environment improves my attitude



towards the subject (3.26, SD = 1.378), and participating in additional math practice helps reduce my anxiety (3.03), also serves as interventions necessary for the reduction of Mathematics anxiety among junior high school students in the Sagnarigu Municipality.

4. Discussion

The study examined the level of mathematics anxiety among JHS students in selected schools in Sagnarigu, the relationship between their mathematics anxiety and academic achievement, factors associated with mathematics anxiety, differences in mathematics anxiety based on some demographic variables and interventions aimed at reducing mathematics anxiety. The findings were generally consistent with that of most previous studies and are discussed as follows based on the various research questions.

Research Question One

What is the level of mathematics anxiety among Junior High School students in the Sagnarigu Municipality?

The results obtained in this research shows a very high level of mathematics anxiety among the students in the selected Junior High Schools in Sagnarigu Municipality especially in their performance in class and taking mathematics tests. A number of students said that they were afraid of not doing well in mathematics assessments, indicating that assessments are a significant source of stress and anxiety for many students. This result aligns with the findings of Gabriel et al. (2020) who found that long-term concern regarding low attainment in mathematics decreases students' confidence and attainment. Jenifer et al. (2023) also noted that students who experience high mathematics anxiety are prone to avoid tasks that are difficult and may fail to perform well when compared with less mathematics anxious students. Likewise, Klee et al. (2022) stated that students who aren't comfortable with mathematics tend to steer clear of mathematics-related tasks, which diminishes learners' confidence and learning prospects. This was also seen in the current study, as some students acknowledged that they avoided mathematics tasks because they were uncomfortable and afraid. Comerros et al. (2026) also found that a number of JHS students are under tension and fear during mathematics classes, thus hindering active participation in the class. The findings of this study are also similar to those of Akram and Abdelrady (2023) who reported that worry and nervousness can be caused by fear of tests and failure. Further, Ashcraft et al., 2022 report that students with high mathematics anxiety tend to view mathematics as very challenging and thus underperform and avoid mathematics.

The results overall support the hypothesis that students' mathematics anxiety is a significant issue that impacts their engagement and performance in mathematics. Some factors that might affect students' confidence in mathematics and anxiety include fear of failure, negative past experiences, and teaching methods that focus on memorizing rather than understanding.

Research Question Two

What is the relationship between mathematics anxiety and academic achievement among Junior High School students in the Sagnarigu Municipality?

The correlation analysis indicated that there was a slight negative correlation between mathematics anxiety and students' achievement in mathematics. That is, the higher the level of anxiety, the more students' mathematics performance drops slightly. Despite the low correlation between the two, the

significance indicates that mathematics anxiety continues to have a significant impact on learning. The result corroborates previous research that has found emotional factors to impact students' achievement in mathematics. Students who experience high mathematics anxiety may have difficulties focusing during math instruction and exams, impacting their working memory and problem-solving skills, as explained by Zhu et al. (2024). Likewise, Barroso et al. (2025) in their meta-analysis found that mathematics anxiety has been linked to mathematics achievement in every study, particularly in students who are not provided with the necessary support.

Moyo (2023) also determined that pupils who become scared and nervous in mathematics class tend to not participate actively in class, do not ask questions and perform poorly in tests. Their research found that students' exam anxiety is associated with reduced academic performance. Hajiyeva (2024) also noted that, the students who get anxious from the negative experiences of the classroom or fear of failure during the initial exams tend to transfer their fears to the subsequent exams which hamper their motivation and self-confidence in exams. Moreover, Firdaus et al (2025) found that when students repeatedly experience learning problems, their fear of learning mathematics and self-confidence will gradually be reduced, which will result in poor performance. As a whole, the results support the idea that math anxiety is a major obstacle to students' involvement and success in mathematics, especially when they are frightened by mathematics, faced with difficult math classes, and are expected to excel in math.

Research Question Three

What are the factors that contribute to mathematics anxiety among Junior High School students?

This study reveals that some factors are responsible for mathematics anxiety in the learners of JHS in the Sagnarigu Municipality. Fear of failing mathematics tests and problems in grasping mathematical concepts were identified as the major contributing factors. A lot of students mentioned that they were nervous in the event in which they are associated with mathematics, because of anxiety regarding their performance. Likewise, students' worry and discouragement will grow when they have trouble understanding a mathematical concept, and this will make them hesitant to do activities related to mathematics. This is consistent with the findings of Sorvo et al. (2022) who stated that students are prone to anxiety in situations where mathematics tasks are too challenging or abstract. Early failure in the understanding of mathematical concepts also corresponds to longer term avoidance and low achievement, as noted by Dictado and Dagdag (2025).

Other contributing variables included low self-confidence, prior negative experiences, and the pressure from teachers and parents, to a lesser degree, were also related to mathematics anxiety. Bandura's Social Cognitive Theory (Bandura, 1997) posits that students who lack self-efficacy tend to be more likely to feel anxious at the prospect of doing tasks that are challenging. Similarly, Masserang (2021) noted that negative attitudes towards mathematics can be formed when students go through a series of conflict and negative experiences in math class. The pressure from teachers and parents was also seen as an external pressure that intensifies fear of failure and let them down. Tapado (2025) stated that students may become more anxious over time if they feel strong pressure from the teachers. In addition, Seo and Lee (2021) argued that high competition in academic learning situations might contribute to increased anxiety, particularly if students are not provided with the opportunity to build their understanding over time. In general, the results indicate that mathematics anxiety is more affected by internal factors (fear of failure and conceptual difficulties) than by external factors. The study thus underscores the importance of teaching practices that foster a positive learning climate, positive classroom atmosphere, and supportive teaching practices that offer chances for understanding rather than fear of failure.



Research Question Four: Are there differences in mathematics anxiety based on gender and age among Junior High School students?

The result of the present study revealed significant differences in mathematics anxiety among male and female JHS students in Sagnarigu Municipality. **However, there was no significant difference with respect to age.** The results showed that the mathematics anxiety and confidence of boys and girls were different with girls generally having a higher level of mathematics anxiety and lower mathematics confidence. When their performance in mathematical tasks is comparable to or superior to that of boys, girls can be more nervous and less confident in mathematics, as found by Svraka and Ádám (2024). The difference between genders might be due to classroom expectations, involvement, and beliefs regarding mathematical ability, as cited by Smith et al, (2024). The study by Amirinejad et al. (2025) also noted that girls' self-confidence may be decreased and their anxiety may be increased when they face gender stereotypes.

On the other hand, age was not a significant factor for mathematics anxiety, implying that similar fears and challenges are related with mathematics in different age groups. Petronzi et al. (2021) stated that mathematics anxiety forms at a very young age and does not go away without intervention. Overall, the findings highlight the importance of providing supportive classroom settings in which all students have confidence and are not worrying about the situation.

Research Question Five

How can mathematics anxiety be minimized and students' achievement in mathematics be enhanced?

The findings of this study reveal several interventions that can help reduce mathematics anxiety of JHS students. Students felt that it was important for teachers to give feedback and encouragement on a regular basis as it boosts confidence and positive attitude towards mathematics. The use of visual aids and hands-on exercises were also deemed as important in making the mathematical concepts easier to understand and less intimidating. Alazemi and Larkins (2024) agree that active and practical learning helps to minimize stress and enhance understanding.

The study also revealed that classroom atmosphere that supports learning decreases anxiety because the student can ask questions and make errors without fear. Students will be more likely to be active in mathematics lessons if they feel respected and supported by their teachers (Xenofontos 2026). More mathematics practice was also reported as beneficial to alleviate anxiety. Faujiah et al. (2026) said frequent practice makes the problem of mathematics familiar and makes them less afraid when doing an examination. Walker (2022) also highlighted the importance of peer tutoring, small group conversations, and scaffolded instruction in boosting students' mathematical confidence

5. Conclusion and recommendations

5.1 Conclusion

The results revealed that mathematics anxiety is a problem for many students, primarily because they have a fear of failing and lack conceptual understanding of mathematics. The study also revealed that increased anxiety is associated with lower mathematics performance. Gender was an important factor with respect to anxiety levels, but age was not. Students recognized teaching styles, frequent feedback and hands-on learning opportunities as effective methods in decreasing anxiety. The study suggests that teachers, parents and school administrators should establish positive learning contexts for



students, foster their confidence and feel of participation and deepen their understanding of mathematics, so as to reduce mathematics anxiety.

5.2 Recommendations

The study suggests teachers use supportive teaching strategies to diminish stress, boost pupils' confidence, and promote their engagement with mathematics lessons. Teachers should give feedback frequently, implement visual supports and hands-on activities and embrace errors as a part of learning. Incorporating anxiety reduction strategies, collaborative learning, and ongoing assessment in mathematics curricula should be included in educational policies and curriculum design. School-wide interventions such as peer tutoring, counseling services, anxiety management should be implemented to support students. Furthermore, parents should be meaningfully engaged in PTA and community forums to support children's learning, and should be engaged in learning with their children. It is also important to have the community leaders support the development of awareness about mathematics anxiety and positive attitude on learning. Last but not least, the ministry of education will need to incorporate mental health and test anxiety reduction techniques into teacher training and educational policies to better help students with mathematics anxiety.

For future research, it is recommended that the present study be replicated in several schools using larger samples.

Acknowledgement

The researchers express their gratitude to the Headteachers, Mathematics teachers and students of the selected Junior High Schools in the Sagnarigu Municipality for their cooperation, granting permission to conduct this study and participating in it.

References

1. Abubakari, A. (2023). *Students' perceptions and their interest in mathematics the case of Senior High Schools in Yendi municipality of Northern Region* (Doctoral dissertation, University of Education, Winneba). <https://ir.uew.edu.gh/handle/123456789/3964>
2. Akram, H., & Abdelrady, A. H. (2023). Application of ClassPoint tool in reducing EFL learners' test anxiety: empirical evidence from Saudi Arabia. *Journal of Computers in Education*, 10(3), 529-547. <https://doi.org/10.1007/s40692-023-00265-z>
3. Alazemi, B., & Larkins, R. (2024). Breaking the Math Barrier: Female Students' Perceptions of Math and Their Involvement in a Math Practice Workshop. *Mathematics Teaching Research Journal*, 16(5), 92-115. <https://files.eric.ed.gov/fulltext/EJ1464453.pdf>
4. Antoniou, A. S., Charitaki, G., Pavlidou, K., & Alevriadou, A. (2025). Examining the Relationships Among Burnout, Mathematics Self-Efficacy, Anxiety, and Mathematical Competence in Primary and Secondary Students with Dyscalculia. *Education Sciences*, 16(1), 48. <https://doi.org/10.3390/educsci16010048>
5. Ashcraft, M. H., Kirk, E. P., & Hopko, D. (2022). On the cognitive consequences of mathematics anxiety. In *The development of mathematical skills* (pp. 174-196). Psychology Press. <https://doi.org/10.4324/9781315784755>
6. Barroso, C., Ganley, C. M., & Casanova, A. (2025). Investigating the Link Between Negative Interpretation Bias and Anxiety in a Mathematics Context. *SAGE Open*, 15(3), 21582440251361765. <https://doi.org/10.1177/2158244025136176>



7. Bendol, R. L., & Dalayap Jr, R. H. (2025). Students' confidence in mathematics: A comprehensive literature review. *Indonesian Journal of Multidisciplinary Research*, 5(1), 187-196. <https://doi.org/10.17509/ijomr.v5i1.82065>
8. Comerros, L. L., Banaan, I. J., Mahilum, R. J., Kahal, J., Eslanan, A., Bais, R., ... & Maghanoy, S. M. (2026). The Learning Barriers in Mathematics: Students' Academic Performance and Experiences. *International Journal of Research on Multidisciplinary Studies*, 1(2), 114-124. <https://doi.org/10.5281/zenodo.19000686>
9. Creswell, J. W., & Creswell, J. D. (2023). Research design: Qualitative, quantitative, and mixed methods approaches (6th ed.). SAGE. https://www.researchgate.net/profile/Daliborka-Luketic/publication/320521456_Nacrt_istrazivanja_kvalitativni_kvantitativni_i_mjesoviti_pris_tupi/links/5a8ad103aca272017e62aa7a/Nacrt-istrazivanja-kvalitativni-kvantitativni-i-mjesoviti-pristupi.pdf
10. Danan, Y., & Ashkenazi, S. (2022). The influence of sex on the relations among spatial ability, math anxiety and math performance. *Trends in neuroscience and education*, 29, 100196. [10.1016/j.tine.2022.100196](https://doi.org/10.1016/j.tine.2022.100196)
11. Dictado, M., & Dagdag, J. (2025). Barriers to Achieving Mathematics Proficiency: Synthesis of Research. *Journal of Interdisciplinary Perspectives*, 3(9), 242-250. <https://doi.org/10.69569/jip.2025.254>
12. Dwijayanti, A. (2026). Mathematics Anxiety as a Learning Problem in Junior High School: A Systematic Review from Psychological and Pedagogical Perspectives. *Desimal*, 9(2), 178-202. <https://doi.org/10.24042/djm.v9i2.31676>
13. Ersozlu, Z. (2024). The role of technology in reducing mathematics anxiety in primary school students. *Contemporary Educational Technology*, 16(3). <https://doi.org/10.30935/cedtech/14717>
14. Faujiah, E., Salim, F., & Bunyamin, M. A. H. (2026). Enhancing Mathematical Disposition Through Schema-Based Instruction. *Journal of Learning Innovation and Environment*, 1(1). <https://journal.serral.org/jolie/article/view/4/3>
15. Firdaus, T. C. M., Sanusi, S., & Maharani, S. (2025). Challenges in Numeracy: The Role of Mathematics Anxiety in Shaping Eleventh-Grade Students' Problem-Solving Abilities. *AL-ISHLAH: Jurnal Pendidikan*, 17(4), 5992-6002. <https://doi.org/10.35445/alishlah.v17i4.5550>
16. Hajiyeva, B. (2024). Language anxiety in ESL learners: Causes, effects, and mitigation strategies. *EuroGlobal Journal of Linguistics and Language Education*, 1(1), 119-133. <https://doi.org/10.69760/pn9wgv05>
17. Hernández de la Hera, J. M., Morales-Rodríguez, F. M., Rodríguez-Gobiet, J. P., & Martínez-Ramón, J. P. (2023). Attitudes toward mathematics/statistics, anxiety, self-efficacy and academic performance: An artificial neural network. *Frontiers in psychology*, 14, 1214892. <https://doi.org/10.3389/fpsyg.2023.1214892>
18. Jenifer, J. B., Levine, S. C., & Beilock, S. L. (2023). Studying while anxious: mathematics anxiety and the avoidance of solving practice problems during exam preparation in college calculus. *ZDM—Mathematics Education*, 55(2), 359-369. <https://doi.org/10.1007/s11858-022-01456-1>
19. Kadir, M. S., Caeon, I. S., Koh, W. X., & Yeung, A. S. (2025). Understanding STEM gender differences through the lens of cognitive load and academic self-concept frameworks: MS Kadir et al. *European Journal of Psychology of Education*, 40(4), 126. <https://doi.org/10.1007/s10212-025-01024-7>
20. Kadonsi, K. (2025). Developing mathematical resilience: Effective strategies to alleviate mathematics anxiety among secondary school students in Kalomo District, Zambia. *Unpublished manuscript*. <https://dx.doi.org/10.47772/IJRISS.2025.906000131>
21. Klee, H. L., Buehl, M. M., & Miller, A. D. (2022). Strategies for alleviating students' math anxiety: Control-value theory in practice. *Theory Into Practice*, 61(1), 49-61. <https://doi.org/10.1080/00405841.2021.1932157>



22. Lee, Y. K., Seo, E., Lee, S. Y., Shin, Y., & Min, J. (2026). Reciprocal Associations Between Achievement Goals and Cooperative/Competitive Attitudes Over Time: Links to Stress and Achievement. *Journal of Youth and Adolescence*, 1-22. <https://doi.org/10.1007/s10964-026-02361-6>
23. Li, H., Zhang, A., Zhang, M., Huang, B., Zhao, X., Gao, J., & Si, J. (2021). Concurrent and longitudinal associations between parental educational involvement, teacher support, and math anxiety: The role of math learning involvement in elementary school children. *Contemporary Educational Psychology*, 66, 101984. <https://doi.org/10.1016/j.cedpsych.2021.101984>
24. Ma, H., & Sun, C. (2025). The relationship between the mathematics anxiety and mathematics achievement of middle school students: the moderating effect of working memory. *Behavioral Sciences*, 15(11), 1566. <https://doi.org/10.3390/bs15111566>
25. Moyo, C. (2023). Secondary school students' mathematics anxiety: A Zimbabwean perspective. *South American journal of academic research*. 10.21522/TIJAR.2014.10.02.Art006
26. O'Hara, R. M. (2023). *Examining the Influence of the Classroom Environment on Motivation, Belonging, and Academic Confidence in Engineering Education: A Relational Developmental Systems Approach* (Doctoral dissertation, Clemson University). https://tigerprints.clemson.edu/all_dissertations/3399
27. Omar, S. H., Syed Aris, S. R., & Teoh, S. H. (2022). Mathematics anxiety and its relationship with mathematics achievement among secondary school students. *Asian Journal of University Education (AJUE)*, 18(4), 863-878. [10.24191/ajue.v18i4.19992](https://doi.org/10.24191/ajue.v18i4.19992)
28. Putwain, D. W., & Wood, P. (2022). Anxiety in the mathematics classroom: reciprocal relations with control and value, and relations with subsequent achievement. *ZDM-Mathematics Education*. <https://doi.org/10.1007/s11858-022-01390-2>
29. Quintero, M., Hasty, L., Li, T., Song, S., & Wang, Z. (2022). A multidimensional examination of math anxiety and engagement on math achievement. *British Journal of Educational Psychology*, 92(3), 955-973. <https://doi.org/10.1111/bjep.12482>
30. Rada, E., & Lucietto, A. M. (2022). Math anxiety—A Literature review on confounding factors. *Journal of Research in Science, Mathematics and Technology Education*, 5(2), 117-129. <https://doi.org/10.31756/jrsmte.12040>
31. Smith, A., & Evans, T. (2024). Gender gap in STEM pathways: The role of gender-segregated schooling in mathematics and science performance. *New Zealand Journal of Educational Studies*, 59(1), 269-287. <https://doi.org/10.1007/s40841-024-00320-y>
32. Sorvo, R., Kiuru, N., Koponen, T., Aro, T., Viholainen, H., Ahonen, T., & Aro, M. (2022). Longitudinal and situational associations between math anxiety and performance among early adolescents. *Annals of the New York Academy of Sciences*, 1514(1), 174-186. <https://doi.org/10.1111/nyas.14788>
33. Subiantoro, N., Lailiyah, J. I., Saputra, M. A. M., & Nurwahid, M. (2025). Implementation of vygotsky's developmental psychology theory to overcome mathematics learning anxiety. *LINEAR: Journal of Mathematics Education*, 6(1), 14-30. <https://doi.org/10.32332/0h11yh51>
34. Svraka, B., & Ádám, S. (2024). Examining mathematics learning abilities as a function of socioeconomic status, achievement and anxiety. *Education Sciences*, 14(6), 668. <https://doi.org/10.3390/educsci14060668>
35. Szczygiał, M., & Pieronkiewicz, B. (2022). Exploring the nature of math anxiety in young children: Intensity, prevalence, reasons. *Mathematical Thinking and Learning*, 24(3), 248-266. <https://doi.org/10.1080/10986065.2021.1882363>



36. Tapado, J. (2025). Exploring Filipino learners' experiences with speaking anxiety in english. *Journal of Interdisciplinary Perspectives*, 3(3), 82-94. <https://doi.org/10.69569/jip.2024.0699>
37. Vakili, R., Vakili, S., Ajilian Abbasi, M., Masoudi, S., & Saeidi, M. (2024). Overcrowded classrooms: Challenges, consequences, and collaborative solutions for educators: A literature review. *Medical Education Bulletin*, 5(2), 961-972. 10.22034/meb.2024.492269.1103
38. Xenofontos, C. (2026). Mathematical heterotopias: lessons from other-ed spaces for the mainstream classroom. *Pedagogy, Culture & Society*, 34(2), 367-386. <https://doi.org/10.1080/14681366.2025.2508715>
39. Zhu, Y., Liu, X., Xiao, Y., & Sindakis, S. (2024). Mathematics anxiety and problem-solving proficiency among high school students: Unraveling the complex interplay in the knowledge economy. *Journal of the Knowledge Economy*, 15(4), 20516-20546. <https://doi.org/10.1007/s13132-023-01688-w>