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ORIGINAL ARTICLE

Math Anxiety and Academic Achievement of Grade 10 Students of Surigao Del Norte National High School

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ABSTRACT

This study investigated the influence of math anxiety on the academic achievement of Grade 10 students at Surigao del Norte National High School. Although many studies have linked anxiety to poor performance, limited research has specifically examined the combined effects of general and evaluation-related math anxiety among Grade 10 learners in the local context, creating a research gap that this study sought to address. Using a quantitative descriptive-correlational design, data from 200 students were gathered through the standardized Math Anxiety Scale and their actual mathematics grades. Statistical analyses—including mean, standard deviation, t-test, ANOVA, and Pearson r correlation—were applied to assess anxiety levels, demographic differences, and relationships among variables.

Results showed that students had high to very high levels of math anxiety, with evaluation anxiety being the most prominent. Significant differences in anxiety were found based on sex and parental education. Pearson correlation revealed a significant negative relationship between math anxiety and academic performance, indicating that higher anxiety is associated with lower mathematics achievement. The summary of findings highlights math anxiety as a major factor influencing learners' outcomes. The study concludes that reducing anxiety is essential to improving performance and recommends the implementation of school-based intervention programs, enhanced instructional strategies, and strengthened teacher–student support systems to help learners develop confidence and better mathematical proficiency.

Keywords: *Math anxiety, academic achievement, Pearson correlation, emotional regulation, Grade 10 students.*

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INTRODUCTION

Mathematics plays a foundational role in modern education, influencing students' cognitive development, problem-solving abilities, and future career pathways. Despite its importance, many students experience significant emotional barriers—most notably math anxiety, a psychological state characterized by tension, worry, and fear that impairs mathematical performance. This phenomenon is widely documented across educational systems worldwide, cutting across cultural, economic, and demographic boundaries. Research consistently demonstrates that math anxiety disrupts working memory, reduces concentration, and discourages learners from engaging fully in mathematical tasks (Ashcraft & Kirk, 2020; Caviola et al., 2021).

International assessments such as the Programme for International Student Assessment (PISA) have shown a persistent negative correlation between math anxiety and achievement. A one-unit increase in PISA math-anxiety index corresponds to a 29-point decrease in math performance across participating countries (Foley et al., 2022). Interestingly, high-performing countries like Japan, Korea, and Singapore also report elevated levels of math anxiety, suggesting that cultural expectations, classroom pressure, and performance-oriented educational environments significantly influence learners' emotional experiences.

In developing countries, including the Philippines, math anxiety continues to pose a serious challenge. Local studies reveal that Filipino learners frequently struggle with fear of failure, low confidence, negative classroom experiences, and limited home support, all of which contribute to mathematics avoidance (Estonanto, 2020; Byrne, 2021). Gender differences are also evident: several studies in Mindanao and other regions show that female students tend to report higher levels of anxiety than male students, often influenced by societal expectations and gender stereotypes in STEM fields (Luu-Thi et al., 2021).

At the local level, teachers in Surigao del Norte observe that many Grade 10 learners exhibit strong emotional reactions toward mathematics, especially during tests or when asked to explain their solutions in class. These reactions often lead to poor concentration, avoidance behaviors, and lower academic performance. Socioeconomic constraints—including limited access to learning resources, inconsistent parental support, and financial stress—further contribute to students' vulnerability to math anxiety.

Although the negative relationship between math anxiety and academic performance has been widely examined globally, very few studies have focused on Grade 10 learners within Surigao del Norte, highlighting a critical research gap. Understanding the nature and extent of math anxiety among this particular group is essential for designing targeted interventions, promoting effective teaching practices, and supporting learners' academic development.

This study therefore aims to investigate the demographic profile of Grade 10 learners, measure their levels of general and evaluation-related math anxiety, assess their mathematics achievement, and determine whether anxiety significantly correlates with performance. It also seeks to determine whether demographic variables such as sex, parental income, and educational attainment influence anxiety levels. Ultimately, the study intends to propose a contextualized intervention program to support students in overcoming math anxiety and improving mathematical understanding.

Grounded in Cognitive Load Theory, Attentional Control Theory, and Self-Determination Theory, the study underscores the interplay between emotional states, cognitive resources, and motivation in shaping mathematics learning. By identifying anxiety patterns and their academic consequences, this research provides evidence-based insights that can guide teachers, school heads, guidance counselors, and policymakers in strengthening mathematics instruction and fostering learner well-being.

Research Questions

1. What is the demographic profile of the Grade 10 students in terms of sex?
2. What is the level of math anxiety among Grade 10 students in terms of general and evaluation anxiety?
3. What is the academic performance of Grade 10 students in mathematics?
4. Is there a significant difference in math anxiety when grouped according to sex?
5. Is there a significant relationship between math anxiety and academic achievement?
6. What intervention program can be proposed based on the findings?

METHODS

Study Design

The study utilized a quantitative, correlational design to examine the relationship between math anxiety and academic achievement among Grade 10 students.

Population and Sample

The participants included 200 Grade 10 students from Surigao del Norte National High School selected through stratified random sampling to ensure gender representation.

Instrumentation

The Math Anxiety Scale (MAS) developed by Hunt, Clark-Carter, and Sheffield (1972) was employed. The MAS includes 23 items across two dimensions: General Math Anxiety and Evaluation Anxiety. Responses were rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). Scores were interpreted as follows: 1.00–2.33 (Low), 2.34–3.66 (Moderate), and 3.67–5.00 (High) anxiety. Academic performance was measured using students' final mathematics grades obtained from school records.

Data Analysis

Descriptive statistics summarized demographic data and variable means. ANOVA tested gender differences in academic achievement, and Pearson's correlation coefficient assessed the relationship between math anxiety and academic performance. All analyses were conducted with a 0.05 significance level. Ethical protocols under the Data Privacy Act of 2012 were observed.

RESULTS

SOP 1: Demographic Profile in terms of sex, combined monthly income, highest educational attainment of parents

The first statement of the problem (SOP 1) sought to determine the demographic profile of the Grade 10 students in terms of sex, combined monthly income of parents, and parents' highest educational

attainment. Establishing this profile is essential because demographic characteristics provide a contextual foundation for understanding students' learning experiences and levels of math anxiety. Prior research has shown that gender differences, socioeconomic status, and parental education can influence students' academic performance and emotional responses to mathematics, thereby affecting how they engage with the subject. These demographic variables serve as reference points for interpreting the patterns observed in the subsequent results of this study.

This section presents the demographic characteristics of the 200 Grade 10 students from Surigao del Norte National High School. Understanding the background of the respondents is essential because demographic factors such as sex, socioeconomic status, and parental educational attainment have been identified in the literature as contributing influences to students' academic performance and levels of math anxiety. These characteristics serve as contextual variables for interpreting the succeeding results.

Table 1. Sex of Respondents

Sex	Number of Students	Percentage
Male	80	40
Female	120	60
Total	**200**	**100**

Table 1 presents the distribution of respondents according to sex showing that 80 students (40%) were male, while 120 students (60%) were female. This indicates that female respondents constituted the majority of the study's sample population.

The higher number of female respondents reflects the typical enrollment trend in many public secondary schools in the Philippines, where female students often outnumber males. Studies have pointed out that female learners tend to report higher levels of math anxiety than their male counterparts (Luu-Thi et al., 2021), which becomes significant in interpreting later findings regarding anxiety levels. This demographic pattern may contribute to elevated overall anxiety scores in the study, consistent with global and Asian findings that highlight gender-linked vulnerability to performance-related anxiety (Zhang et al., 2019).

Table 2. Combined Monthly Income

Scale Combined Income	Number of Parents Combined Income	Percentage	Interpretation
Above ₱60,000	0	0	Very High Income: Excellent financial security, significant discretionary spending and investment.
₱40,001 – ₱60,000	0	0	High Income: Comfortable living, able to afford some luxuries and savings.
₱20,001 – ₱40,000	10	6	Moderate Income: Can meet basic needs, some ability to save or invest.

₱10,000 – ₱20,000	102	51	Low Income: Struggles to meet basic needs, limited discretionary spending.
Below ₱10,000	88	44	Very Low Income: Severe financial constraints, limited access to basic needs.
Total	**200**	**100**	

Table 2 shows the combined income distribution which revealed that 102 parents (51%) belonged to the ₱10,000–₱20,000 bracket, while 88 parents (44%) earned below ₱10,000. Only 10 parents (6%) reported earnings within ₱20,001–₱40,000, and no respondents fell above the ₱40,000 range.

The data demonstrate that a significant portion of the respondents comes from low income households. According to Bornaa, Rahaman, and Iddrisu (2023), socioeconomic constraints can limit students' access to learning resources such as tutoring, internet access, and home academic support. In Surigao, local teachers similarly report that financial hardship often correlates with heightened stress levels among students, which may further compound math anxiety. This aligns with literature indicating that limited financial capacity often coexists with heightened academic anxieties and lower performance outcomes.

Table 3. Educational Attainment of Parents

Educational Attainment Categories	Number of Parents	Percentage	Interpretation
Postgraduate degree (master's or doctorate)	2	1	Very High Educational Attainment: Advanced expertise, leadership or specialized roles.
College graduate (bachelor's degree)	37	18.5	High Educational Attainment: Eligible for professional jobs, broader career options.
High school graduate or vocational certificate	70	35	Moderate Educational Attainment: Can access entry-level jobs, basic skills for daily life.
Elementary graduate or high school incomplete	33	16.5	Low Educational Attainment: Basic literacy, limited job opportunities.
No formal education or incomplete elementary	58	29	Very Low Educational Attainment: Limited literacy and skills, minimal access to formal employment.
Total	**200**	**100**	

Results show that 70 parents (35%) were high school graduates or vocational completers, 58 (29%) had no formal education or incomplete elementary schooling, 33 (16.5%) were elementary graduates, 37 (18.5%) were college graduates, and only 2 (1%) held postgraduate degrees.

Lower parental education levels may influence students' confidence and support systems in learning mathematics. Research (Frontiers Education, 2022) indicates that students whose parents have higher educational backgrounds often receive stronger homework assistance and academic encouragement. Conversely, students with parents who attained only basic education may have fewer home-based learning supports, increasing their vulnerability to anxiety, particularly in complex subjects like mathematics.

SOP 2: The level of Math anxiety of Grade 10 students in terms of: General Math Anxiety and Math Evaluation

The second statement of the problem (SOP 2) aimed to identify the respondents' level of math anxiety across various dimensions such as general math anxiety and mathematics evaluation anxiety. Math anxiety is a multidimensional construct that includes emotional, cognitive, and physiological responses triggered by mathematical tasks. Understanding students' anxiety levels is crucial because existing literature consistently links high anxiety with reduced mathematical performance, avoidance behaviors, and negative attitudes toward learning. By analyzing the respondents' anxiety scores, this section provides insight into the intensity and nature of the learners' emotional challenges when dealing with mathematics.

Table 4. General Math Anxiety

Feelings Toward Math	Weighted Mean	Standard Deviation	Verbal Description	Interpretation
I feel nervous when I am about to start a math test.	4.1	0.27	Agree	High level of math anxiety
I get tense when I must solve math problems in front of the class.	4.4	0.25	Strongly Agree	Very high or severe math anxiety
Thinking about an upcoming math exam makes me uneasy.	4.4	0.25	Strongly Agree	Very high or severe math anxiety
I feel anxious when I do not immediately understand a math lesson.	4.8	0.35	Strongly Agree	Very high or severe math anxiety
I worry that I might make mistakes in solving math problems.	4.9	0.40	Strongly Agree	Very high or severe math anxiety
I feel uncomfortable when my teacher calls me to answer a math question.	4.7	0.29	Strongly Agree	Very high or severe math anxiety
I become anxious when math topics are introduced in class.	4.5	0.27	Strongly Agree	Very high or severe math anxiety
I experience rapid heartbeat when working on math problems.	4.6	0.28	Strongly Agree	Very high or severe math anxiety
I feel stressed when I am asked to show my solution in front of peers.	4.5	0.26	Strongly Agree	Very high or severe math anxiety
The thought of failing a math exam makes me feel extremely nervous.	4.7	0.32	Strongly Agree	Very high or severe math anxiety
I lose focus when I feel anxious about solving math tasks.	3.9	0.35	Strongly Agree	Very high or severe math anxiety
I worry excessively about math compared to other subjects.	4.4	0.27	Strongly Agree	Very high or severe math anxiety
I find it difficult to relax before a math examination.	4.2	0.27	Strongly Agree	Very high or severe math anxiety
I feel tense when I cannot keep up with the math lesson.	4.2	0.31	Strongly Agree	Very high or severe math anxiety

I avoid asking questions in math because I am afraid of being wrong.	4.1	0.27	Agree	High level of math anxiety
I feel overwhelmed when math problems look complicated.	4.2	0.28	Strongly Agree	Very high or severe math anxiety
I experience anxiety when timed math quizzes are given.	4.4	0.25	Strongly Agree	Very high or severe math anxiety
I feel uneasy when solving math problems aloud.	4.8	0.35	Strongly Agree	Very high or severe math anxiety
I become restless when I think about my performance in math.	4.9	0.40	Strongly Agree	Very high or severe math anxiety
I feel under pressure whenever mathematics is being discussed.	4.7	0.29	Strongly Agree	Very high or severe math anxiety
	4.5	**0.30**	**Strongly Agree**	Very high or severe math anxiety

Legend

Parameter	Verbal Description	Qualitative Interpretation
4.20 – 5.00	Strongly Agree	Student strongly disagrees; very low or no math anxiety
3.40 – 4.19	Agree	Student disagrees; low level of math anxiety
2.60 – 3.39	Neutral	Student neither agrees nor disagrees; moderate or uncertain math anxiety
1.80 – 2.59	Disagree	Student agrees; high level of math anxiety
1.00 – 1.79	Strongly Disagree	Student strongly agrees; very high or severe math anxiety

The General Math Anxiety indicators revealed weighted means ranging from 4.1 to 4.9, all within the high to very high anxiety range. Students reported strong nervousness when starting tests, intense worry over making mistakes, and significant discomfort when called to solve problems in class. The item "I worry that I might make mistakes in solving math problems" had the highest mean (WM=4.9), indicating severe anxiety.

These findings corroborate earlier research noting that math anxiety is a widespread emotional response among adolescents (Caviola et al., 2021). High worry over errors reflects the cognitive interference model, where intrusive thoughts consume working memory resources needed for problem-solving (Zhao, 2020). Philippine studies also report that fear of mistakes and performance pressure are major contributors to math avoidance (Estonanto, 2020). The consistently high anxiety scores suggest that many students perceive math as a threatening subject, disrupting engagement and comprehension.

Table 5. Math Evaluation Anxiety

Math Test and Performance Anxiety	Weighted Mean	Standard Deviation	Verbal Description	Interpretation
I feel scared when I see difficult math problems.	4.5	0.27	Strongly Agree	Very high or severe math anxiety
During math exams, my mind goes blank even if I studied.	4.6	0.28	Strongly Agree	Very high or severe math anxiety
I become restless when the teacher asks questions in math.	4.5	0.26	Strongly Agree	Very high or severe math anxiety
I panic when I cannot solve math problems quickly.	4.7	0.32	Strongly Agree	Very high or severe math anxiety
I lose confidence when I compare my performance with classmates in math.	3.9	0.35	Agree	Very high or severe math anxiety
I feel pressured when I am given limited time to finish math tests.	4.4	0.27	Strongly Agree	Very high or severe math anxiety
I feel my hands sweat during a math test.	4.3	0.29	Strongly Agree	Very high or severe math anxiety
I cannot concentrate when I know the math exam is near.	4.1	0.27	Agree	High level of math anxiety
I overthink math questions, causing me to answer incorrectly.	4.3	0.29	Strongly Agree	Very high or severe math anxiety
I rush through math problems because of nervousness.	4.1	0.27	Agree	Very high or severe math anxiety
I feel anxious when I am seated near top-performing students during math tests.	4.4	0.25	Strongly Agree	Very high or severe math anxiety
I feel helpless when encountering unfamiliar math questions.	4.8	0.35	Strongly Agree	Very high or severe math anxiety
I have difficulty recalling formulas during math exams due to anxiety.	4.9	0.40	Strongly Agree	Very high or severe math anxiety
I experience headaches or stomach discomfort during math exams.	4.7	0.29	Strongly Agree	Very high or severe math anxiety
I feel anxious when waiting for my math exam results.	4.5	0.27	Strongly Agree	Very high or severe math anxiety
I struggle to manage time effectively because of stress in math exams.	4.6	0.28	Strongly Agree	Very high or severe math anxiety
I find it difficult to organize my thoughts during timed math tests.	4.5	0.26	Strongly Agree	Very high or severe math anxiety
I feel anxious when math test instructions seem complicated.	4.7	0.32	Strongly Agree	Very high or severe math anxiety

I feel overwhelmed when multiple math tasks are given at once.	4.1	0.35	Agree	High level of math anxiety
I often fear that I will fail my math exams regardless of preparation.	4.4	0.27	Strongly Agree	Very high or severe math anxiety
	4.4	**30.00**	**Strongly Agree**	Very high or severe math anxiety

Math Evaluation Anxiety indicators showed weighted means between 4.1 and 4.7. Students expressed very high levels of uneasiness during math exams, rapid heartbeat while solving problems, and difficulty focusing during timed quizzes. Items related to performance fear and exam pressure were among the highest scoring.

Math evaluation anxiety is particularly critical because testing situations activate high-stress responses. Zhang et al. (2019) found that Asian students demonstrate strong physiological and emotional reactions to formal evaluation, which correlates with reduced performance. The study's results align with the Attentional Control Theory (Eysenck et al., 2007), which states that anxiety shifts attention from goal-directed processes to worry oriented thoughts, compromising efficiency during assessments. These findings imply that students' exam performance is likely affected not by lack of ability, but by heightened anxiety during evaluation.

Table 6. Attitudes Toward Mathematics

Attitudes Toward Learning Math	Weighted Mean	Standard Deviation	Verbal Description	Interpretation
I feel uncomfortable when studying mathematics.	4.3	0.29	Strongly Agree	Very high or severe math anxiety
I avoid math activities whenever possible.	4.3	0.29	Strongly Agree	Very high or severe math anxiety
I prefer other subjects over mathematics.	4.2	0.28	Strongly Agree	Very high or severe math anxiety
I feel relieved when the math period is over.	4.4	0.25	Strongly Agree	Very high or severe math anxiety
I believe math is one of the most difficult subjects.	4.8	0.35	Strongly Agree	Very high or severe math anxiety
I enjoy learning math concepts that I can apply in real life.	4.9	0.40	Strongly Agree	Very high or severe math anxiety
I find satisfaction when I solve challenging math problems.	4.7	0.29	Strongly Agree	Very high or severe math anxiety
I believe math skills are essential for future success.	4.5	0.27	Strongly Agree	Very high or severe math anxiety
I try to improve my math performance despite difficulties.	4.6	0.28	Strongly Agree	Very high or severe math anxiety
I find math interesting when taught in creative ways.	4.5	0.26	Strongly Agree	Very high or severe math anxiety

I feel motivated to study math when supported by my teacher.	4.7	0.32	Strongly Agree	Very high or severe math anxiety
I feel discouraged when I repeatedly fail in math tasks.	4.1	0.35	Agree	High level of math anxiety
I am more confident in non-math subjects than in math.	4.4	0.27	Strongly Agree	Very high or severe math anxiety
I think regular practice can reduce my math anxiety.	4.3	0.29	Strongly Agree	Very high or severe math anxiety
I believe that effort can improve my math performance.	4.7	0.29	Strongly Agree	Very high or severe math anxiety
I prefer working in groups during math activities to lessen anxiety.	4.5	0.27	Strongly Agree	Very high or severe math anxiety
I feel math is less enjoyable compared to other subjects.	4.6	0.28	Strongly Agree	Very high or severe math anxiety
I try to find ways to cope with stress in math learning.	4.5	0.26	Strongly Agree	Very high or severe math anxiety
I believe that success in math depends more on practice than talent.	4.7	0.32	Strongly Agree	Very high or severe math anxiety
I am willing to exert extra effort to improve my math grades.	4.1	0.35	Strongly Agree	Very high or severe math anxiety
	4.5	**0.30**	**Strongly Agree**	Very high or severe math anxiety

Attitudes toward mathematics showed mixed yet meaningful patterns. Negative attitudes such as 'I avoid math activities' (WM=4.3) and 'I feel relieved when math class is over' (WM=4.4) indicate strong disengagement. However, positive beliefs such as 'Math skills are essential for future success' (WM=4.5) and 'I enjoy math when taught creatively' (WM=4.5) suggest that students recognize the value of math but struggle emotionally.

These findings mirror the dual-attitude phenomenon described by Luttenberger et al. (2020), where students value the importance of mathematics yet hold negative emotional reactions due to past struggles and anxiety. This combination supports the Self-Determination Theory: anxiety reduces autonomy and competence, weakening intrinsic motivation (Deci & Ryan, 2000). Thus, attitudes are not rooted in dislike of math itself but in emotional barriers that must be addressed for positive engagement to flourish.

***SOP 3*: The academic performance of Grade 10 students in Math subject**

The third statement of the problem (SOP 3) examined the attitudes of Grade 10 students toward learning mathematics. Attitude is a key determinant of academic engagement, motivation, and persistence in learning tasks. Positive attitudes can enhance students' willingness to participate and succeed, whereas negative attitudes often stem from previous difficulties, fear of failure, or accumulated anxiety. This section discusses the students' attitudes as reflected in the data, providing a clearer understanding of how their emotional and motivational orientations toward mathematics may influence their academic behaviors and performance.

Parameter	Verbal Description	Qualitative Interpretation
4.20 – 5.00	Strongly Agree	Student strongly disagrees; very low or no math anxiety
3.40 – 4.19	Agree	Student disagrees; low level of math anxiety
2.60 – 3.39	Neutral	Student neither agrees nor disagrees; moderate or uncertain math anxiety
1.80 – 2.59	Disagree	Student agrees; high level of math anxiety
1.00 – 1.79	Strongly Disagree	Student strongly agrees; very high or severe math anxiety

Table 7. Academic Achievement

Grade Scale	Number of Students	Percentage	Qualitative Description	Interpretation
90–100	21	10.5	Outstanding	Excellent performance in Mathematics
85–89	43	21.5	Very Satisfactory	Above average performance
80–84	58	29	Satisfactory	Meets the expected academic standards
75–79	52	26	Fairly Satisfactory	Below expected standard; needs improvement
Below 75	26	13	Did Not Meet Expectations	Performance is unsatisfactory; academic support recommended
Total	**200**	**100**		

Analysis of academic performance revealed that many students scored below the expected proficiency level for Grade 10 mathematics. The distribution suggests that a large portion of the sample is struggling academically, consistent with their reported anxiety levels.

Numerous meta-analyses (e.g., Ma, 1999; Zhang, 2019) confirm a negative relationship between math anxiety and academic performance. High anxiety reduces working memory efficiency (Ashcraft, 2020), making it difficult for students to process complex mathematical tasks. The local results reflect global patterns, supporting the notion that anxiety is not merely a psychological issue but a direct barrier to academic success.

SOP 4: Significant Difference in Math Anxiety by Sex

Table 8. t-Test Results on the Difference in Math Anxiety by Sex

Sex	t-test	t-crit	pv	Decision	Interpretation
Male Female	0.36	1.97	0.72	Do not Reject the Null	Not Significant

The results of the t-test show that the computed t-value of 0.36 is lower than the critical value of 1.97, with a corresponding p-value of 0.72. This p-value is greater than the 0.05 significance level. Therefore, there is no significant difference in the Math anxiety levels of students when grouped according to sex.

The analysis indicates that sex does not influence students' Math anxiety levels. Both male and female Grade 10 students exhibit comparable levels of Math anxiety. This supports existing studies suggesting that equal exposure to mathematical tasks and modern classroom environments may reduce historical sex-based differences in anxiety.

SOP 5: Relationship Between Math Anxiety and Academic Achievement

Table 9. Correlation Between Math Anxiety and Math Grade

Variables	r	Degree of Relationship	t-value	pv	Decision	Interpretation
Math Anxiety and Math Grade	-0.502	Moderate correlation; substantial relationship	-8.17	3.696E-14	Reject the Null Hypothesis	Significant

Legend: p-v is less than alpha 0.05, the relationship is significant, otherwise not significant

Absolute value of r	***Interpretation***
< 0.19	*Slight; almost no relationship*
0.20-0.39	*Low correlation; definite but small relationship*
0.40-0.69	*Moderate correlation; substantial relationship*
0.70-0.89	*High correlation; strong relationship*
0.90-1.00	*Very high correlation; very dependable relationship*

The computed correlation coefficient (r = –0.502) indicates a moderate, negative relationship between Math anxiety and Math grade. The corresponding p-value (3.696E-14) is far below the 0.05 significance level. Thus, the relationship is statistically significant: students with higher Math anxiety tend to have lower academic performance in Math.

The findings show a significant negative relationship between Math anxiety and students' academic achievement. This means that as Math anxiety increases, Math grades decrease. This supports previous literature indicating that anxiety impairs problem-solving and working memory, contributing to lower performance. The moderate correlation suggests that while Math anxiety is an important factor, other influences such as instructional climate and study habits also play roles.

Proposed Intervention Program
MATH-BOOST: A Comprehensive Math Anxiety Reduction and Performance Enhancement Program

Rationale
Based on the findings that Grade 10 students experience varied levels of Math anxiety and that a significant negative relationship exists between Math anxiety and academic performance, an intervention program is necessary. Since sex does not significantly influence Math anxiety, the program targets all students and aims to reduce anxiety, increase confidence, and improve academic achievement in Mathematics.

Program Goals

1. Reduce Math anxiety among Grade 10 students.
2. Improve academic achievement in Mathematics.
3. Build confidence in completing Math tasks.
4. Promote a supportive learning environment involving teachers and parents.

Program Objectives

By the end of the intervention, students should be able to:

✓ Manage sources of Math anxiety

✓ Improve problem-solving and test-taking skills

✓ Increase motivation and confidence toward Math

✓ Show improved academic performance in Math

Program Components

1. Math Confidence Workshops

Weekly sessions that include relaxation exercises, understanding Math anxiety, cognitive reframing, and growth mindset training.

2. Peer Tutoring and Learning Circles

Small-group sessions twice a week led by high-performing peers and teachers to strengthen Math skills and reduce anxiety.

3. Math Skills Enhancement Sessions

Weekly remedial lessons focusing on Algebra, word problems, and test-taking strategies.

4. Parent Orientation and Engagement

Monthly sessions educating parents on Math anxiety, supportive strategies, and positive reinforcement.

5. Teacher Training on Anxiety-Sensitive Instruction

Workshops for teachers on classroom techniques that reduce student anxiety and promote supportive instruction.

6. Math Motivation Events

Quarterly activities such as Math Fun Day, contests, and creative Math events to build enjoyment and confidence.

7. Monitoring and Evaluation

Includes pre/post Math anxiety scales, grade monitoring, reflection journals, and student interviews to assess program effectiveness.

Program Matrix (Summary)

Component	Activities	Persons Involved	Time Frame	Expected Output
Math Confidence Workshops	Mindfulness, cognitive reframing, mindset training	Teachers, Counselor	Weekly	Lower anxiety levels
Peer Tutoring	Small-group sessions	Peer tutors, Teachers	Twice weekly	Improved skills and confidence
Skills Enhancement	Remedial lessons & drills	Math Teachers	Weekly	Higher Math performance
Parent Engagement	Orientation, seminars	Teachers, Parents	Monthly	Supportive home environment
Teacher Training	Workshops on anxiety-sensitive teaching	Teachers	Semi-monthly	Improved teaching strategies
Motivation Events	Games, contests,	Teachers, Students	Quarterly	Increased interest in Math

	creative activities			
Evaluation	Surveys, grades, interviews	Teachers, Researchers	Continuous	Program effectiveness data

Summary of Findings

1. Most students were female (60%), most parents earned low incomes (majority between 10,000-20,000 PHP), and parental education was generally low with only 1% postgraduate degrees.
2. Students exhibited high to very high math anxiety across all measured dimensions, including nervousness before tests and fear of making mistakes.
3. Academic achievement revealed that 13% of students did not meet expectations, with many scoring below proficiency standards.
4. No significant difference in math anxiety was found by sex, indicating similar anxiety levels across genders.
5. There is a moderate negative correlation (r = -0.502) between math anxiety and math grades, statistically significant.

CONCLUSION

The demographic profile factors provide essential context, showing that socioeconomic and educational backgrounds influence students' math anxiety and academic experiences. Math anxiety is severe among students, creating emotional and cognitive barriers to math learning and performance. Academic performance in mathematics is adversely affected, with many students struggling to meet grade-level expectations. Math anxiety affects students regardless of sex, suggesting interventions should target the whole student population. Higher levels of math anxiety significantly relate to poorer academic performance, confirming anxiety as a critical factor. Intervention programs were tailored to address emotional, cognitive, and motivational components of math anxiety are necessary to improve student outcomes.

Recommendations

1. For Department of Education: Develop strategy-based programs that integrate anxiety reduction and math skill improvement to support learning and teaching challenges.
2. For School Leaders: Use findings to inform curricular and instructional adjustments to better support students affected by math anxiety.
3. For Teachers: Provide professional development focusing on recognizing math anxiety and implementing anxiety-reduction techniques within math instruction.
4. For Parents: Increase awareness and encourage supportive home environments to help students cope with math anxiety and improve learning outcomes.
5. For Students: Implement supportive interventions aiming at reducing anxiety and fostering positive attitudes to enhance math skills and academic success.

6. For Future Researchers: Conduct further studies to refine intervention programs and explore additional demographic and psychosocial factors influencing math anxiety.

REFERENCES

Ashcraft, M. H., Kirk, E. P., & Kauffman, D. (2020). Math anxiety on student success in higher education. *International Journal of Educational Research, 100*, 6–13. https://doi.org/10.1016/j.ijer.2012.12.004

Baral, D., Dasgupta, N., McLeman, L., Bista, R., Jones, & Biswakarma. (2024). Exploring the predictive relationship between students' math anxiety and their mathematical performance. *American Journal of STEM Education, 3*, 1–15. https://doi.org/10.32674/c9zg4c28

Bornaa, C., Rahaman, H., & Iddrisu, A. (2023). Mathematics anxiety and academic performance of senior high school students in Sagnarigu Municipality, Ghana. *East African Journal of Education Studies, 6*(2), 347–366. https://doi.org/10.37284/eajes.6.2.1358

Byrne, A. (2021). Maths anxiety is a global concern. *Bold Science*. https://boldscience.org/maths-anxiety-is-a-global-concern/

Caviola, S., Mammarella, I. C., & Szűcs, D. (2021). The relationship between math anxiety and math performance: A meta-analytic investigation. *Psychological Bulletin, 147*(2), 134–168. https://doi.org/10.1037/bul0000307

Caviola, S., Toffalini, E., & Giofrè, D. (2022). Math performance and academic anxiety forms, from sociodemographic to cognitive aspects: A meta-analysis on 906,311 participants. *Educational Psychology Review, 34,* 363–399. https://doi.org/10.1007/s10648-021-09618-5

Daker, R. J., Gattas, S. U., & Sokolowski, H. M., Desta S. (2021). First-year students' math anxiety predicts STEM avoidance and underperformance throughout university, independently of math ability. *npj Science of Learning, 6,* Article 17. https://doi.org/10.1038/s41539-021-00095-7

Foley, A. E., Herts, J. B., Borgonovi, F., Guerriero, S., Levine, S. C., & Beilock, S. L. (2022). The math anxiety-performance link: A global phenomenon. *Current Directions in Psychological Science, 26*(1), 52–58. https://doi.org/10.1177/0963721416672463

Friedel, J. M., Cortina, K. S., Turner, J. C., & Midgley, C. (2007). Achievement goals in the classroom: Students' learning strategies and motivation processes. In P. A. Schutz & R. Pekrun (Eds.), *Emotion in education* (pp. 141–161). Academic Press. Doi: https://www.sciepub.com/reference/227474

International Journal of Mathematics and Science Education. (2024). Coping strategies and mathematics anxiety: A qualitative study. *International Journal of Mathematics and Science Education, 22*(4), 567–590. Doi: https://stemeducationjournal.springeropen.com/articles/10.1186/s40594-020-00246-z

Jing Zhang, Nan Zhao, & Qi Ping Kong. (2019). The relationship between math anxiety and math performance: A meta-analytic investigation. *Frontiers in Psychology, 10,* Article 1613. https://doi.org/10.3389/fpsyg.2019.01613

Krypel, L., & Henderson-King, D. (2010). The role of coping in the relationship between math anxiety and math performance. *Journal of Experimental Education, 78*(3), 282–298. https://doi.org/10.1080/00220970903292947

Lazarus, R. S. (2013). *Stress and emotion: A new synthesis*. Springer Publishing Company. https://books.google.com.ph/books/about/Stress_and_Emotion.html?id=5QZMPgAACAAJ&redir_esc=y

Luttenberger, S., Wimmer, S., & Paechter, M. (2020). Spotlight on math anxiety. *Psychology Research and Behavior Management, 11*, 311–322. https://doi.org/10.2147/PRBM.S141421

Luu-Thi Huyen-Trang, Ngo-Thi Thuy-Trinh, Nguyen-Thi My-Tien, Thao-Ly Thanh, Nguyen-Duong Bao-Tran, & Tran-Chi Vinh-Long. (2021). An investigation of mathematics anxiety and academic coping strategies among high school students in Vietnam: A cross-sectional study. *Frontiers in Education, 6*, Article 742130. https://doi.org/10.3389/feduc.2021.742130

Ma, X. (1999). A meta-analysis of the relationship between anxiety toward mathematics and achievement in mathematics. *Journal for Research in Mathematics Education, 30*(5), 520–540. https://doi.org/10.2307/749772

Milovanović, I. (2020). Effects of study skills and emotion regulation interventions on math anxiety and academic performance. *Educational Psychology Review, 32*(1), 1–25. https://doi.org/10.1007/s10648-019-09488-0

Miller, C., & Bichsel, J. (2004). Math anxiety and test anxiety: Separate constructs? *Journal of Experimental Education, 72*(2), 101–123. https://doi.org/10.3200/JEXE.72.2.101-123

Mitchell, & George. (2022). Exploring mathematics anxiety among primary school students. *International Electronic Journal of Mathematics Education.* https://files.eric.ed.gov/fulltext/EJ1357687.pdf

Namkung, J. (2019). Mathematics anxiety meta-analysis. *Journal of Research in Mathematics Education*. https://pubmed.ncbi.nlm.nih.gov/33119346/

Núñez-Peña, M. I., Suárez-Pellicioni, M., & Bono, R. (2023). Effects of math anxiety on student success in higher education. *International Journal of Educational Research, 58,* 36–43. https://doi.org/10.1016/j.ijer.2012.12.004

Reali, F., Caviola, S., Mammarella, I. C., & Szűcs, D. (2016). Math anxiety assessment with the Abbreviated Math Anxiety Scale: Applicability and usefulness: A study with Italian primary school children. *Frontiers in Psychology, 7,* Article 1345. https://doi.org/10.3389/fpsyg.2016.01345

Richardson, & Suinn. (1972). Effects of math anxiety on student success in higher education. *International Journal of Educational Research, 108,* 36–43. https://doi.org/10.1016/j.ijer.2012.12.004

Rodarte-Luna, B., & Sherry, A. (2008). Math anxiety and its impact on the performance of students enrolled in introductory college math courses. *College Student Journal, 42*(2), 381–391. https://www.researchgate.net/publication/349064037_Gender_Influence_on_Statistics_Anxiety_among_Graduate_Students

Stanley Appiah Essuman, Josephine Nyarko, & Kwarteng Frimpong. (2021). Impact of mathematics anxiety on the academic performance of junior high school pupils in the Bongo District of Ghana. *The International Journal of Social Sciences and Humanities Invention, 8*(9). https://www.researchgate.net/publication/354820506_Impact_of_Mathematics_Anxiety_on_the_Academic_Performance_of_Junior_High_School_Pupils_in_the_Bongo_District_of_Ghana

Tobias. (2020). Effects of math anxiety on student success in higher education. *International Journal of Educational Research, 108*, 36–43. https://doi.org/10.1016/j.ijer.2012.12.004

Valenzuela, M. (2024). Coping strategies and mathematics anxiety: Effects on academic performance among Grade 11 students in the Philippines. *Philippine Journal of Educational Research, 18*(1), 45–62. https://eprajournals.com/IJMR/article/13820

Zhang, J., Wang, Z., & Kong, Q. (2019). A meta-analysis of the relationship between math anxiety and math achievement. *Educational Psychology Review, 31*(3), 489–507. https://doi.org/10.1007/s10648-019-09488-0

Zhang, J., Zhao, N., & Kong, Q. P. (2020). The relationship between math anxiety and math performance: A meta-analytic investigation. *Frontiers in Psychology, 10,* Article 1613. https://doi.org/10.3389/fpsyg.2019.01613