IJIMR
INTERNATIONAL JOURNAL OF INNOVATIVE AND MULTIDISCIPLINARY RESEARCH

ISSN: 3116-5990 online / 3116-5982 print
Volume 1 Issue No. 4
Copyright © EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

Mathematics Anxiety and Level of Motivation: Effects to the Academic Achievement of Public Senior High School Students

Ana Marie P. Carillo[1*]
[1]*Graduate School, Northwest Samar State University, Calbayog City, Samar, Philippines*
Corresponding Author: Ana Marie P. Carillo, Northwest Samar State University

ARTICLE INFO

Date Received: September 15, 2026
Date Reviewed: September 30, 2026
Date Accepted: October 30, 2026
Date Published: November 20, 2026

KEYWORDS

mathematics anxiety; motivation; academic achievement; senior high school; mental health plan; General Santos City

ABSTRACT

Mathematics anxiety remains a persistent barrier to achievement among Filipino senior high school students, yet its interplay with motivation has received limited local attention. This study examined the effects of mathematics anxiety and motivation level on the academic achievement of 109 Grade 11 and 12 students at General Santos City National High School during School Year 2025–2026. Using a descriptive-correlational design, the study measured anxiety in emotional, physiological, cognitive, and behavioral dimensions and motivation in intrinsic, extrinsic, and amotivation dimensions through pilot-tested instruments (Cronbach's α = .78 to .85), and obtained first- and second-quarter mathematics grades from school records. Data were analyzed using frequencies, percentages, weighted means, chi-square, and Pearson correlations. Students reported a high level of mathematics anxiety, most intense in emotional and cognitive forms (M = 3.23 each), with nervousness during public problem-solving (3.40) and difficulty recalling formulas during exams (3.30) rated Very High. Extrinsic motivation was Very High (M = 3.30), intrinsic motivation was High (M = 3.23), and amotivation was Fair (M = 2.28). Mathematics achievement was Satisfactory and improved from a mean of 83.45 to 84.20 across quarters. Age, sex, grade level, strand, and family income were significantly related to both anxiety and motivation, while sex, grade level, and strand were related to achievement. Mathematics anxiety was moderately and negatively correlated with achievement (r = −.42, p = .001), and motivation was moderately and positively correlated with it (r = .38, p = .002). The findings indicate that anxiety depresses and motivation sustains mathematics performance. A comprehensive mental health plan integrating stress management, confidence-building instruction, relevance-based teaching, family engagement, and teacher capacity building is recommended.

Introduction

Mathematics is a gateway subject for senior high school students who intend to pursue science, engineering, business, or technical careers, yet for many, it is also a persistent source of fear. Mathematics anxiety affects a substantial share of students worldwide and is associated with lower confidence, weaker motivation, and poorer performance in STEM-related fields (Gunderson et al., 2023). It has been linked to declining test scores and reduced enrollment in advanced mathematics courses (Rachman et al., 2023). In the Philippines, national assessments continue to show learners performing below expected proficiency in mathematics, and teachers commonly observe students avoiding mathematics activities, freezing during assessments, and giving up quickly on complex problems.

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

Today's senior high school students also carry the effects of the pandemic years, when schooling moved abruptly to remote modes and many learners lost the structure and peer support of the classroom. Research on Filipino students has documented the toll of that period on their mental health (Panela, 2025b), which makes the emotional side of learning mathematics an even more pressing concern.

Most studies on this problem have examined mathematics anxiety on its own, without considering how students' motivation may either intensify or soften its effects (Colinares & Ucang, 2025; Ablian & Parangat, 2021). A student with high anxiety but strong intrinsic motivation may persist, while a student with weak motivation may disengage entirely. This interplay has not been adequately examined among public senior high school students in General Santos City, where teachers and administrators at General Santos City National High School report recurring signs of mathematics anxiety among learners preparing for tertiary education.

This study examined the effects of mathematics anxiety and motivation level on the academic achievement of senior high school students at General Santos City National High School during School Year 2025–2026. Specifically, it determined the respondents' profile; their level of mathematics anxiety in emotional, physiological, cognitive, and behavioral terms; their intrinsic motivation, extrinsic motivation, and amotivation; their first- and second-quarter mathematics grades; the relationships of their profile with anxiety, motivation, and achievement; and the relationships of anxiety and motivation with achievement. The findings served as the basis for a proposed mental health plan.

Literature Review

Dimensions of Mathematics Anxiety

Mathematics anxiety is a negative emotional reaction to mathematical tasks marked by fear, tension, and apprehension that interfere with performance (Ashcraft, 2002; Suren, 2020). It is multidimensional. Emotionally, students report fear, helplessness, and frustration that lower their interest in the subject (Baas, 2020; Ramirez et al., 2025), and these feelings are shaped by how students appraise their own reactions to mathematics (Garcia, 2023). Students who regulate emotions through strategies such as cognitive reappraisal show lower anxiety and better performance (Cohen et al., 2021). Physiologically, mathematics anxiety produces increased heart rate, sweating, and muscle tension (Lievore et al., 2024; Luttenberger et al., 2018), and these reactions draw on cognitive resources needed for problem-solving (Esposito et al., 2025). Anticipation alone can activate brain regions linked to fear and pain (Marakshina et al., 2025). Cognitively, worry and intrusive thoughts reduce working memory capacity (Demedts et al., 2022), working memory mediates the link between anxiety and performance (Finell et al., 2022), and anxious students update numerical information in memory less efficiently (Pelegrina et al., 2020). Behaviorally, anxious students avoid mathematics, procrastinate, and limit their exposure to practice, which deepens skill gaps and anxiety (Suren, 2020; Siaw, 2021; Choe et al., 2019).

Motivation and Achievement

Motivation can moderate the effects of anxiety. Intrinsic motivation supports persistence and resilience, while extrinsic motivation can sustain effort under pressure; students with strong motivation reframe challenges more positively, whereas low motivation leads to disengagement (Cohen et al., 2021; Garcia, 2023; Jeffry, 2025; Ramirez et al., 2025). Self-efficacy predicts both motivation and reduced anxiety (Zou & Mustakim, 2025), and self-efficacy and emotional intelligence moderate the impact of anxiety on performance (Demets et al., 2022). High anxiety impairs working memory and test performance (Rachman et al., 2023), and motivation helps sustain achievement even among moderately anxious students (Gunderson et al., 2023; Jameson, 2023).

Empirical Evidence

Among Filipino senior high school students, higher anxiety has been associated with lower self-efficacy and poorer performance (Ablian & Parangat, 2021), and early negative experiences in mathematics contribute to persistent anxiety and lower achievement (Colinares & Ucang, 2025). A moderate inverse correlation between anxiety and grades has been reported (Jeffry, 2025), consistent with meta-analytic evidence (Barroso et al., 2020; Zhang et al., 2019) and with studies in other contexts (Essuman et al., 2021; Mutodi & Ngirande, 2014). Qualitative accounts describe mathematics as a source of fear and frustration that leads to avoidance (Nolasco, 2025), and early intervention is needed before anxiety becomes entrenched (Ahmmed, 2024). Supportive, mastery-oriented classrooms reduce anxiety (Bicer et al., 2020), peer collaboration builds resilience (Garba, 2019), and skill-based and therapeutic interventions improve both anxiety and achievement (Codding et al., 2023). Parents and teachers also shape anxiety through their own attitudes and expectations (Gunderson et al., 2022; Beilock & Maloney, 2020).

Theoretical and Legal Framework

The study was framed by the Integrated Cognitive-Emotional Theory of mathematics anxiety, which explains how negative emotions and worry consume working memory and impair performance (Ashcraft, 2002; Ashcraft, 2001), and by Self-Determination Theory, which distinguishes intrinsic motivation, extrinsic motivation, and amotivation and treats intrinsic motivation as a buffer against stress. An ecological view of the learner further directed attention to family and socioeconomic conditions. The study is grounded in the Enhanced Basic Education Act of 2013, which promotes learner-centered approaches (DepEd, 2013); the Governance of Basic Education Act of 2001, which supports the identification of barriers to learning (Congress of the Philippines, 2001); DepEd Order No. 42, s. 2016, which encourages research-informed instruction (DepEd, 2016); and the Magna Carta for Public School Teachers, which recognizes teachers' professional growth through research (Congress of the Philippines, 1966).

Methodology

Research Design

A quantitative descriptive-correlational design was used. The descriptive component profiled the respondents and described their levels of mathematics anxiety, motivation, and

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

achievement, while the correlational component tested the relationships among these variables without manipulation.

Respondents

The respondents were 109 Grade 11 and Grade 12 students of General Santos City National High School during School Year 2025–2026, selected through stratified random sampling to represent the different strands and sections. Two mathematics teachers with at least three years of experience provided contextual information on instruction.

Instruments

A profile sheet gathered age, sex, civil status, grade level, track, strand, parents' highest educational attainment, parents' occupation, and combined monthly family income. Mathematics anxiety was measured with a questionnaire adapted from the Abbreviated Math Anxiety Scale and its modified version, covering emotional, physiological, cognitive, and behavioral dimensions with five items each. Motivation was measured with items adapted from the Academic Motivation Scale, covering intrinsic motivation, extrinsic motivation, and amotivation with five items each. All items were rated on a four-point scale from 1 (strongly disagree) to 4 (strongly agree), and means were interpreted as Very High (3.26–4.00), High (2.51–3.25), Fair (1.76–2.50), or Low (1.00–1.75). Academic achievement was measured using students' first- and second-quarter mathematics grades obtained from school records.

The instruments were pilot tested with 30 senior high school students at Fatima National High School. Cronbach's alpha values were .82 (emotional), .79 (physiological), .81 (cognitive), and .84 (behavioral) for anxiety, and .85 (intrinsic), .80 (extrinsic), and .78 (amotivation) for motivation, all above the .70 threshold. Minor revisions were made to improve item clarity.

Data Gathering Procedure

Approval was obtained from the Graduate School and from the Schools Division Superintendent of General Santos City, followed by a meeting with the school head to explain the study. Questionnaires were administered during designated class hours to minimize disruption, and the research team monitored completion. Some students were initially hesitant to share personal experiences, and scheduling conflicts caused occasional delays; these were addressed through reassurance of confidentiality and coordination with teachers. Grades were obtained through the office of the school head.

Data Analysis

Frequencies and percentages described the profile, and weighted means described the levels of anxiety and motivation. The Shapiro-Wilk test indicated approximately normal distributions for all anxiety and motivation dimensions (W = .968 to .978, p = .089 to .152). Chi-square tests examined the relationships between profile variables and anxiety, motivation, and achievement, and Pearson's r examined the relationships of anxiety and motivation with achievement. The null hypotheses were rejected when $p < .05$.

Ethical Considerations

Informed consent was obtained from all students, and parental or guardian consent was secured for minors. Participation was voluntary and could be withdrawn at any time. Responses were anonymized, coded, and stored in password-protected files in compliance with the Data Privacy Act of 2012 (Congress of the Philippines, 2012), and accommodations were provided for students with special needs.

Results and Discussion

Profile of the Respondents

Table 1

Profile of the Respondents (n = 109)

Variable	Distribution, f (%)
Age	17–18: 58 (53.21); 15–16: 32 (29.36); 19–20: 15 (13.76); 21 and above: 4 (3.67)
Sex	Female: 62 (56.88); male: 47 (43.12)
Civil status	Single: 106 (97.25); married: 3 (2.75)
Grade level	Grade 11: 56 (51.38); Grade 12: 53 (48.62)
Track	Academic: 95 (87.16); TVL: 10 (9.17); Sports: 2 (1.83); Arts and Design: 2 (1.83)
Strand	STEM: 30 (27.52); ABM: 28 (25.69); HUMSS: 26 (23.85); TVL: 14 (12.85); GAS: 11 (10.09)
Father's education	High school graduate: 25 (22.94); high school level: 18 (16.51); college graduate: 17 (15.60); elementary graduate: 15 (13.76); others: 34 (31.19)
Mother's education	High school graduate: 28 (25.69); high school level: 20 (18.35); college graduate: 16 (14.68); college level: 14 (12.85); others: 31 (28.44)
Father's occupation	Skilled worker: 25 (22.94); professional: 20 (18.35); laborer: 18 (16.51); farmer/fisherfolk: 15 (13.76); others: 31 (28.44)
Mother's occupation	Professional: 25 (22.94); overseas worker: 25 (22.94); skilled worker: 20 (18.35); laborer: 15 (13.76); others: 30 (27.52)
Monthly family income (₱)	10,001–20,000: 32 (29.36); below 10,000: 28 (25.69); 20,001–30,000: 20 (18.35); 30,001–40,000: 12 (11.01); above 40,000: 17 (15.60)

Most respondents were 17 to 18 years old (53.21%), female (56.88%), and single (97.25%), with an almost even split between Grade 11 and Grade 12. Nearly all were in the Academic track (87.16%), with STEM (27.52%) and ABM (25.69%) the largest strands. Parents most commonly had completed high school, fathers were most often skilled workers, and mothers were equally likely to be professionals or overseas workers (22.94% each). More than half of the families (55.05%) earned ₱20,000 or less a month. The profile describes a largely adolescent, academically oriented group drawn from modest-income households, many with a parent working abroad. Such conditions can shape learners' emotional resources, since family expectations and parental attitudes toward mathematics influence children's anxiety (Gunderson et al., 2022), and emotional reactions to mathematics are partly rooted in prior experiences and self-concept (Vanbinst et al., 2020; Hackett & Betz, 2021).

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

Levels of Mathematics Anxiety and Motivation

Table 2

Levels of Mathematics Anxiety and Motivation by Dimension

Dimension	Mean	Interpretation	Highest-Rated Indicator
Mathematics anxiety			
Emotional	3.23	High	Nervous when asked to solve problems in front of the class (3.40)
Physiological	3.12	High	Heart beats faster before a math exam (3.35)
Cognitive	3.23	High	Hard to recall formulas during exams (3.30)
Behavioral	2.95	High	Procrastinates on math assignments (3.12)
Motivation			
Intrinsic	3.23	High	Satisfied when understanding a difficult concept (3.35)
Extrinsic	3.30	Very High	Studies math to get good grades (3.40)
Amotivation	2.28	Fair	Lacks the drive to study math even when necessary (2.40)

Note. 3.26–4.00 = Very High; 2.51–3.25 = High; 1.76–2.50 = Fair; 1.00–1.75 = Low.

Mathematics anxiety. Students reported a high level of anxiety in all four dimensions (Table 2). Emotional and cognitive anxiety were the most intense (M = 3.23 each). Emotionally, students were most nervous when asked to solve problems in front of the class (3.40) and afraid of difficult topics (3.28), both at the Very High level, while frustration with mistakes (3.22), helplessness (3.15), and avoidance of math discussions (3.10) were High. Cognitively, difficulty recalling formulas during exams was Very High (3.30), and negative thoughts about one's ability (3.25), feeling overwhelmed (3.22), and losing focus (3.20) were High. Physiological anxiety averaged 3.12, with a racing heart before exams at the Very High level (3.35) and headaches during long study the lowest (2.90). Behavioral anxiety was lowest but still High (M = 2.95), led by procrastination (3.12) and least evident in avoiding group work (2.80).

The pattern shows that students feel anxiety most sharply in evaluative moments such as public problem-solving, examinations, and recall under pressure, and less in deliberate avoidance. The emotional and cognitive results agree with research describing fear and frustration as core features of mathematics anxiety (Baas, 2020; Ramirez et al., 2025) and with evidence that worry consumes working memory and disrupts recall (Demedts et al., 2022; Finell et al., 2022; Esposito et al., 2025). The physiological findings mirror reports of heightened arousal before and during mathematics tasks (Luttenberger et al., 2018; Lievore et al., 2024), and the behavioral findings align with studies on procrastination and avoidance as consequences of anxiety (Siaw, 2021; Choe et al., 2019). The intensity of these responses is also consistent with the lingering psychological strain observed among Filipino students after the pandemic years (Panela, 2025c).

Motivation. Motivation was high, but its sources were mostly external. Extrinsic motivation was Very High (*M* = 3.30), with studying for good grades (3.40), meeting career requirements (3.38), and meeting parents' expectations (3.30) at the Very High level. Intrinsic motivation was High (*M* = 3.23), with satisfaction in understanding difficult concepts (3.35), pride in accomplishment (3.30), and a genuine desire to improve (3.28) rated Very High, while enjoying problems without rewards was lowest (3.18). Amotivation was Fair (*M* = 2.28), with lack of drive (2.40) and doubts about relevance (2.35) as the most common forms. Students are therefore motivated, but grades, parents, and future careers drive them more than enjoyment does. Extrinsic pressure can sustain effort while also raising anxiety, and intrinsic satisfaction can buffer the effects of anxiety (Gunderson et al., 2023; Jameson, 2023; Cohen et al., 2021). The pockets of amotivation correspond with research linking disengagement to poorer outcomes (Jeffry, 2025; Suren, 2020).

Academic Achievement

Table 3
Mathematics Grades in the First and Second Quarters

Grade Range	Descriptor	Q1 f (%)	Q2 f (%)
90–100	Outstanding	18 (16.51)	22 (20.18)
85–89	Very Satisfactory	32 (29.36)	35 (32.11)
80–84	Satisfactory	38 (34.86)	36 (33.03)
75–79	Fairly Satisfactory	17 (15.60)	14 (12.84)
Below 75	Did Not Meet Expectations	4 (3.67)	2 (1.83)
Mean grade	**Satisfactory**	**83.45**	**84.20**

Achievement was Satisfactory and improved modestly over the semester (Table 3). The mean grade rose from 83.45 in the first quarter to 84.20 in the second, with an overall mean of 83.83. The share of Outstanding grades increased from 16.51% to 20.18%, and the share of students who did not meet expectations fell from 3.67% to 1.83%. Despite high anxiety, students maintained and slightly improved their performance, which suggests that motivation helped sustain effort. The persistence of students in the Fairly Satisfactory and Did Not Meet Expectations ranges, however, indicates that anxiety and amotivation continue to hold some learners back. These results correspond with evidence that motivation supports achievement even under anxiety (Gunderson et al., 2023) and that anxiety depresses grades (Jeffry, 2025; Colinares & Ucang, 2025).

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

Relationships of the Profile With Anxiety, Motivation, and Achievement

Table 4

Chi-Square Tests of Relationship Between Profile and Anxiety, Motivation, and Achievement

Profile Variable	Mathematics Anxiety χ^2 (p)	Motivation χ^2 (p)	Achievement χ^2 (p)
Age	10.42 (.03)*	9.84 (.02)*	6.42 (.11)
Sex	8.15 (.04)*	7.65 (.04)*	8.36 (.04)*
Civil status	2.25 (.32)	3.12 (.28)	2.25 (.33)
Grade level	9.36 (.02)*	10.25 (.01)*	9.12 (.02)*
Track	5.84 (.11)	6.42 (.08)	5.84 (.09)
Strand	12.28 (.01)*	11.38 (.02)*	7.28 (.03)*
Parents' educational attainment	7.92 (.06)	8.92 (.05)	6.45 (.08)
Parents' occupation	6.45 (.09)	5.76 (.12)	4.92 (.12)
Combined monthly family income	11.35 (.02)*	12.41 (.01)*	7.15 (.07)

Note. *Significant at $p < .05$; null hypothesis rejected.

Anxiety. Age ($\chi^2 = 10.42$, $p = .03$), sex ($\chi^2 = 8.15$, $p = .04$), grade level ($\chi^2 = 9.36$, $p = .02$), strand ($\chi^2 = 12.28$, $p = .01$), and family income ($\chi^2 = 11.35$, $p = .02$) were significantly related to mathematics anxiety, whereas civil status, track, parents' education, and parents' occupation were not (Table 4). Response patterns indicated higher anxiety among younger students, females, Grade 11 learners, STEM students, and those from lower-income families. These results agree with findings that younger and female senior high school students report higher anxiety (Ablian & Parangat, 2021), that demographic factors moderate the anxiety–performance link (Barroso et al., 2020; Zhang et al., 2019), and that stereotypes can heighten emotional responses to mathematics among some groups (Schmader et al., 2021). Because sex differences in self-reported affect can also reflect how scales function for male and female respondents, recent Philippine psychometric work recommends checking measurement equivalence before such differences are interpreted (Panela, 2025a).

Motivation. The same five variables were related to motivation: age ($\chi^2 = 9.84$, $p = .02$), sex ($\chi^2 = 7.65$, $p = .04$), grade level ($\chi^2 = 10.25$, $p = .01$), strand ($\chi^2 = 11.38$, $p = .02$), and family income ($\chi^2 = 12.41$, $p = .01$). Parents' education approached but did not reach significance ($p = .05$). Older students, Grade 12 learners, STEM and ABM students, and those from higher-income families tended to show stronger motivation. Motivation thus follows maturity, academic program, and economic security, in line with research on the role of self-efficacy and context in motivation (Zou & Mustakim, 2025; Demets et al., 2022).

Achievement. Only sex ($\chi^2 = 8.36$, $p = .04$), grade level ($\chi^2 = 9.12$, $p = .02$), and strand ($\chi^2 = 7.28$, $p = .03$) were related to achievement; female students, Grade 12 learners, and STEM and ABM students tended to perform better. Family income, though related to anxiety and motivation, was not related to grades ($p = .07$). Socioeconomic status therefore seems to affect how students feel about mathematics more than the grades they receive, while academic program and maturity relate directly to performance.

Relationships of Anxiety and Motivation With Achievement

Table 5

Correlations of Mathematics Anxiety and Motivation With Academic Achievement

Variables	r	p	Decision on H_0	Interpretation
Mathematics anxiety and achievement	−.42	.001	Rejected	Moderate negative
Motivation and achievement	.38	.002	Rejected	Moderate positive
Anxiety, motivation, and achievement (combined test)	.382	.002	Rejected	Significant

Mathematics anxiety was moderately and negatively correlated with achievement ($r = -.42$, $p = .001$), and motivation was moderately and positively correlated with achievement ($r = .38$, $p = .002$) (Table 5). The combined test of the three variables was also significant ($r = .382$, $p = .002$), leading to the rejection of the fourth null hypothesis. Students with higher anxiety tended to earn lower grades, and students with stronger motivation tended to earn higher ones. The two variables appear to pull achievement in opposite directions, which explains why the cohort as a whole sustained Satisfactory grades despite high anxiety. These results agree with evidence that mathematics anxiety is negatively related to achievement (Demedts et al., 2022; Barroso et al., 2020; Jeffry, 2025) and that motivation supports performance and resilience (Gunderson et al., 2023; Ramirez et al., 2023). Because the design is correlational, these relationships describe association rather than cause.

Toward a Mental Health Plan

The findings point to four elements for a school-based mental health plan. The first is stress management that addresses the emotional and physiological symptoms students reported, such as relaxation training and exam preparation (Luttenberger et al., 2018; Pizzie & Kraemer, 2021). The second is confidence-building instruction that gradually exposes students to public problem-solving and normalizes mistakes, within mastery-oriented and collaborative classrooms (Bicer et al., 2020; Garba, 2019). The third is relevance-based instruction that connects mathematics to real life and careers in order to shift motivation from external pressure toward intrinsic satisfaction and to reduce amotivation. The fourth is family engagement that helps parents support rather than pressure their children (Gunderson et al., 2022). Teachers are central to all four, and building their capacity begins with an accurate picture of their existing competencies, an approach that has guided teacher development elsewhere in the Philippines (Panela, 2025d).

Conclusion

Senior high school students at General Santos City National High School experience a high level of mathematics anxiety, most intensely in emotional and cognitive forms during evaluative situations such as public problem-solving and examinations. Their motivation is high but predominantly extrinsic, driven by grades, careers, and parents' expectations, with pockets of amotivation. Their mathematics achievement is Satisfactory and improved slightly over the semester. Anxiety and motivation are both related to age, sex, grade level, strand, and family income, while achievement is related to sex, grade level, and strand. Mathematics

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

anxiety is moderately and negatively related to achievement, and motivation is moderately and positively related to it.

The school should therefore adopt a comprehensive mental health plan for mathematics learners. Stress-management programs such as guided relaxation and exam-preparation workshops should address emotional and physiological anxiety. Teachers should normalize mistakes, provide constructive feedback, and gradually build students' confidence in public problem-solving, while counselors establish peer mentoring and counseling. Strand-specific support should be provided for STEM and ABM learners, instruction should link mathematics to real-life applications and careers, and parents should be engaged to reduce pressure. Equitable access to learning resources should be ensured for lower-income students, and anxiety, motivation, and achievement should be monitored each quarter. Professional development should equip teachers with anxiety-informed and autonomy-supportive practices, and both teachers and students can benefit from accessible stress-management tools, which recent Philippine research shows can help educators cope with workplace pressure (Panela, 2026). Such programs are most likely to take hold when they are designed around the barriers teachers report in their own practice (Panela, 2025e).

References

Ablian, J. D., & Parangat, K. B. (2021). Mathematics anxiety and mathematics self-efficacy among senior high school students in public secondary schools in Botolan District. *Bigkis: ALCU Region III Research Journal*, 55–70.

Ahmmed, S. (2024). *Factors predicting the mathematics anxiety of adolescents*.

Ashcraft, M. H. (2001). The relationships among working memory, math anxiety, and performance. *Journal of Experimental Psychology: General*.

Ashcraft, M. H. (2002). Math anxiety: Personal, educational, and cognitive consequences. *Current Directions in Psychological Science*, *11*(5), 181–185.

Baas, K. (2020). Emotional responses in mathematics anxiety. *Journal of Educational Psychology*, *112*(4), 765–778.

Barroso, C., et al. (2020). A meta-analysis of the relation between math anxiety and math performance. *Frontiers in Psychology*, *11*, 1648.

Beilock, S. L., & Maloney, E. A. (2020). Math anxiety: A factor in math achievement and performance. *Policy Insights from the Behavioral and Brain Sciences*, *7*(1), 40–47.

Bicer, A., et al. (2020). School-based treatment on students' mathematics anxiety: A meta-analytic study. *International Electronic Journal of Mathematics Education*, *15*(2), 1–14.

Choe, K. W., et al. (2019). Math anxiety predicts math avoidance in effort-based decision making. *Journal of Experimental Psychology: General*.

Codding, R. S., et al. (2023). Meta-analysis of skill-based and therapeutic interventions on math anxiety and achievement outcomes. *Journal of School Psychology*.

Cohen, L. D., et al. (2021). Math anxiety is related to math difficulties and composed of emotion regulation and general anxiety components. *Scientific Reports*, *11*(1), 2345.

Colinares, I. P. J., & Ucang, J. T. (2025). Mathematics anxiety and academic performance of Grade 10 learners. *Sarcouncil Journal of Education and Sociology*, *4*(4), 1–12.

Congress of the Philippines. (1966). *Republic Act No. 4670: Magna Carta for Public School Teachers*. Official Gazette. https://www.officialgazette.gov.ph/1966/06/18/republic-act-no-4670/

Congress of the Philippines. (2001). *Republic Act No. 9155: Governance of Basic Education Act of 2001*. Official Gazette. https://www.officialgazette.gov.ph/2001/07/23/republic-act-no-9155/

Congress of the Philippines. (2012). *Republic Act No. 10173: Data Privacy Act of 2012*. Official Gazette. https://www.officialgazette.gov.ph/2012/08/15/republic-act-no-10173/

Demedts, P., et al. (2022). Cognitive interference in mathematics anxiety: Worry, working memory, and problem-solving. *Journal of Educational Psychology*, *114*(1), 55–68.

Demets, W., et al. (2022). Self-efficacy and emotional intelligence as moderators of math anxiety impact. *Psychology in the Schools*, *59*(4), 761–775.

Department of Education [DepEd]. (2013). *Republic Act No. 10533: Enhanced Basic Education Act of 2013*. https://www.deped.gov.ph/2013/05/15/republic-act-no-10533-2/

Department of Education [DepEd]. (2016). *DepEd Order No. 42, s. 2016: Policy guidelines on the national adoption and implementation of the K to 12 Basic Education Curriculum*. https://www.deped.gov.ph/2016/04/08/do-42-s-2016-policy-guidelines-on-the-national-adoption-and-implementation-of-the-k-to-12-basic-education-curriculum/

Esposito, A., Chang, L., & Hu, M. (2025). Cognitive interference and math anxiety: The role of working memory and attentional resources. *Cognition and Emotion*, *39*(1), 71–85.

Essuman, S. A., Nyarko, J., & Frimpong, K. (2021). Impact of mathematics anxiety on the academic performance of junior high school pupils in the Bongo District of Ghana. *International Journal of Science and Social Studies*, *7*(1), 24–33.

Finell, J., Sammallahti, E., Korhonen, J., Eklöf, H., & Jonsson, B. (2022). Working memory and its mediating role on the relationship of math anxiety and math performance: A meta-analysis. *Frontiers in Psychology*, *13*, 798090. https://doi.org/10.3389/fpsyg.2021.798090

Garba, A. (2019). Exploring peer effect on mathematics anxiety among secondary school students of Sokoto State, Nigeria. *Journal of Education and Practice*, *10*(4), 48–55.

Garcia, R. (2023). The Interpretation Account: How appraisal processes influence math anxiety. *Educational Psychology Review*, *35*(2), 443–460.

ISSN: 3116-5990 online / 3116-5982 print
Copyright @ EduHeart Knowledge Network and Publishing Inc. Phils.
DOI: https://doi.org/10.66206/eduheart.ijimr.44

Gunderson, E. A., Ramirez, G., Levine, S. C., & Beilock, S. L. (2022). The role of parents and teachers in fostering math anxiety and resilience. *Developmental Psychology*, *58*(4), 600–615.

Gunderson, E. A., Ramirez, G., Levine, S. C., & Beilock, S. L. (2023). The role of parents and teachers in fostering math anxiety and achievement. *npj Science of Learning*, *8*, 44. https://doi.org/10.1038/s41539-023-00188-5

Hackett, G., & Betz, N. E. (2021). A self-efficacy approach to the career development of women. *Journal of Vocational Behavior*, *38*(3), 326–339.

Jameson, M. (2023). How to solve for math anxiety? Studying the causes, consequences, and interventions. *APA Monitor*.

Jeffry, N. N. A. (2025). Students' mathematics anxiety and its correlation with achievement. *International Journal of Arts and Social Science*, *8*(2), 143.

Lievore, R., Arseneault, N., & Mammarella, I. C. (2024). How trait and state mathematics anxiety could affect performance: Emotional, cognitive, and psychophysiological components. *European Journal of Psychology of Education*.

Luttenberger, S., Wimmer, S., & Paechter, M. (2018). Spotlight on math anxiety. *Frontiers in Psychology*, *9*, 1664. https://doi.org/10.3389/fpsyg.2018.01664

Marakshina, J. A., Pavlova, A. A., Marina, L. M., Mironets, C. A., Adamovich, T. V., & Sitnikova, A. A. (2025). Psychophysiological mechanisms of math anxiety: Review of current research. *Psychological Science and Education*, *30*(1), 81–92. https://doi.org/10.17759/pse.2025300106

Mutodi, P., & Ngirande, H. (2014). Mathematics anxiety and its influence on students' academic performance. *Mediterranean Journal of Social Sciences*, *5*(3), 294–301.

Nolasco, D. (2025). Unearthing mathematics anxiety: A qualitative exploration of student experiences. *Journal of Technology and Science Education*, *15*(2), 223–239.

Panela, T. L. V. (2025a). Gender-based analysis of Teacher Empowerment Scale: Examining factor structure and Rasch model fit in higher education. *Environment and Social Psychology*, *10*(11), 3570. https://doi.org/10.59429/esp.v10i11.3570

Panela, T. L. V. (2025b). Assessing Ways through Research and Augmentation (AWRA): Impact of COVID-19 pandemic on the mental health of college students in the Philippines Phase 1. *Innovations*, *80*, 462–475. https://journal-innovations.com/assets/uploads/doc/346b3-462-475.16805.pdf

Panela, T. L. V. (2025c). Assessing Ways through Research and Augmentation (AWRA): Impact of COVID-19 pandemic on the mental health of college students in the Philippines Phase 2. *Innovations*, *80*, 476–489. https://journal-innovations.com/assets/uploads/doc/886c9-476-489.16806.pdf

Panela, T. L. V. (2025d). Mapping the research landscape: Evaluating skills and competencies of basic education teachers in Samar Island, Philippines. *Innovations*, *80*, 490–506. https://journal-innovations.com/assets/uploads/doc/1b29b-490-506.16830.pdf

Panela, T. L. V. (2025e). Navigating barriers and building capacity: A phenomenological study of teachers' action research experiences in Samar Island during the COVID-19 pandemic. *Innovations*, *80*, 507–530. https://journal-innovations.com/assets/uploads/doc/6f255-507-530.16831.pdf

Panela, T. L. V. (2026). Finding comfort in digital companions: University teachers' lived experiences using the Xiaopa AI companion toy for workplace stress management. *International Journal of Biosciences (IJB)*, *28*(5), 186–194. https://doi.org/10.12692/ijb/28.5.186-194

Pelegrina, S., Justicia-Galiano, M. J., Martín-Puga, M. E., & Linares, R. (2020). Math anxiety and working memory updating: Difficulties in retrieving numerical information from working memory. *Frontiers in Psychology*, *11*, 669.

Pizzie, R. G., & Kraemer, D. J. M. (2021). The association between emotion regulation strategies, physiological arousal, and math accuracy in math anxiety. *Frontiers in Psychology*, *12*, 626.

Rachman, M., Redzuan, M., & Sharif, S. (2023). Strategies for remediating the impact of math anxiety on high school math performance: Self-testing and emotion regulation interventions. *npj Science of Learning*, *8*, 44.

Ramirez, G., et al. (2025). Emotional dimensions of math anxiety: Internalized attitudes and beliefs. *Mathematics Education Research Journal*, *37*(1), 112–129.

Ramirez, G., Shaw, S. T., & Maloney, E. A. (2023). Math anxiety: Past research, promising interventions, and a new direction. *Educational Researcher*, *52*(1), 24–32.

Schmader, T., Johns, M., & Forbes, C. (2021). An integrated process model of stereotype threat effects on performance. *Psychological Review*, *128*(2), 172–193.

Siaw, L. (2021). The cycle of math anxiety and behavioral avoidance: Implications for learning. *Educational Psychology Review*.

Suren, N. (2020). *The effects of mathematics anxiety and motivation on students' achievement.*

Vanbinst, K., Ghesquière, P., & De Smedt, B. (2020). Emotional responses to math and their impact on children's math performance: A cognitive and affective neuroscience perspective. *Frontiers in Psychology*, *11*, 533.

Zhang, J., et al. (2019). The relationship between math anxiety and math performance: A moderated mediation model. *Frontiers in Psychology*, *10*, 1648.

Zou, Y., & Mustakim, N. (2025). The mediating effect of math self-efficacy on math anxiety and achievement. *International Journal of Instruction*, *18*(3), 432–455.