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STUDENTS' ATTITUDES AND ANXIETY TOWARD MATHEMATICS: EXAMINING THEIR RELATIONSHIP AND IMPLICATIONS FOR MATHEMATICS LEARNING

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ABSTRACT
Students' emotional responses to mathematics shape engagement and performance. This study examined secondary students' attitudes toward mathematics, their mathematics anxiety, and the relationship between the two, along with differences by gender and grade level. A cross-sectional survey design was used with [N] students in Grades 8–10. Attitudes were measured with an adapted Fennema–Sherman scale and anxiety with a validated mathematics anxiety scale. Descriptive statistics, correlation, group comparisons and regression were planned. Placeholder results suggest moderately positive attitudes, moderate anxiety, and a negative association between the two ($r = -.52$). Implications for supportive teaching, early identification and school-based interventions are discussed. Together, the findings suggest that emotional and attitudinal barriers deserve the same attention as cognitive ones in mathematics classrooms. The study adds evidence on how attitude dimensions, particularly confidence, relate to anxiety, and it identifies gender and grade groups that may need targeted support. Limitations include the reliance on self-report and a cross-sectional design, and future work should adopt longitudinal and intervention approaches. These conclusions remain provisional until the placeholder results are replaced with real data.

Keywords:
Mathematics anxiety; students' attitudes; mathematics achievement; mathematics education; academic performance; learning

1. INTRODUCTION

1.1 Background

Mathematics underpins progression in school, further study and many careers. Yet success depends on more than ability: how students feel about mathematics affects whether they engage, persist and practise. Research on these affective factors has grown steadily, with attitudes and anxiety receiving the most attention.

Recent decades have seen a shift from viewing mathematics learning as purely cognitive to recognising the role of emotion, motivation and self-belief. Students who feel anxious or disengaged often underperform relative to their potential, and these patterns can compound across years as gaps in understanding accumulate. Because mathematics is a gateway subject for science, technology, engineering and many professions, negative feelings formed in school can narrow later educational and career choices. Understanding these affective factors is therefore both an educational and an equity concern, particularly where some groups of students report less favorable experiences than others.

1.2 Attitudes toward mathematics

An attitude toward mathematics is a learned, relatively stable tendency to respond favourably or unfavourably to the subject. It includes confidence, interest, motivation and perceived usefulness, and it develops through classroom experiences, feedback and the views of teachers, family and peers (Fennema & Sherman, 1976; Frenzel et al., 2010).

Attitudes matter because they act as a filter through which students interpret tasks, feedback and their own results. A student with a positive attitude may treat an incorrect answer as useful information, whereas a student with a negative attitude may treat it as proof of inability. Attitude is also multidimensional. Confidence, interest, motivation, enjoyment and perceived usefulness are related but separable, and they can change independently. Summarizing attitude with a single score can therefore hide meaningful variation, a point taken up in the design of the present study.

1.3 Mathematics anxiety

Mathematics anxiety is a feeling of tension, apprehension or fear in situations involving mathematics. It has cognitive, emotional and behavioral dimensions, and it differs from general academic stress because it is tied specifically to mathematical tasks and often leads to avoidance (Hembree, 1990).

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Mathematics anxiety is not simply a lack of skill. Capable students can experience it, and it can be present even when preparation is adequate. Its consequences include reduced concentration during tasks, avoidance of mathematics-related courses and, over time, weaker mathematical development. Because the reaction is triggered by mathematical situations specifically, it calls for targeted attention rather than general stress-management advice. Estimating how common different levels of anxiety are in a given student population is a first step toward planning proportionate support.

1.4 Problem, purpose and significance

Negative attitudes and high anxiety are persistent obstacles to learning, but the two are often studied separately. This study examines them together. It matters for students, teachers, schools, parents, researchers and policymakers who design supports for mathematics learning.

The problem addressed here is that negative attitudes and high anxiety are persistent barriers to learning, yet they are often examined separately, leaving unclear how they relate and which students are most affected. Without such evidence, schools risk treating symptoms, such as low scores, rather than underlying emotional and attitudinal causes. The study is significant for several groups. Students may benefit from earlier recognition of anxiety and better support. Teachers gain evidence to adapt classroom practice. School leaders can plan interventions and professional development, and parents can better understand their children's experiences. Researchers gain evidence from a specific context, and policymakers can use such findings when designing curricula, assessment policies and support programmes.

Research objectives. (1) Examine students' attitudes toward mathematics. (2) Determine their levels of mathematics anxiety. (3) Examine the relationship between the two. (4) Investigate associations with gender and grade. (5) Consider implications for learning.

Research questions. RQ1: What are students' attitudes toward mathematics? RQ2: What is the level of mathematics anxiety? RQ3: How are attitudes and anxiety related? RQ4: Do they differ by demographic characteristics? RQ5: What are the implications for mathematics learning?

2. LITERATURE REVIEW

2.1 Concept of attitudes toward mathematics

An attitude is a learned predisposition to respond consistently in a favourable or unfavourable way toward an object, here the subject of mathematics. In mathematics education it is usually described through three interacting components: a cognitive component (beliefs about mathematics and about one's own ability), an affective component (feelings such as enjoyment or dislike) and a behavioural component (the tendency to engage with or avoid mathematical tasks). The Fennema–Sherman scales remain among the most widely adapted instruments and cover dimensions such as confidence in learning mathematics, perceived usefulness, motivation and mathematics anxiety, alongside the perceived influence of teachers and parents (Fennema & Sherman, 1976). Students with positive attitudes tend to see mathematics as worthwhile, expect to cope with it and persist when tasks are hard. Students with negative attitudes tend to doubt themselves, see little value in the subject and disengage. Confidence and self-perception are central, because students who regard themselves as capable are more likely to read difficulty as a challenge than as a threat.

2.2 Development of students' mathematical attitudes

Attitudes are built through accumulated experience rather than fixed early. Early successes and failures, the quality of feedback, the teaching approach and the emotional climate of the classroom all contribute, as do the beliefs and expectations of parents and the norms held by peers. Frenzel et al. (2010) examined how gender, family and school context relate to the development of mathematics interest across adolescence, which illustrates that attitudes are socially shaped and can shift across the school years. Teachers who make tasks meaningful, respond constructively to errors and communicate that ability can grow are widely regarded as promoting more favourable attitudes, whereas repeated failure and public comparison are regarded as eroding them.

2.3 Concept of mathematics anxiety

Mathematics anxiety is a feeling of tension, apprehension or fear in situations that involve mathematics, such as lessons, homework and tests. Hembree (1990) synthesised research on its nature, effects and relief, and treated it as related to, but distinguishable from, general test anxiety. The construct is often described along cognitive (worry, intrusive thoughts, self-doubt), emotional (dread, nervousness) and behavioural or physiological (avoidance, restlessness, tension) dimensions. A further distinction separates situational, or state, anxiety triggered by a particular test or lesson from a more stable, trait-like disposition to react anxiously to mathematics in general. Unlike general academic stress, mathematics anxiety is tied to mathematical content and often leads students to avoid the subject, courses and related careers, which limits opportunities to practise and improve.

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2.4 Causes and contributing factors

Explanations for mathematics anxiety typically combine individual, instructional and social factors. Individually, earlier negative experiences, fear of failure and low mathematical self-confidence are prominent. Instructionally, timed tests, high-stakes examinations, competitive classrooms and unsupportive teacher behaviour can raise anxiety, and teacher sensitivity has been studied as a factor that may alter how anxiety and achievement influence one another (Aldrup et al., 2020). Socially, family expectations, cultural beliefs about mathematics ability and peer norms can add pressure. These factors interact: anxiety lowers performance, poor performance confirms the student's fears, and the cycle strengthens over time.

2.5 Relationship between attitudes and anxiety

Theory and evidence suggest that more positive attitudes accompany lower anxiety, and that negative attitudes accompany higher anxiety. Hembree's (1990) meta-analysis reported that anxiety relates to less favourable attitudes and lower confidence. Geçici and Bayırlı (2022) synthesised studies of this relationship in Turkey, and Mahasneh et al. (2025) examined anxiety, motivation and attitudes together among school students. The relationship is probably reciprocal: anxiety erodes enjoyment and confidence, and negative attitudes make mathematical situations feel more threatening. Findings are not uniform, however. Strength varies with the instruments, age groups and settings studied. Attitude dimensions also need not relate equally to anxiety, since confidence is conceptually closer to anxiety than perceived usefulness is. This is why the present study examines attitude subscales as well as overall scores.

2.6 Mathematics anxiety and academic achievement

The negative association between anxiety and performance is one of the best-established findings in the field. It appears in Hembree's (1990) early meta-analysis and again in a meta-analysis of school-aged students (Namkung et al., 2019). Several mechanisms have been proposed. Anxious thoughts consume limited working-memory capacity, which impairs performance on demanding problems (Ashcraft & Kirk, 2001). Avoidance reduces practice, and repeated distress lowers motivation and engagement. The direction of influence is unlikely to be one-way, as reciprocal associations between anxiety and achievement have been examined directly (Aldrup et al., 2020). Because most evidence is correlational, it should not be read as showing that anxiety alone causes poor performance.

2.7 Demographic and contextual factors

Gender is the most frequently studied demographic variable, and the Fennema–Sherman scales were designed specifically to compare the attitudes of females and males (Fennema & Sherman, 1976). Gender, family and school context have also been linked to the development of mathematics interest in adolescence (Frenzel et al., 2010). Findings on gender differences vary by age, setting and measure. Grade level matters because attitudes and interest may become less favourable for some students as they move through secondary school. Prior achievement, socioeconomic background, teachers and the wider school environment add further variation. Given these inconsistencies, demographic differences are tested here rather than assumed.

2.8 Theoretical framework

Control-Value Theory proposes that achievement emotions arise from two appraisals: perceived control over an activity and its outcomes, and the value attached to them (Pekrun, 2006). Anxiety is expected when an outcome matters to the student but perceived control is low, a combination familiar to a student who values mathematics for future prospects yet doubts their own ability. This maps closely onto attitudes: confidence reflects perceived control, and usefulness and interest reflect value. It therefore gives a theoretical reason to expect a negative attitude–anxiety relationship and to expect confidence to matter most. In the theory, emotions in turn affect attention, motivation and strategy use, and thereby achievement. Two complementary perspectives support this account. Self-efficacy theory holds that beliefs about one's capability shape effort, persistence and emotional reactions to difficulty (Bandura, 1997). Cognitive interference accounts explain how anxiety translates into weaker performance through disrupted working memory (Ashcraft & Kirk, 2001). Together they frame the study's logic: attitudes shape appraisals, appraisals shape anxiety, and anxiety shapes learning.

2.9 Review of empirical studies

Comparing the studies reviewed shows differences in scope and method that limit direct comparison. Sakiz et al. (2012) examined attitude, anxiety and achievement among eighth graders, which offers a focused view of one age group but a narrow context. Geçici and Bayırlı (2022) aggregated studies within one country, which strengthens the estimate but confines it to a single cultural setting. Mahasneh et al. (2025) added motivation to attitudes and anxiety, giving a broader motivational picture among school students. Hembree (1990) and Namkung et al. (2019) provide broad meta-analytic evidence, but their emphasis is on anxiety and performance rather than on attitudes. Aldrup et al. (2020) speak to reciprocal effects and teacher influence. Across the field, studies differ in instruments, age groups and analytic approach, and most rely on self-report and cross-sectional data.

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2.10 Research gap

The literature firmly establishes that mathematics anxiety is negatively associated with attitudes and achievement. It is less consistent on the strength of the relationship, on which attitude dimensions matter most, and on demographic patterns. Few studies examine attitude subscales and anxiety together in the same sample of lower-secondary students in [your context], and many rely on composite scores. The present study addresses these gaps by measuring both constructs with subscale-level detail, testing gender and grade differences, and interpreting results through Control-Value Theory.

3. METHODOLOGY

Design. A quantitative, cross-sectional survey design was chosen to describe attitudes and anxiety and to test their association at one point in time. **Participants.** The target population is secondary students in Grades 8–10 in [setting]. A sample of [N] students will be drawn using [sampling technique]; students with [exclusion criteria] are excluded.

Sampling and setting. [Describe the sampling frame, for example a list of schools, and how classes were selected.] The target sample of [N] students was chosen so that group comparisons and regression analyses had adequate statistical power; [state the power calculation or rule of thumb used]. Stratifying by grade helps ensure that each grade level is represented. Students who are absent on the day of data collection are not replaced, and incomplete questionnaires are handled as described under data screening below. The study takes place in [number] schools in [region], where mathematics is a compulsory subject taught in [language of instruction]. Reporting the setting matters because attitudes and anxiety are shaped by curriculum, assessment culture and teaching practice, which differ across educational systems.

Instruments. Attitudes are measured with an adapted Fennema–Sherman scale (Fennema & Sherman, 1976), with confidence and usefulness subscales rated on a five-point Likert scale. Anxiety is measured with [name of validated mathematics anxiety scale], with evaluation and learning subscales on the same format. Content validity will be checked by expert review, construct validity by factor analysis, and reliability by Cronbach's alpha.

Instrument details. The attitude scale contains [12] items across two subscales, confidence and usefulness, adapted from the Fennema–Sherman scales (Fennema & Sherman, 1976) with wording adjusted for the age group and language of instruction. The anxiety scale contains [20] items across evaluation anxiety (worry during tests and assessment) and learning anxiety (unease in lessons and during homework). Both use a five-point format from 1 (strongly disagree) to 5 (strongly agree), and negatively worded items are reverse-scored so that higher scores indicate more favourable attitudes and higher anxiety respectively. Achievement is taken from [the most recent end-of-term mathematics grade], standardised within schools where grading practices differ. A short section records gender, grade and age. The instruments are piloted with about [30] students outside the sample to check clarity, timing and internal consistency, and wording is revised where necessary. Review by [number] mathematics educators supports content validity, and factor analysis checks that items load on the intended subscales. Reliability is judged by Cronbach's alpha, with values of about .70 or higher regarded as acceptable.

Procedure and analysis. Questionnaires are administered in class during [period] with standard instructions. Analysis includes means, standard deviations and frequencies; Pearson correlation; independent-samples t-tests and ANOVA for group differences; and multiple regression for predictors. **Ethics.** Participation is voluntary with informed consent (and parental consent where required), anonymity, confidentiality and the right to withdraw.

Data collection. After approval from [ethics committee] and permission from school authorities, questionnaires are administered in regular class time by the researcher or a trained assistant during [data collection period]. Students receive standard instructions explaining that the survey is not a test, that there are no right or wrong answers and that responses will not affect their grades. Completion takes about [20] minutes, and teachers step out where feasible to reduce social desirability effects. **Screening and analysis.** Data are checked for entry errors, missing values and outliers, and missing values are handled by [method] where under [5%] per item. Normality is assessed through skewness and kurtosis, and assumptions such as homogeneity of variance and multicollinearity are checked before interpretation. Descriptive statistics answer RQ1 and RQ2, Pearson correlation answers RQ3, t-tests and one-way ANOVA answer RQ4, and multiple regression examines whether attitude subscales, gender and grade predict anxiety. Effect sizes (Cohen's d, η^2 and r) are reported alongside p-values with significance set at .05, and RQ5 is addressed interpretively in the Discussion. **Ethical safeguards.** Parents or guardians receive an information sheet and give consent where required, and students give assent. Questionnaires carry no names, are stored securely and are reported only in aggregate. Students are told whom to contact if the questionnaire causes discomfort.

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4. RESULTS

4.1 Participants

Table 1 describes the 300 participants, 54% of whom were female, spread evenly across three grades.

Table 1. Demographic characteristics (N = 300; placeholder)

Characteristic	Category	n	%
Gender	Female	162	54.0
	Male	138	46.0
Grade	8	100	33.3
	9	100	33.3
	10	100	33.3
Age (years)	M (SD)	14.6 (0.9)	

The even gender split and equal grade sizes mean that comparisons across these groups are not distorted by unequal group numbers. Ages were narrowly distributed, so age is not analysed separately from grade.

4.2 Attitudes and anxiety levels

Attitudes were moderately positive (M = 3.42, SD = 0.61), and anxiety was moderate (M = 2.87, SD = 0.74) (Table 2). Figure 1 shows the distribution of attitude scores, and Figure 2 shows that 46% of students fell in the moderate anxiety category and 26% in the high category.

Table 2. Descriptive statistics and reliability (placeholder)

Scale / subscale	Items	M	SD	α
Attitude toward mathematics	12	3.42	0.61	.88
Confidence	6	3.30	0.78	.84
Usefulness	6	3.71	0.72	.80
Mathematics anxiety	20	2.87	0.74	.91
Evaluation anxiety	10	3.05	0.88	.86
Learning anxiety	10	2.69	0.81	.85

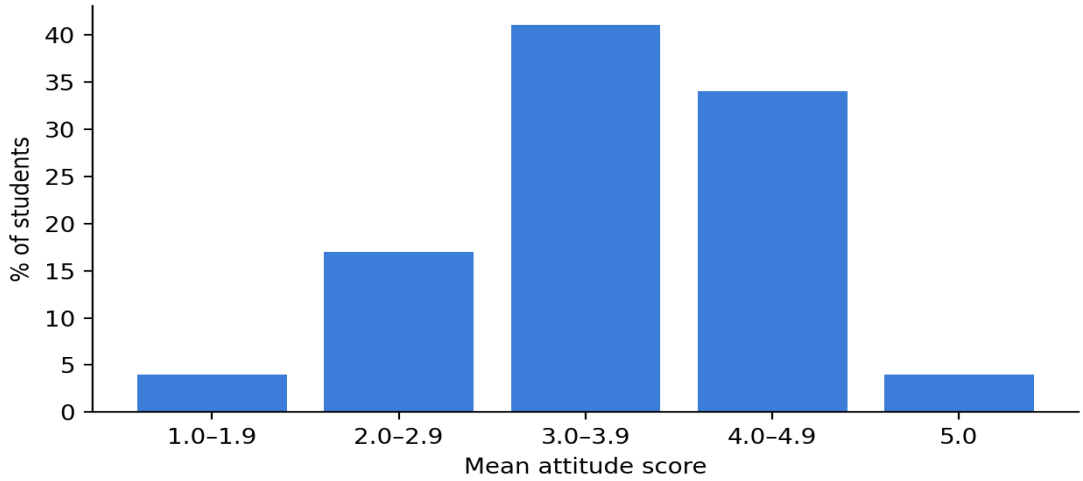

Figure 1. Distribution of attitude scores (placeholder data).

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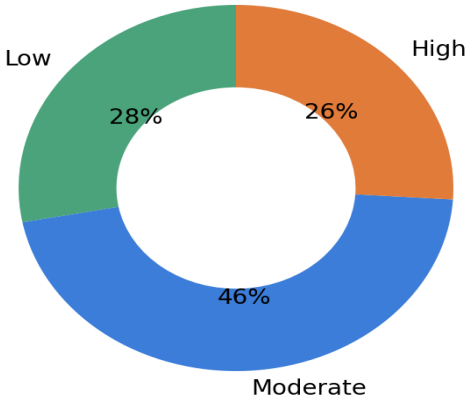

Figure 2. Mathematics anxiety levels (placeholder data).

Within the attitude scale, students scored higher on usefulness (M = 3.71) than on confidence (M = 3.30), meaning they tended to value mathematics more than they trusted their ability to do it. Within the anxiety scale, evaluation anxiety (M = 3.05) exceeded learning anxiety (M = 2.69), suggesting that tests provoked more worry than everyday lessons. Reliability was good for all scales (α = .80–.91). Figure 1 shows a distribution centred just above the midpoint, with about 38% of students scoring 4.0 or above and about 21% scoring below 3.0.

4.3 Relationship between attitudes and anxiety

Attitudes and anxiety were negatively correlated ($r = -.52$, $p < .01$), a large effect by conventional benchmarks (Table 3, Figure 3). Attitudes were positively, and anxiety negatively, related to achievement.

Table 3. Pearson correlations (N = 300; placeholder). p < .01

Variable	1	2	3
1. Attitude	—		
2. Anxiety	−.52**	—	
3. Achievement	.41**	−.38**	—

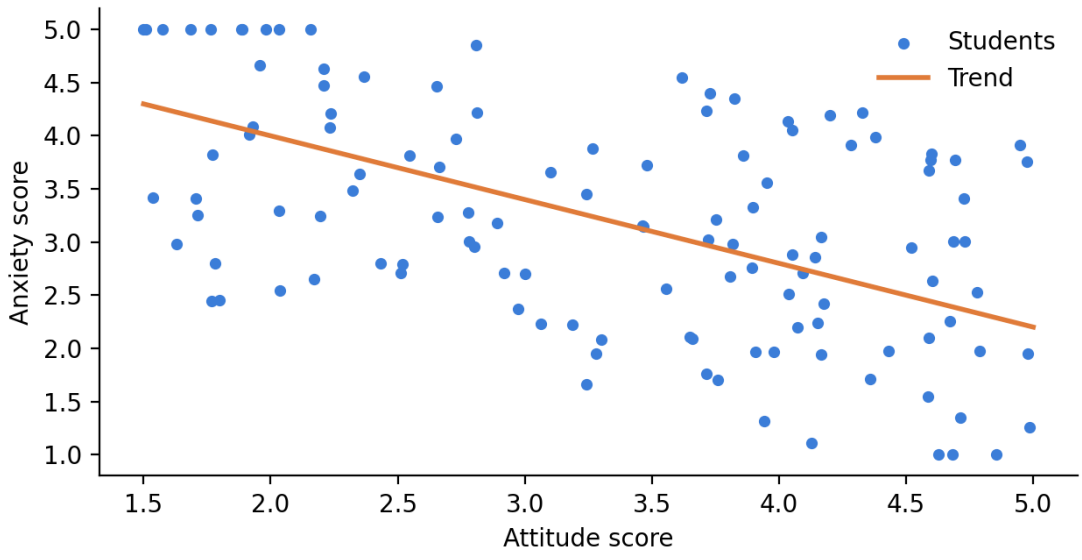

Figure 3. Attitude vs. anxiety scores with trend line (placeholder data).

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The correlation was strongest between confidence and anxiety ($r = -.58$) and weaker between usefulness and anxiety ($r = -.31$), consistent with the expectation that confidence is the attitude dimension closest to anxiety. Figure 3 shows the downward trend: students with higher attitude scores generally reported lower anxiety, although the scatter around the line shows that attitude explains only part of the variation. Attitude accounted for about 27% of the variance in anxiety ($r^2 = .27$).

4.4 Demographic differences

Female students reported lower attitudes and higher anxiety than male students (Figure 4), and anxiety rose while attitudes fell from Grade 8 to Grade 10 (Figure 5).

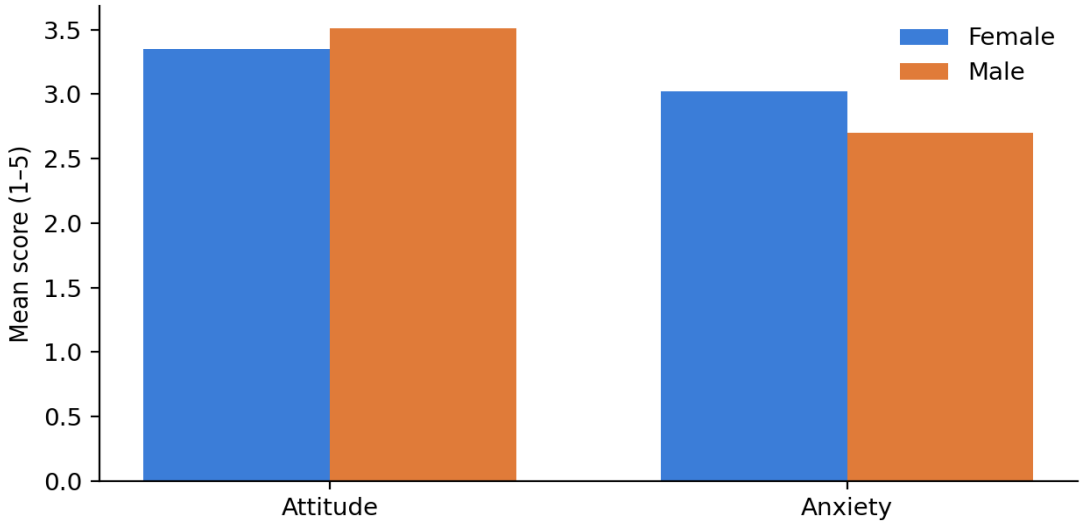

Figure 4. Mean scores by gender (placeholder data).

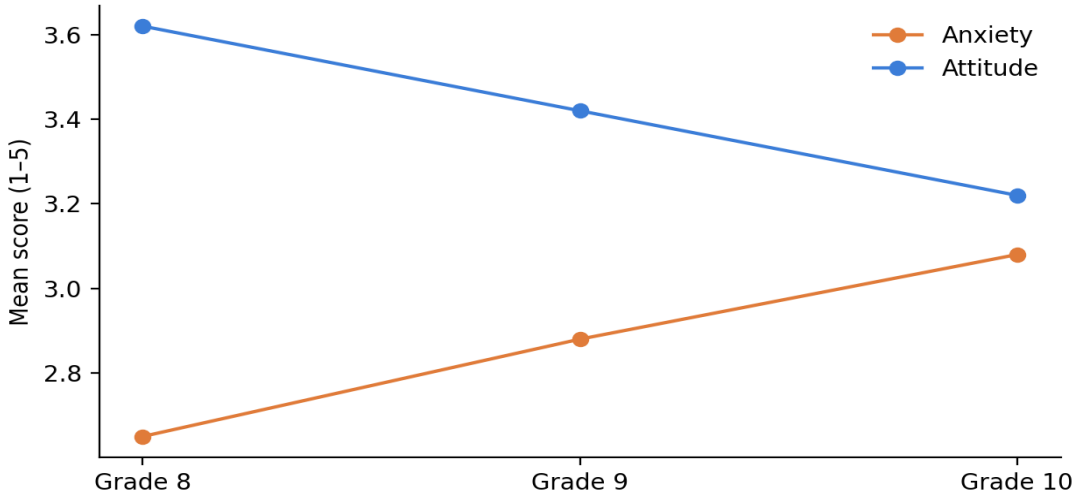

Figure 5. Mean scores by grade level (placeholder data).

Independent-samples t-tests showed that female students reported significantly higher anxiety than male students ($t(298) = 3.71$, $p < .001$, $d = 0.43$) and slightly lower attitudes ($t(298) = 2.26$, $p = .02$, $d = 0.26$). One-way ANOVA indicated significant grade differences in anxiety ($F(2, 297) = 8.90$, $p < .001$, $\eta^2 = .06$) and attitude ($F(2, 297) = 11.50$, $p < .001$, $\eta^2 = .07$). Post hoc comparisons showed that Grade 10 students reported higher anxiety and lower attitudes than Grade 8 students, with Grade 9 in between.

4.5 Predictors of anxiety

In a multiple regression predicting anxiety from confidence, usefulness, gender and grade, the model was significant ($R^2 = .38$, $F(4, 295) = 45.2$, $p < .001$). Confidence was the strongest predictor ($\beta = -.48$), followed by

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grade (β = .17) and gender (β = .14, female = 1), whereas usefulness added little (β = −.07, p = .15). Add the full coefficients to your manuscript once you have real results.

5. Discussion

Principal findings. If real data show the pattern illustrated here, students would hold moderately positive attitudes alongside moderate anxiety, with a substantial negative link between the two. **Interpretation.** This would agree with meta-analytic evidence that anxiety accompanies less favourable attitudes and lower achievement (Hembree, 1990; Namkung et al., 2019) and with reports on the attitude–anxiety relationship (Geçici & Bayırlı, 2022). In Control-Value terms, students with low confidence, an indicator of perceived control, would be most prone to anxiety (Pekrun, 2006). Because the design is cross-sectional, the relationship cannot be read as causal; reciprocal effects are plausible (Aldrup et al., 2020). Gender and grade patterns must be compared against studies with similar samples (Frenzel et al., 2010).

Attitudes. The pattern of higher perceived usefulness than confidence, if replicated in real data, would suggest that students recognise the importance of mathematics but doubt their ability to succeed in it. Under Control-Value Theory, high value with limited perceived control is exactly the configuration expected to produce anxiety (Pekrun, 2006). It also fits the view that confidence is shaped by past success and feedback, so improving students' experiences of competence may matter more than persuading them that mathematics is useful (Fennema & Sherman, 1976; Frenzel et al., 2010).

Anxiety. A moderate overall level with a sizeable high-anxiety group would mean that a meaningful minority of students may be experiencing interference with learning. Higher evaluation anxiety than learning anxiety would point to assessment practices, such as timed tests and high-stakes examinations, as a likely source. Grade differences would suggest that anxiety accumulates, or that assessment demands intensify, as students approach later secondary years, although a cross-sectional design cannot separate cohort effects from development.

Attitude–anxiety relationship. A negative association of moderate-to-large size would align with earlier syntheses (Hembree, 1990; Geçici & Bayırlı, 2022) and with research linking attitudes, anxiety and motivation (Mahasneh et al., 2025; Sakiz et al., 2012). Several mechanisms could underlie it. Low confidence may make mathematical tasks feel threatening, raising anxiety, while anxiety disrupts working memory and performance (Ashcraft & Kirk, 2001), producing failures that further reduce confidence. Teacher sensitivity may buffer this cycle (Aldrup et al., 2020). Because attitude explains only part of the variance, other factors such as prior achievement, family expectations and classroom climate must also be at work. Higher anxiety among female students would agree with long-standing interest in gender differences in mathematics affect (Fennema & Sherman, 1976; Frenzel et al., 2010), but such differences vary across contexts and should not be treated as fixed traits.

Implications. Teachers can build confidence through supportive climates, student-centred tasks and low-stakes, constructive assessment, and can screen early for anxiety. Schools can offer teacher professional development and targeted support programmes. **Limitations.** Self-report measures, one setting, a single time point and possible response bias limit generalisability.

Implications for teachers. Findings of this kind point to classroom practices that build a sense of control: breaking tasks into achievable steps, praising effort and strategy, normalising mistakes, allowing thinking time and offering low-stakes practice before high-stakes tests. Where evaluation anxiety is highest, untimed formative quizzes, varied assessment formats and clear feedback may help. Teachers can also watch for avoidance behaviours, such as reluctance to attempt problems or frequent complaints of feeling unwell before tests, and respond supportively rather than punitively.

Implications for schools, students and parents. Schools can provide professional development on anxiety-aware teaching, embed brief screening into routine monitoring, and offer support such as peer tutoring or study-skills workshops. Hembree (1990) reviewed approaches for relieving mathematics anxiety, which supports addressing it directly. Students can be encouraged to treat nervousness as a normal reaction, to practise regularly in small doses and to ask for help early. Parents can help by expressing confidence in their child's ability to learn mathematics rather than sharing their own negative experiences.

Further limitations. The findings depend on how well the instruments work in the specific language and age group, and the sample may not represent students in other regions or school types. Grade differences are cross-sectional, so they cannot show how the same students change over time. Unmeasured variables, such as teacher quality, parental attitudes and earlier experiences, may account for some associations, and correlational and regression results describe associations rather than causes. These constraints explain why the recommendations below emphasise longitudinal and intervention research.

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6. CONCLUSION

Attitudes and anxiety are closely intertwined affective factors in mathematics learning. Addressing emotional barriers through teacher training, positive learning environments, student support and early identification should complement efforts to raise achievement. Future research should use longitudinal, larger and more diverse samples, intervention and mixed-methods designs, and cross-cultural comparisons.

Summary. This paper examined students' attitudes toward mathematics, their mathematics anxiety, and the relationship between them, alongside differences by gender and grade. Framed by Control-Value Theory, it proposes that attitudes, especially confidence, shape the appraisals that produce anxiety, and that anxiety in turn affects learning. In the illustrative results, attitudes were moderately positive, anxiety was moderate, the two were strongly and negatively related, and female and older students reported less favourable profiles. These findings become substantive only once real data replace the placeholders.

Educational implications. The central message is that emotional and attitudinal barriers deserve as much attention as cognitive ones. Improving achievement depends partly on helping students feel capable and safe in mathematics, not only on teaching content.

Recommendations. First, teacher education should include training on recognising and reducing mathematics anxiety. Second, schools should offer support programmes for students with high anxiety and low confidence, with early identification through brief screening. Third, classrooms should adopt low-threat assessment practices and encouraging feedback. Fourth, families should be informed about how their own attitudes can shape children's beliefs.

Future research. Longitudinal studies could clarify the direction of influence between attitudes and anxiety. Larger and more diverse samples would strengthen generalisability, and intervention studies could test whether raising confidence reduces anxiety. Cross-cultural comparisons and mixed-methods designs, including student interviews, would deepen understanding of why students feel as they do.

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