

The Impact of Teachers' Practices and Parents' Attitude on Math Students' Anxiety in Secondary Classes

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Résumé

En dépit des nombreuses initiatives visant à améliorer la réussite en mathématiques, un grand nombre d'élèves continuent de souffrir d'un niveau élevé d'anxiété lié à l'apprentissage des mathématiques. Alors que de nombreuses recherches ont examiné les facteurs individuels de cette anxiété, peu d'études se sont intéressées à l'influence combinée des pratiques pédagogiques des enseignants et des attitudes des parents sur les réponses émotionnelles des élèves face aux mathématiques. Cette étude quantitative vise à explorer dans quelle mesure ces deux facteurs sociaux clés influencent l'anxiété mathématique chez les élèves. Un échantillon aléatoire de 40 élèves issus d'une école privée à Beyrouth, répartis équitablement entre les classes de 10e et de 11e année, a participé à l'étude. Les données ont été recueillies à l'aide d'un questionnaire structuré et analysées à l'aide du logiciel SPSS. Des méthodes statistiques inférentielles, y compris le test de corrélation de Pearson, ont été utilisées pour évaluer les relations entre les variables, tandis que des statistiques descriptives ont permis de résumer les réponses des élèves. Les résultats visent à enrichir la compréhension des dynamiques sociales et pédagogiques qui influencent l'anxiété mathématique des élèves.

Mots-clés

Anxiété mathématique, Réussite en mathématiques, Pratiques des enseignants, Attitude des parents

Abstract

Despite extensive initiatives aimed at enhancing mathematics achievement, a substantial number of students continue to experience high levels of anxiety associated with learning mathematics. While numerous studies have explored individual factors contributing to math anxiety, limited research has addressed the combined influence of teachers' instructional practices and parents' attitudes on students' emotional responses to mathematics. This quantitative study aims to examine the extent to which these two key social factors—teacher practices and parental attitudes—affect students' math anxiety. A random sample of 40 students from a private school in Beirut, equally distributed between Grade 10 and Grade 11, participated in the study. Data were collected through a structured survey questionnaire and analyzed using SPSS software. Inferential statistical methods, including Pearson correlation, were employed to examine the relationships among the variables, while descriptive statistics were used to summarize students' responses. The findings aim to contribute to a deeper understanding of the social and instructional dynamics underlying students' experiences with math anxiety.

Key words

Math anxiety, Math achievement, Teachers' practices, Parents' attitude

مستخلص

على الرغم من الجهود الواسعة لتحسين التحصيل في مادة الرياضيات، لا يزال عدد كبير من الطلاب يعانون من مستويات عالية من القلق المرتبط بتعلّم الرياضيات. وبينما تناولت العديد من الدراسات العوامل الفردية المساهمة في قلق الرياضيات، إلا أن هناك نقصاً في الأبحاث التي تدرس التفاعل بين ممارسات المعلمين واتجاهات الأهل وتأثيرها على الاستجابات العاطفية للطلاب تجاه الرياضيات. تهدف هذه الدراسة الكمية إلى استكشاف مدى تأثير هذين العاملين الاجتماعيين الرئيسيين على قلق الطلاب من مادة الرياضيات. شارك في الدراسة عينة عشوائية من 40 طالباً من مدرسة خاصة في بيروت، تم توزيعهم بالتساوي بين الصفين العاشر والحادي عشر. تم جمع البيانات باستخدام استبيان منظم، وتم تحليلها باستخدام برنامج. تم استخدام الإحصاءات الاستدلالية مثل اختبار الارتباط لبيرسون لفحص العلاقات بين المتغيرات، بالإضافة إلى استخدام الإحصاءات الوصفية لتلخيص استجابات الطلاب. تهدف النتائج إلى المساهمة في فهم أعمق للديناميكيات الاجتماعية والتعليمية التي تشكّل تجربة الطلاب مع قلق الرياضيات.

كلمات مفتاحية

القلق من الرياضيات، التحصيل في مادة الرياضيات، ممارسات المعلمين التعليمية، اتجاهات الأهالي.

1. Introduction

Anxiety is a future-focused emotional state that prepares individuals for potential negative outcomes, it engages a complex interaction of thoughts, feelings, physical responses, and behaviors aimed at anticipating and managing threats (Chand & Marwaha, 2023). In educational settings anxiety can significantly hinder learners' progress as it manifests not only during high-pressure situations like examinations but also throughout the broader learning process potentially impacting lifelong academic and vocational development beyond general anxiety disorders individuals may experience specific forms of test and performance anxiety that are closely linked to particular knowledge domains such as mathematics or language learning (Luttenberger, Wimmer, & Paechter, 2018).

As a mathematics teacher early in my career, I observed that some students exhibited signs of heightened stress and nervousness upon receiving their math exams, with a few even responding with tears shortly after the test began. This reaction initially surprised me, as I had not yet developed an awareness of math anxiety as a specific emotional and cognitive response that can significantly affect students' performance and well-being in mathematical contexts. Math anxiety is widely recognized as a significant factor that can adversely affect students' learning and achievement in mathematics across different levels of education (Barroso et al., 2021). Whereas Carey, Hill, Devine & Szücs (2015) define Mathematics anxiety refers to a sense of unease accompanied by heightened physiological responses that arise when individuals are required to work with numbers, engage in problem-solving tasks, or face evaluative situations involving mathematical content.

Trends in International Mathematics and Science Study (TIMSS) reports show that students in Middle Eastern countries often express lower confidence and higher stress related to mathematics, as 30% of students in countries like Qatar, UAE, and Saudi Arabia may experience moderate to high levels of math anxiety (International Association for the Evaluation of Educational Achievement [IEA], 2020). TIMSS did not report an exact percentage of math anxious students in Lebanon, but it is stated that 35% of Grade 8 students reported being confident in learning mathematics, which is lower than the international average, which stands at 62% for Grade 8 students.

Math anxiety can arise from various factors, such as parents' attitudes toward math, teachers' practices, the content of math instruction, and after-school preparation, particularly related to math homework, parental support, and content of mathematics (Ashcraft, 2002; Casad et al., 2015; Maloney et al., 2015). On the academic level, math anxiety can affect students' academic level of achievement negatively, regarding students' assessment preparation which may cause low level of achievements. Barroso, McGraw, Hart & Daucourt, (2021) noted that math anxiety significantly impacts students' achievements.

Mathematics anxiety is a significant barrier to academic success, affecting students' performance, confidence, and long-term engagement with math-related subjects (Ashcraft & Krause, 2007). Despite widespread efforts to improve math achievement, many students continue to experience high levels of anxiety related to mathematics. Numerous studies have examined various factors contributing to math anxiety, such as teachers' instructional practices and parents' attitudes toward mathematics. However, there is limited research that investigates how teachers' practices and parents' attitudes interact to influence students' emotional responses to math at the secondary level. Addressing this gap is crucial for advancing our understanding of the social and instructional factors that influence students' experiences with mathematics. Gaining insights into these dynamics will not only enhance our theoretical knowledge but also inform the development of targeted interventions aimed at reducing mathematics anxiety and promoting more effective learning outcomes in future research.

Several studies have been conducted to investigate the contributing factors to math anxiety, as well as to define and illustrate its meaning. For example, Shehayeb and Anouti (2018) conducted research to examine two key factors influencing math anxiety: teachers' practices, which is one of the focal points of the present study and math content. The sample included students from middle and secondary levels across three private and two public schools. The researchers employed a sequential explanatory design to analyze the data. The findings revealed that both the nature of math content and teachers' instructional practices are significant contributors to students' math anxiety. Regarding parents' attitude toward a study examining parental attitudes toward mathematics, specifically investigated how parents' math anxiety affects their children's math performance over the academic year. The study found that parents' math anxiety negatively affects their children's math achievement and increases their math anxiety but only when those parents frequently help with math homework. When math-anxious parents offer less help, the negative impact is not observed. The effect is specific to math and

does not extend to reading achievement (Maloney et al., 2015). The notable result in this study is that parents' math anxiety affects children's math achievement only when parents frequently assist with math homework, highlighting the role of parental interaction in transmitting anxiety.

Understanding the impact of teachers' practices and parents' attitudes on students' math anxiety is a critical step toward developing effective intervention strategies that foster supportive learning environments both at school and at home. A growing body of literature highlights the wide-ranging impact of math anxiety on students' academic performance, emotional well-being, and future educational and career choices, with effects that may persist over the long term. The effects of math anxiety can extend into students' futures, as individuals with math anxiety often shy away from college majors or career paths that require significant math or quantitative skills, leading to long-term consequences (Luttenberger, Wimmer, & Paechter, 2018).

Research Questions:

- 1- To what extent do teachers' practices cause students' math anxiety at the secondary level?
- 2- To what extent do parental anxiety toward mathematics contribute to the development of math anxiety among secondary school students?

Teachers' instructional practices are integral to the teaching-learning process, not only for effectively conveying mathematical content but also for fostering a supportive classroom climate. As Zhang (2022) emphasizes, mitigating math anxiety necessitates careful consideration of both classroom dynamics and instructional strategies, given their substantial influence on students' emotional responses to mathematics. Teachers thus emerge as either potential contributors to students' math anxiety or as crucial facilitators in its reduction through the adoption of effective and empathetic pedagogical approaches. Similarly, Soni and Kumari (2017) explain that children often develop behavioral patterns through observational learning, modelling the attitudes and actions of significant figures in their environment, particularly parents, educators, and peers. Many students regard their parents as foundational role models, frequently assimilating their attitudes and emotional responses, including those related to academic subjects. Consequently, when parents or teachers exhibit anxiety, pessimism, or

diminished expectations concerning mathematics, students may internalize these cues, which can result in heightened math anxiety, lowered self-efficacy, and the avoidance of math-related tasks (Maloney, Ramirez, Gunderson, Levine, & Beilock, 2015). Recognizing and understanding these contributing factors is essential for developing targeted strategies to mitigate math anxiety, ultimately enhancing students' academic performance, emotional resilience, and sustained engagement with mathematics.

Research Hypothesis

- There is a significant relation between teachers' practices and students' math anxiety
- There is a significant relation between parents' attitude toward math and students' math anxiety

Research Objective

This research aims to investigate the factors contributing to math anxiety, focusing on the influence of parental attitudes, teachers' instructional practices to math anxiety.

2. Methodology

Research Design

This study adopts a quantitative descriptive research design to investigate the factors contributing to math anxiety among secondary students, focusing on teachers' practices and students' attitudes toward math. The data will be collected through a survey questionnaire for students, teachers and parents.

Participants and Sampling

The study sample will be a random sample of 98 students at the secondary level, 20 students from the tenth grade, 40 students from grade 11 and 38 students in grade 12 (life science/ economics and sociology) from a private school in Beirut. However, only 51 participants completed the survey. This study does not examine gender differences or academic achievement outcomes.

Research Instruments

The research study will be conducted using a 5-point Likert scale survey questionnaire composed of standardized items adapted from several sources: May (2009), the University of Southampton; Smith (2014), the University of New Hampshire; Adeyemi (2015), the University of Windsor; and Theo Wubbels and Jack Levy's Student Questionnaire on Teacher Interaction (Wubbels & Levy, 1993). The parents' questionnaire is an adapted version of the Mathematics Anxiety Scale for Parents (MAS-P), originally developed by Öztop (2018) focused not just on parental math anxiety, but also how that anxiety may be transmitted to their children through emotions, behaviors, or communication. Each response was assigned a numerical value as follows: 1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree. The questionnaire consisted of three main components: students' math anxiety measured by 5 items, teachers' practices assessed by 22 items, and parents' attitudes measured by 15 items

Validity and Reliability

A pilot study was conducted to test the survey instruments. The Student Math Anxiety and Teacher Practices questionnaires were administered to a small, purposive sample comprising one Grade 10 student, two Grade 11 students, and one Grade 12 student. Correspondingly, the Parents' Questionnaire was distributed to the parents of these students, who were invited to the school specifically for the pilot testing process. These individuals did not participate in the final data collection phase. Feedback from the pilot informed minor revisions to enhance item clarity and led to the development of an Arabic translation of the Parents' Questionnaire, accommodating French-educated parents. To further ensure content validity, the survey instruments were reviewed by a secondary-level mathematics coordinator, a mathematics teacher, and a school counselor—each with expertise in secondary education. Prior to full implementation, the instruments were pilot-tested to identify potential issues in item clarity and structure. To assess reliability, Cronbach's alpha was calculated using the Statistical Package for the Social Sciences (SPSS). The scale measuring students' math anxiety yielded a low reliability coefficient ($\alpha = 0.449$), and the teacher practices scale also showed low reliability ($\alpha = 0.380$). In contrast, the parents' attitudes scale demonstrated high internal consistency ($\alpha = 0.936$). The low reliability of the math anxiety and teacher practices scales may indicate that some items did not consistently capture the intended constructs, despite undergoing expert review and piloting. This could be attributed to a small sample size, variability in participants' interpretations, or lack of engagement with the questionnaire. Future research should consider further refining or rewording certain items, re-evaluating the scale structure, and using a larger sample to enhance reliability.

Date Collection

Following the validation and pilot testing of the survey instruments, and after confirming their reliability, a formal request was submitted to the school administration to obtain approval for distributing the questionnaire via a Google Form. Data collection was conducted digitally using the Google Form platform.

Data Analysis

Upon completion of data collection, participants' responses will be systematically coded and subjected to analysis using the Statistical Package for the Social Sciences (SPSS). Descriptive statistical methods—including measures of mean, standard deviation, minimum and maximum will be utilized to summarize students' responses. In addition, inferential statistical techniques will be applied, specifically Pearson correlation analyses, to examine the relationships between students' levels of mathematics anxiety and two key variables: teachers' instructional practices and parental attitudes toward mathematics.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
MA_Total	51	1.00	4.40	2.6353	.75335
Valid N (listwise)	51				

Table 1: Descriptive inferential statistics for math anxiety

Descriptive statistics were calculated for the math anxiety scale to determine students' overall levels of anxiety toward mathematics. The results showed that students' math anxiety scores ranged from 1.00 to 4.40, with a mean of 2.64 and a standard deviation of 0.75 (N = 51). These results indicate that, on average, students exhibited a moderate level of math anxiety.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
TP_Total	51	2.45	4.60	3.0369	.37981
Valid N (listwise)	51				

Table 2: Descriptive statistics of teachers' practices.

Table 2 shows descriptive statistics for the teacher practices scale revealed that scores ranged from 2.45 to 4.60, with a mean of 3.04 and a standard deviation of 0.38 (N = 51). This indicates that students generally perceive teacher practices as moderately positive. The relatively low standard deviation suggests that most students' responses clustered closely around the mean. In other words, students tended to have similar views about their teachers' practices, with only slight differences across the group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
PA_Total	46	1.00	5.00	2.4490	1.00898
Valid N (listwise)	46				

Table 3: Descriptive statistics of parents attitude

The descriptive statistics for the parents' attitudes scale showed a wide range of responses, with scores ranging from 1.00 to 5.00, a mean of 2.45, and a standard deviation of 1.01 (N = 46). These results suggest that students' perceptions of parental attitudes toward mathematics were varied, with the average score indicating a generally neutral to slightly negative perception.

Ethical Consideration

Ethical approval will be obtained from the school principal prior to conducting the survey. Students will be informed about the purpose and content of the questionnaire. Participation will be voluntary, and no names or identifying information will be included to ensure anonymity and confidentiality.

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APPENDICES

Appendix A- Students Math Anxiety Questionnaire

Dear students, take your time to fill in the following survey and feel free to ask any questions. Remember that your opinion is critical in our study. Your honesty will lead to objective findings.

In what follows, choose the degree of acceptance that best matches your opinion

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree:

	1	2	3	4	5
Generally, I have felt secure about studying math					
I understand math now, but I worry that it's going to get really difficult soon					
I like to look through mathematics books					
I can reject helping a child with his math homework, because I am afraid of facing a question which I cannot solve					
When I open my math book and look at the pages, I fear what is written inside					

Appendix B- Teachers' Practices Questionnaire

Dear students, take your time to fill in the following survey and feel free to ask any questions. Remember that your opinion is critical in our study. Your honesty will lead to objective findings.

In what follows, choose the degree of acceptance that best matches your opinion

1 = Strongly Disagree, 2 = Disagree, 3 = Undecided, 4 = Agree, and 5 = Strongly Agree:

	1	2	3	4	5
My math teacher is a good teacher.					
My math teacher holds our attention in classrooms.					
My math teacher realizes when we don't understand.					
My math teacher spends the necessary amount of time helping us to understand math concepts					
My math teacher is willing to explain things again.					

My math teacher teaches us skills that help us understand more.					
My math teacher uses creative teaching methods to reinforce my understanding of concepts.					
My math teacher works on understanding and not just memorization.					
If we have something to say to our math teacher, he listens.					
My math teacher positive attitude reflects on our attitude towards math.					
My math teacher is friendly.					
My math teacher does not explain things clearly.					
My math teacher gets angry unexpectedly					
My math teacher is strict and hard to connect with to the limit we cannot discuss anything in class concerning math or other things.					
My math teacher thinks we don't know anything in math.					
My math teacher puts us down.					
During my math classes I am expected to sit quietly and listen.					
My math teacher's attitude prevents me from understanding in class and asking about things I did not understand.					
My math teacher's attitude causes me serious worries every day.					
I can recall math teachers who made me feel dumb in class.					
Many of my math teachers were not qualified to teach.					
My math teacher is not patient with us					

Appendix C- Parents' Questionnaire

Dear parents, take your time to fill in the following survey and feel free to ask any questions. Remember that your opinion is critical in our study. Your honesty will lead to objective findings.

In what follows, choose the degree of acceptance that best matches your opinion

1 = Strongly Disagree, 2 = Disagree,

	1	2	3	4	5
I felt anxious during math lessons when I was in school.					
I used to avoid math subjects whenever possible.					
I still feel nervous when I'm faced with math-related tasks.					
I doubt my ability to solve math problems.					
I feel tense when I have to calculate something in everyday life					
I feel anxious when my child asks me for help with math homework.					
I'm afraid I might confuse my child when trying to explain math.					
I prefer my child not ask me for help with math.					
I avoid participating in math-related school activities or homework.					
I feel guilty that I can't help my child confidently with math.					
I believe my child senses my discomfort with math.					
My child seems less confident in math after I try to help.					
I worry that my anxiety about math affects my child's attitude toward the subject.					
I've noticed my child avoids math when I show signs of stress.					
I sometimes express negative feelings about math in front of my child.					