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WHEN TEST ANXIETY MEETS MATH ANXIETY: IMPLICATIONS FOR ROMANIAN'S NATIONAL EVALUATIONS

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Abstract: This study investigates the levels of anxiety regarding testing and math in 2nd and 4th graders (*N*= 273) in the context of Romanian National Evaluations (NE), concentrating on differences before and after the assessments. The research purpose is to understand how the pressure of national testing impacts primary school students' emotional well-being, particularly their test and math anxiety levels. Utilizing a pre-test-post-test research design, the study measured anxiety levels using two questionnaires: the "Cognitive Test Anxiety Scale Survey" (CTAS; Cassady and Johnson, 2002) and the "Abbreviate Math Anxiety Scale" (AMAS; Hopko et al., 2003). These were administered at two-time points: one week before the National Evaluation and one week after its completion. Statistical analyses, including mean comparison using the Paired Samples T-Test, and covariance-based analysis (ANCOVA) were conducted to identify significant changes in anxiety levels across time points and explore the discrepancies in test and math anxiety levels according to grade and gender. The results highlight a noteworthy decrease both in math and test anxiety following National Evaluations. The comparative analysis by grade and gender pointed out insignificant variations in test and math anxiety across grade levels and gender.

Key words: test anxiety, math anxiety, primary school, National Evaluations

Mathematics Subject Classification (2010): 97C20, 97D60.

1. Introduction

The stage of primary school education is critical for nurturing students' independence, fostering innovative thinking, and developing a strong and well-rounded personality, with education being the main focus (Pânișoară & Manolescu, 2019).

As we inhabit a society increasingly reliant on numerical data, where math skills are essential for progress (Furlog et al., 2016), it becomes imperative to provide a supportive and secure learning environment in which children can engage with mathematics and undergo assessment without facing negative emotions that may adversely affect their well-being. Starting from kindergarten and extending into primary school, math is a powerful tool for developing mental discipline, promoting logical reasoning, and enhancing mental agility. It familiarizes children with fundamental concepts, skills, and thinking methods essential in daily life (Benson-O'Connor et al., 2019) and aids learning across various subjects. Enabling children to comprehend and interpret numbers, patterns, and shapes in their surroundings equips them to navigate data in a constantly evolving digital landscape and plays a vital role in shaping them into accomplished learners.

Sometimes ensuring a safe environment can be more challenging than it appears, as teachers may not easily recognize the symptoms of anxiety that typically emerge in testing situations. In the Romanian primary educational cycle, where grading is based on a four-tier system ranging from insufficient to very good, subtle signs of test anxiety may go unnoticed, particularly as the system does not clearly reflect extremely poor performance in anxious students. However, it is well established that assessments can trigger strong emotional responses (Pekrun et al., 2004), leading students to develop individualized dysfunctional coping mechanisms to manage assessment-related stress (Spandana et al., 2024).

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While anxiety is an imminent part of the instructional and learning process, a handleable level can enhance both. When students are equipped with effective coping skills to manage their anxiety, they can maintain it at a productive intensity, allowing learning activities to be shaped into enjoyable experiences. To create a safe environment where primary school children feel comfortable and can effectively understand mathematics, it is essential to consider how evaluations impact their well-being and propose suitable solutions. Spandana et al. (2024) identify several positive coping strategies for managing anxiety, and some of these can be adapted for younger students. Specifically, strategies such as emotional support**,** humor**,** positive reframing**,** active coping, and planning are highly applicable to primary school students. These approaches can assist young individuals in coping with anxiety by guiding them to seek help from trusted adults, find humor in challenging situations, focus on positive aspects, take proactive steps to solve problems and plan their tasks in a manageable way. These strategies can help alleviate stress and build emotional resilience, specifically within the realm of academic assessments.

There has been extensive research concerning the connection among math anxiety or anxiety in testing situations and math achievement (e.g. Crișan & Copaci, 2014; Cuder et al., 2023; Demedts et al., 2022; Luttenberger et al., 2018; Ma & Xu, 2003; Wigfield & Meece, 1988; Zhang et al., 2019). However, there has been limited research specifically exploring the association between test anxiety and math anxiety within the framework of certain National Evaluations, especially in the Romaninan educational context. In an attempt to narrow the current gap in the literature, the ongoing study focused on the exploration of anxieties within the framework of Romanian National Evaluations for primary school graders. Pupils' ldegrees of anxiety related to mathematics and testing might offer significant insights regarding the impact of the entire evaluation process in primary school.

2. Theoretical background

2. 1. The Romanian National Evaluations in Primary Education

The Romanian curriculum places significant emphasis on active learning, real-world problem-solving, collaborative work, and a student-centered approach. Its primary objective is to foster the development of eight key competencies by the recommendations set forth by the European Union. According to the teaching plan for the students assessed in 2018-2019, Mathematics serves as an integral component of the curriculum area of "Mathematics and Natural Sciences", aiming to cultivate problem-solving abilities and integrate mathematical knowledge innovatively using technology and modern strategies (CNEE, 2012).

Mathematics plays a pivotal role in the Romanian primary curriculum, which is competency-driven and aligned with European Union standards, focusing on developing both general and specific competencies alongside domains including technology, natural and social sciences. In alignment with the mathematics curriculum, cultivating these competencies implies educators prioritizing experiential learning, problem-solving activities, and real-life applications that demand active engagement within practical contexts. Stimulating curiosity, emphasizing analytical thinking, and decision-making within problem-solving scenarios is essential. Furthermore, implementing diverse instructional innovative strategies to motivate and facilitate collaborative learning is crucial. Additionally, integrating assessments as an integral component of the learning process is essential for gauging student progress and understanding.

Moreover, Mathematics is a core component of the Romanian National Evaluation System, which evaluates students in Grades 2, 4, 6, and 8. All the National Evaluations tests are designed by the National Centre for Assessment and Examinations (Ministry of Education) following the national curriculum. The National Evaluations (NE) in the second and fourth grades are both significative pedagogical assessments that assess the students' ability in applying aquired knowledge, notional luggage, and skills gained during the entire year. These evaluations are meant to provide valuable feedback on the overall teaching process, evaluate students' academic performance, monitor the primary education system nationwide, and diagnose the educational status at the national level. This is done in alignment with international standards to improve the curriculum and optimize the outcomes.

In the Romanian primary education system, students' performance is evaluated using qualitative descriptors rather than numerical grades, categorized as follows: I (insufficient), S (sufficient), B (good), and FB (very good). However, the results of these assessments are not made public, are not marked with grades or included in the student's record, but serve as a tool to determine students' knowledge upon completion of each curricular cycle and provide an indication of their future learning approach.

Despite being daunting for both students and teachers, assessments are not the ultimate goal (Ausubel & Robinson, 1981). Instead, they provide valuable insight into students' grasp of the content and their ability to apply it in real-life scenarios, as well as into teachers' effectiveness in guiding students through their journey of exploration the intricacies of the world. Assessments also help gauge if students have been able to bridge theoretical teachings with real-world applications, demonstrating their understanding of the interconnectedness between the two. According to Snow & Van Hemel (2008), the assessment of young children is vital for understanding their developmental progress and learning. It informs caregivers and educators on how to tailor instruction and services to meet individual needs, supports program evaluation, and enhances accountability. Additionally, it contributes to the broader understanding of child development, enabling educators to explore how effectively they achieve their objectives in promoting children's growth and learning.

2. 2. Romanian math performance in recent years

Mathematics serves as a crucial gateway to the scientific and technological world in our dynamic society. It enables the discovery and understanding of the world's mysteries. However, it is often perceived by students and teachers from all over the world as a challenging subject (Fritz et al., 2019). Moreover, the acquisition of mathematical knowledge is frequently regarded as onerous by students, leading to a diminished interest in the subject and presenting various challenges (Wang, 2021), most notably during assessment periods. This negative perception associated with learning and evaluation in math can cause anxiety and repeated unpleasant experiences, ultimately resulting in poor math performance, lack of motivation, and disengagement from the subject in the future (Wang et al., 2022). According to the findings from PISA (2018), it has been confirmed that globally, increased mathematics anxiety is associated with reduced scores in the subject of mathematics.

In the PISA 2022 reported results, it was noted that the performance of Romanian students across the domains of math, reading, and science has remained consistent compared to 2018. This is in contrast to other OECD countries, where there have been declines in performance across all domains. Romanian students achieved an average score of 428 across all domains, which is below the OECD and EU averages. Additionally, the disparity between the highest and lowest performers in Romania has not shown significant changes over the past four years.

It is worth noting that while reading and science performance has stayed consistent, there has been a 17-point decline in mathematics over the past decade in Romania. This decrease was attributed to the rise in the inclusion rate to 76% in 2022, indicating a greater incorporation of vulnerable students in the assessment (Ministerul Educației, 2022).

2. 3. Anxiety

Anxiety disorders rank among the foremost prevalent mental health conerns internationally (Papousek et al., 2012), with test anxiety (TA) classified as a specific form of these disorders, specifically categorized as social phobia (American Psychiatric Association, 2013).

2.3.1. Cognitive Test Anxiety

Test anxiety denotes an affective condition that occurs in assessment circumstances and gives rise to heightened tension, nervousness, and concern (Spielberg & Vagg, 1995). A key feature of test anxiety is the presence of task-irrelevant responses, including cognitive interference, increased physiological arousal, avoidance behaviors, and maladaptive coping strategies, all of which collectively impede optimal performance (Sarason & Sarason, 1990), hinder the development of self-maximal potential, a core aspect of Maslow's concept of self-actualization, which represents the highest level of human motivation. As the pinnacle need, self-actualization embodies the drive to achieve and harness the complete range of one's potential (Maslow, 1943). Fostering self-actualization from a young age is essential for healthy development, helping students reach their full potential while cultivating a sense of inner satisfaction, a key component of well-being, and minimizing negative emotions such as anxiety and demotivation (Diener et al., 1999). Maslow (1998) revealed the strong correlation of self-actualization with psychological health, underscoring its importance for emotional well-being.

According to Liebert & Moris (1967), anxiety manifested in examination scenarios consisted of a cognitive component, known as worry, which involves the concern about the negative outcomes of failure, and an emotional component, emotionality, which refers to all the psychological changes generated by the nervous system, particularly the sympathetic nervous system (Liebert & Morris, 1967; Spielberg & Vagg, 1995). Some of the changes include increased heart rate, accelerated breathing, or perspiration (Pekrun & Stephens, 2010). Students exhibiting maximum levels of anxiety during tests are very sensitive and have low resilience to anxiety-inducing stimuli, which they perceive as threatening (Zeidner, 1998).

2.3.2. Math Anxiety

Another prevalent global issue that impacts individuals across all age groups, from early childhood through high school is math anxiety (Ma & Xu, 2004; Jain & Downson, 2009). Mathematics anxiety (MA) denotes an intense negative emotional response to performing different mathematical tasks, which can manifest across diverse mathematical contexts (Ashcraft, 2002; Ashcraft & Ridley, 2005; Cemen, 1987; Wood, 1988; Zaslavsky, 1994). This particular anxiety in learning and testing in math (Hembree, 1990) can also be characterized as a profound sensation of tension, helplessness, and mental confusion (Richardson & Suinn, 1972), emphasizing the tendency to avoid math (Ashcraft, 2002). Despite being an independent construct (Ashcraft & Ridley, 2005), there are some similarities between test and math anxiety. Similar to test anxiety math anxiety frequently occurs in testing situations within the mathematics discipline, often caused by unpleasant and ineffective assessment strategies or excessive pressure upon students (Ashcraft & Moore, 2009). Math anxiety, like test anxiety, is multidimensional. It has two key dimensions that correspond to those previously identified for test anxiety (Wigfield and Meece, 1988). One dimension, known as the cognitive component or "worry", concerns worries about math performance, while the affective aspect or "emotionality", encompasses nervousness or tension and accompanying physiological responses arised in evaluative settings (Dowker et al., 2016).

According to Hembree (1990), another common feature between these two constructs is that both are associated with general anxiety, exert analogous effects on performance, and are receptive to identical interventions.

3. Research Framework: Problem Statement, Aim, and Hypotheses

3. 1. Problem statement (Knowledge gap)

Most studies investigating test or math anxiety have been built on samples involving students from secondary school through university (e.g. Birjandi & Alemi, 2010; Patkin & Greenstein, 2020; Sarason, 1984; Stefan et al., 2020). Although less attention has been placed on test anxiety in parallel with math anxiety during a period of National Evaluations in primary schools, some studies revealed that math anxiety is positively linked in a moderate sense to test anxiety (Dew & Galassi, 1983; Hembree, 1990). Additionally, there is also evidence that detrimental effects of test anxiety start at very early ages and significantly impact pupils' well-being, diminish goal-focused preparation (Mowbray, 2012), harms working memory skills (Ashcraft et al., 1999; Beilock et al., 2004; Darke, 1988; Eysenck & Calvo, 1992; Sorg & Whitney, 1992) and reduces their academic performance (Cassaday & Johnson, 2002; Crișan & Copaci, 2014; Embse et al., 2018; Hembree, 1988; Ramirez et al., 2013; Vukovic et al., 2013). These investigations resonate with the cognitive interference model, which asserts that individuals experiencing substantial test anxiety face difficulties in suppressing extraneous thoughts during examinations. They also undergo significant apprehension regarding the assessment outcomes, engage in self-comparisons of their abilities with others, and ponder the feeling of being inadequately prepared for the examination (Sarason, 1988). Moreover, their primary focus is on preventing failure, and avoiding any appearance of incompetence (Stan & Oprea, 2015). This cognitive disruption hampers their ability to concentrate fully on the task, thereby adversely affecting their performance outcomes.

Although mathematics and test anxiety can manifest relatively early in human life, research indicates numerous opportunities to mitigate both throughout various educational stages (Dondio et al., 2023; Hembree, 1990). These opportunities encompass the integration of innovative strategies alongside traditional approaches which can cultivate positive attitudes towards learning and math.

3. 2. Aim of the study

The present research seeks to explore cognitive test anxiety and math anxiety within the context of Romanian National Evaluations. The primary goal was to foster a profound comprehension of the National Evaluations' psychological effects on second and fourth-grade learners and provide insights that may guide future educational practices and policies aimed at supporting students' emotional health during critical assessment periods.

3. 3. Research hypotheses

The aim of the current study is to test the following research hyphoteses:

(H_1) There is a significantl variation across the initial and subsequent measures of math learning and math testing anxiety of primary school pupils after participating in National Evaluations.

(H_2) There is a significant difference in test anxiety across grade levels, both before and after the National Evaluations, if math leaning and math testing anxiety levels are controlled.

(H_3) There is a significant disparity between the female and male students regarding test anxiety, both before and after the National Evaluations, if math learning and math testing anxiety levels are controlled.

4. Method

4. 1. Participants and design

Three hundred sixty four second-grade and fourth-grade students (from four schools: three public primary schools, and one private school in Romania), aged 8 through 12 years, were involved in the study. The testing was voluntary, but before the students' participation, consent statements were signed by parents. The students who provided incomplete data or who were absent from one of the two assessments were eliminated from the analysis. A total of 273 students (127 boys and 146 girls; age *M*= 9,67, *SD*= 1,16) made up the final sample. Among the 273 pupils surveyed, 73 children havo no siblings. Most of them have one sibling (138), while others have two (41), three (12), four (8), or five (1). Of these, 141 are in second grade, and 132 are in fourth grade. The majority of them 211 students are enrolled in public schools, and 62 attend a private institution. No information regarding families' socioeconomic status or education was collected.

4. 2. Tools

The Cognitive Test Anxiety Scale Survey (CTAS; Cassady and Johnson, 2002) represents a commonly used 27-item scale, developed to assess students' level of the cognitive aspect of test anxiety. The rating was made on a 4-point Likert scale (1- It doesn't suit me at all to 4- It suits me very well) and 9 items being reversed. The scale was answered by students within a timeframe of 8 to 12 minutes. In this study, the total score was used, and the Cronbach Alpha coefficient was 0.89. The Abbreviate Math Anxiety Scale (AMAS; Hopko et al., 2003) comprises nine Likert-type items rated on a 5-point scale from 1 (I m not worried at all) to 5 (extremely worried) and consists of two subscales measuring Math Learning Anxiety (5 items) and Math Testing Anxiety (4 items). A cumulative score, indicating math anxiety, can be computed by summing the scores of all 9 items.

Elevated scores reflect greater levels of math anxiety. Both subscales demonstrated good internal consistency estimates (Learning: Cronbach's $\alpha = 0{,}78$; Testing: Cronbach's $\alpha = 0{,}66$).

4. 3. Procedure

Firstly, the school principals, teachers, parents, and pupils were introduced to the aim, objectives and tools utilized for gathering data. The measures were administered to all students one week before the National Evaluations for the second and fourth grade respectively, and one week after this evaluation. All tests were paper and pencil administered. Due to the young age of the students, the researcher administered the questionnaires orally to maintain a consistent pace and prevent time-wasting. The students were instructed to complete the questionnaires by circling or coloring their responses. A week before the National Evaluations, participants completed a questionnaire and were asked to indicate their expected test score, as if the test would provide an immediate result like other standardized assessments. One week after the exam, they were asked to evaluate whether their performance was satisfactory on a scale from 0 (not satisfactory at all) to 2 (very satisfactory). After completing the scale, participants were debriefed, thanked, and dismissed. Additionally, they were invited to rate the exams' difficulty using a scale from 0 (very easy) to 3 (very hard).

5. Results

According to the responses presented in Table 1, 82.42% of the participating students self-perceived themselves as being prepared for the assessment itself before the assessment, and the remaining 17.58% were not confident in their preparation. Of the 141 second graders, 90.07% consider themselves well-prepared, while 9.93% do not (see Table 1). Among the 132 fourth graders, 74.24% feel well-prepared, whereas 25.76% believe they are not (see Table 1).

Table 1. *Self-perceived preparedness*

Self-Perceived preparedness	2nd Grade f %	4th Grade f %	Total f %
No, I am not prepared for the NE.	14(9.9)	34(25.8)	48(17.6)
Yes, I am prepared for the NE.	127(90.1)	98(74.2)	225(82.4)

In terms of time dedicated to studying mathematics, 21.3% of second graders spend less than 30 minutes per day on mathematics, while the largest group, 39.7%, allocates 30 minutes to one hour daily (see Table 2). Additionally, 28.4% study for one to two hours, 7.8% for two to four hours, and only 2.8% dedicate over four hours per day to mathematics. Among fourth graders, 19.7% spend less than 30 minutes per day on mathematics, while the largest proportion, 47%, dedicates between 30 minutes and one hour daily. Additionally, 22.7% allocate one to two hours, 8.3% study for two to four hours, and only 2.3% devote more than four hours a day to mathematics. Table 2 displays the results.

Table 2. *Time spent by second graders studying math*

Time allocated to study mathematics per day	2th Grade f %	4th Grade f %	Total f %
less than half an hour a day	30(21.3)	26(19.7)	56(20.5)
between half an hour a day and one hour a day	56(39.7)	62(47)	118(43.2)
between one hour a day and two hours a day	40(28.4)	30(22.7)	70(25.6)
between two hours a day and four hours a day	11(7.8)	11(8.3)	22(8.1)
more than four hours a day	4(2.8)	3(2.3)	7(2.6)

Even if students do not receive a formal grade in the National Evaluations, they were asked to reflect on the following: the grade they believe they anticipate to attain, and the grade their parents want them to achieve and expect them to achieve. Among the 141 second-grade students, 4 (2.8%) anticipate receiving an S grade in the National Evaluation, 39 (27.7%) presume that they will achieve a B, while the majority, 98 students (69.5%) believe they will earn an FB (see Table 3). Furthermore, they perceive that their parents hold higher expectations for their performance. Only 9 students (6.4%) reported that their parents expect a B, whereas the vast majority, 132 students (93.6%), indicated that their parents expect them to achieve an FB. In the fourth grade, one student (0.8%) expects to receive an I, 9 students (6.8%) anticipate an S, 58 students (43.9%) expect a B, while the majority, 64 students (48.5%), aim for the highest grade, FB. According to the students, their parents also hold high expectations, with only 5 parents (3.8%) anticipating a B, while the vast majority, 127 parents (96.2%), expect their children to achieve an FB.

Table 3. *Anticipated grades for the National Evaluation in Math*

Anticipated grade	2nd Grade f %		4th Grade f %		Total f %	
	Students	Parents	Students	Parents	Students	Parents
I	0(0)	0(0)	1(0.8)	0(0)	1(0.4)	0(0)
S	4(2.8)	0(0)	9(6.8)	0(0)	13(4.8)	0(0)
B	39(27.7)	9(6.4)	58(43.9)	5(3.8)	97(35.5)	14(5.1)
FB	98(69.5)	132(93.6)	64(48.5)	127(96.2)	162(59.3)	259(94.8)

From Table 4. it can be observed that out of the 141 second-grade students, 63 (44.7%) reported that their parents have never reprimanded them for not meeting expectations. Another 57 students (40.4%) stated that they are occasionally scolded, while 12 students (8.5%) indicated that it happens frequently. Additionally, 9 students (6.4%) shared that their parents always scolded them when they failed to achieve the expected results. In contrast to the fact that most second-grade students reported that their parents scolded them rarely or not at all, the majority indicated that their parents hold high expectations regarding their academic performance. Only 2 students (1.4%) stated that their parents never have expectations in this area, while 6 students (4.3%) reported that their parents sometimes do. Additionally, 24 students (17%) indicated that their parents frequently have high expectations, and the remaining 109 students (77.3%) stated that their parents always expect strong academic results.

Among the 132 fourth-grade students, 47 (35.6%) reported that their parents never scolded them for their academic performance, while 62 (47%) indicated they are sometimes reprimanded for their grades (see Table 4). Only 15 students (11.4%) mentioned that their parents often scold them, and 8 students (6.1%) stated that their parents always do so. Regarding parental expectations, 5 students (3.8%) said their parents never have any, 14 (10.6%) noted that their parents occasionally hold expectations, 23 (17.4%) reported frequent expectations, and the majority, 90 students (68.2%), indicated that their parents consistently expect high academic achievement.

Table 4. *Disciplinary measures applied and parents' expectations*

	2nd Grade f %		4th Grade f %		Total f %	
	Disciplinary measures	Parents' high expectations	Disciplinary measures	Parents' high expectations	Disciplinary measures	Parents' high expectations
never	63(44.7)	2(1.4)	47(35.6)	5(3.8)	110(40.3)	7(2.6)
sometimes	57(40.4)	6(4.3)	62(47)	14(10.6)	119(43.6)	20(7.3)
often	12(8.5)	24(17)	15(11.4)	23(17.4)	27(9.9)	47(17.2)
always	9(6.4)	109(77.3)	8(6.1)	90(68.2)	17(6.2)	199(72.9)

In regards to cognitive test anxiety, the mean score before the NE intervention was 62.52, which decreased to 59.24 following the intervention. The Paired T-Test results ($t(272) = 4.749$, $p < .05$) suggest that the decrease in cognitive test anxiety post-NE was statistically significant. These findings suggested that finishing the assessment period significantly reduces cognitive test anxiety in students.

Interestingly, regarding anxiety in learning mathematics, the mean score was lower after the NE (11.49) than before the intervention (12.10). The Paired T-Test result ($t(272) = 3.132$, $p < .05$, see Table 5) confirmed that the anxiety reduction related to learning mathematics after NE was statistically significant. These findings revealed the positive influence of the completion of the NE on reducing anxiety associated with the learning process in mathematics.

Concerning mathematics test anxiety, the average score before the implementation of NE was 8.59, which decreased to 8.26 after NE. The Paired T-test value ($t (272) = 1.981$, $p = .049$, see Table 5) revealed a statistically significant reduction in mathematics test anxiety after NE, thereby supporting the conclusion that the end of National Evaluation generated an alleviation of math testing anxiety.

Thus, cognitive test anxiety, anxiety related to learning mathematics, and mathematics test anxiety underwent significant changes following the implementation of the National Evaluation, reflecting that anxiety levels significantly decreased after the completion of the testing period within the context of these assessments. Therefore, hypothesis (H_1), which asserts that significant differences exist in anxiety levels among primary school students before and after participating in National Evaluations, is confirmed.

Table 5. *Results in the comparison by pair (test-retest) regarding the math anxiety and test anxiety*

Paired Samples T Test	**Test Anxiety**		**Math Learning Anxiety**		**Math Testing Anxiety**	
Means	**Before EN**	**After EN**	**Before EN**	**After EN**	**Before EN**	**After EN**
	62.52	59.24	12.10	11.49	8.59	8.26
t (272)	4.749		3.132		1.981	
Asymp. Sig. (2-tailed)	.000		.002		.049	

To examine the impact of educational level (second grade versus fourth grade) on students' cognitive test anxiety before the National Evaluation, while controlling for two covariates—math learning anxiety and math testing anxiety, both assessed before the National Evaluations—we conducted an Analysis of Covariance (ANCOVA).

The findings revealed that after controlling for the levels of math learning and math testing anxiety prior to the National Evaluations, insignificant differences in cognitive test anxiety exist between the two educational levels ($F(1, 269) = 1.969$, $p = .162 > .05$ from Table 6), but the effects of the covariates, specifically math learning anxiety before NE, and math testing anxiety before NE, were both statistically significant, as indicated by $F (1, 269) = 49.543$, $p < .05$, and $F(1, 169) = 28.475$, $p < .05$, respectively (see Table 6). Furthermore, the effect size of educational level on cognitive test anxiety, when maintaining the covariates constant was $r = .39$. According to Cohen (1988), this value implies that educational level exerted a moderate effect on cognitive test anxiety, suggesting that as students advance through grades, their cognitive test anxiety levels may be moderately influenced by the aforementioned covariates.

Table 6. *Analysis of covariance for the effect of grade on cognitive test anxiety, controlling for types of mathematics-related anxieties*

	Source of variance	**SS**	**df**	**MS**	**F**	**Sig.**
Before NE	Math Learning Anxiety	5529,346	1	5529,346	49.543	.000
	Math Testing Anxiety	3177,992	1	3177,992	28.475	.000
	Grade	219.745	1	219.745	1.969	.162
	Residual (error)	30022.133	269			
	Total	66312.139	272			
After NE	Math Learning Anxiety	6691.694	1	6691.694	65.068	.000
	Math Testing Anxiety	1502.172	1	1502.172	14.607	.000
	Grade	701.975	1	701.975	6.826	.009
	Residual (error)	27664,398	269			
	Total (corrected)	65047.524	272			

The results concerning the means indicated that the difference in cognitive test anxiety between the second and fourth grades diminished when controlling for mathematics-related anxieties. Specifically, the adjusted means highlighted that when we accounted for mathematics studying and testing anxieties, the difference in cognitive test anxiety between the two grades was significantly reduced (from a difference of 5.15 to only 1.81, see Table 7). This suggested that the levels of anxiety related to mathematics not only contribute to students' overall cognitive test anxiety but may also obscure the direct influence of educational level on test anxiety. Thus, students' cognitive test anxiety levels are more intricately linked to personal experiences with mathematics than to grade level alone.

Table 7. *Adjusted and unadjusted means and variance indicators for cognitive test anxiety level, for each level of the variable grade, controlling for the effects of math learning anxiety and math testing anxiety*

	Grade	N	Unadjusted		Adjusted	
			M	SD	M	SE
Before NE	2nd Grade	141	60.03	16.22	61.64	.89
	4th Grade	132	65.18	14.52	63.45	.92
After NE	2nd Grade	141	56.18	14.16	57.66	.86
	4th Grade	132	62.51	16.16	60.91	.88

Following the Analysis of Covariance conducted to examine the influence exerted by educational level on cognitive test anxiety following the NE, while controlling for the same variables related to mathematics anxieties, it was found that after adjusting for these covariates and maintaining them constant, students in the fourth grade exhibited a significantly higher level of cognitive test anxiety compared to students in the second grade ($F(1, 269) = 65.068$, $p = .009 < .05$; $F(1, 269) = 14.607$, $p < .05$, see Table 6). This difference can be explained by the higher level of awareness and the development of metacognitive skills among fourth-grade students, which may lead to an increased perception of evaluation-related anxiety. Additionally, it was observed that the disparity in cognitive test anxiety levels between groups when accounting for mathematics learning anxiety and mathematics testing anxiety post-NE (adjusted means: 57.664 for the second grade, and 60.91 for the fourth grade, see Table 7) is smaller compared to the scenario where these anxieties are not controlled (means: 56.18 for the second grade and 62.51 for the fourth grade, see Table 6). The effect size of the educational level on cognitive test anxiety, while controlling for the covariates, was assessed as weak ($r = 0.157$). This weak effect revealed that despite the existence of a significant distinction between the groups, the effect of educational level on cognitive test anxiety is not particularly strong, and other factors may likely influence it.

It is noteworthy that, in the case of anxiety related to learning in this subject before the NE, the Analysis of Covariance (ANCOVA) revealed that, after controlling for cognitive test anxiety and math testing anxiety measured before NE, there were no significant discrepancies in math learning anxiety derived from educational level ($F(1, 269) = 1.397$, $p > .05$, see Table 8). Conversely, both covariates demonstrated significant effects; specifically, cognitive test anxiety influenced the outcome significantly ($F(1, 269) = 49.543$, $p < .05$), while math testing anxiety also exhibited a substantial impact ($F(1, 269) = 107.690$, $p < .05$). These findings suggested that both forms of anxiety significantly affect math learning anxiety.

Table 8. *Analysis of covariance for the effect of grade on math learning anxiety, controlling for types of testing anxieties*

	Source of variance	SS	df	MS	F	Sig.
Before NE	Cognitive Test Anxiety	341.118	1	341.118	49.543	.000
	Math Testing Anxiety	741.470	1	741.470	107.690	.000
	Grade	9.616	1	9.616	1.397	.238
	Residual (error)	1852.132	269			
	Total	5168.330	272			
After NE	Cognitive Test Anxiety	413.785	1	413.785	65.068	.000
	Math Testing Anxiety	902.581	1	902.581	141.931	.000
	Grade	6.528	1	6.528	1.027	.312
	Residual (error)	1710.647	269			
	Total (corrected)	5716.227	272			

Moreover, the adjusted means reveal that the difference in math learning anxiety between the second and fourth grades is minimized when both forms of test anxiety are controlled. The adjusted means are 11.915 for the second and 12.296 for the fourth grades, resulting in a minimal difference of 0.381. In contrast, when the levels of the covariates are not controlled, the raw means are 11.43 and 12.81, resulting in a more pronounced difference of 1.37 (see Table 9). This indicates that the direct effect of educational level on math learning anxiety is mitigated when controlling for test-related anxieties. Thus, these findings underscore the significance of test-related anxieties as important mediators in the relationship between educational level and math learning anxiety.

Table 9. *Adjusted and unadjusted means and variance indicators of math learning anxiety level, for each level of the variable grade, controlling for the effects of cognitive test anxiety and math testing anxiety*

	Grade	N	Unadjusted		Adjusted	
			M	**SD**	**M**	**SE**
Before NE	2nd Grade	141	11.43	4.463	11.915	.222
	4th Grade	132	12.81	4.145	12.296	.230
After NE	2nd Grade	141	10.815	4.685	11.337	.215
	4th Grade	132	12.212	4.377	11.655	.222

The Analysis of Covariance (ANCOVA) assessing the effect of educational level on math learning anxiety after the National Evaluation (NE), while controlling for cognitive test anxiety and math testing anxiety, revealed no significant variations founded on educational level ($F(1, 269) = 1.027$, $p = .312 > .05$, see Table 8). In contrast, both covariates had statistically significant effects, with cognitive test anxiety ($F(1, 269) = 65.068$, $p < .05$), and math testing anxiety ($F(1, 269) = 141.931$, $p < .05$) significantly influencing math learning anxiety. Furthermore, the adjusted means for the second and fourth grades indicated a smaller difference in math learning anxiety (11.337 and 11.655, respectively, with a difference of .318) when controlling for test-related anxieties compared to the unadjusted means (10.815 and 12.212, with a difference of 1.397, see Table 9). These results suggested that test-related anxieties mediate the connection between educational level and math learning anxiety.

Examining the impact of grade on math testing anxiety prior to the NE, while controlling for cognitive test anxiety and math learning anxiety, the analysis of covariance revealed no statistically significant differences in math testing anxiety across educational levels ($F(1, 269) = .431$, $p = .512 > .05$, see Table 10). However, both covariates exhibited statistically significant effects, with cognitive test anxiety yielding ($F(1, 269) = 28.475$, $p < .05$), and math learning anxiety resulting in $F(1, 269) = 107.690$, $p < .05$. This indicates that both specified covariates significantly influenced students' anxiety towards assessments in mathematics.

Table 10. *Analysis of covariance for the effect of grade on math testing anxiety, controlling for cognitive test anxiety and math learning anxiety*

	Source of variance	SS	df	MS	F	Sig.
Before NE	Cognitive Test Anxiety	101.418	1	101.418	28.475	.000
	Math Learning Anxiety	383.552	1	383.552	107.690	.000
	Grade	1.535	1	1.535	.431	.512
	Residual (error)	958.082	269			
	Total	2464.051	272			
After NE	Cognitive Test Anxiety	62.862	1	62.862	14.607	.000
	Math Learning Anxiety	610.819	1	610.819	141.931	.000
	Grade	12.115	1	12.115	2.815	.095
	Residual (error)	1157.675	269			
	Total (corrected)	3227.480	272			

Furthermore, as observed in Table 11, the difference between the adjusted means for the second and fourth grades concerning math learning anxiety is minimized when maintaining both forms of test anxiety constant, with adjusted means of 8.66 and 8.51, respectively, resulting in a minimal difference of 0.15. Conversely, when the covariates were not accounted for, the means were 8.27 and 8.93, with a difference of .66 (see Table 11).

In a parallel analysis for math testing anxiety after NE, the effect of educational level remained insignificant, yielding ($F(1, 269) = 2.815$, $p = .095 > .05$, see Table 10). The covariates continued to demonstrate significant effects, with cognitive test anxiety showing ($F(1, 269) = 14.607$, $p < .05$), and math learning anxiety indicating ($F(1, 269) = 141.931$, $p < .05$ see Table 10). Additionally, as highlighted in Table 11, the adjusted means for math testing anxiety are 8.47 for the second grade and 8.045 for the fourth grade, resulting in a difference of .425 when maintaining cognitive test anxiety and math learning anxiety after NE constant. Without accounting for the covariates, the raw means were 8.007 and 8.545, with a difference of .538.

Table 11. *Adjusted and unadjusted means and variance indicators of math testing anxiety level, for each level of the variable grade, controlling for the effects of cognitive test anxiety and math learning anxiety*

	Grade	N	Unadjusted		Adjusted	
			M	SD	M	SE
Before NE	2nd Grade	141	8.27	3.277	8.663	.160
	4th Grade	132	8.93	2.665	8.511	.166
After NE	2nd Grade	141	8.007	3.829	8.476	.177
	4th Grade	132	8.267	2.968	8.045	.183

Consequently, no meaningful distinctions were detected between second and fourth graders regarding test anxiety, leading to the rejection of the research hypothesis (H_2).

To verify how gender affects the level of cognitive test anxiety before NE while controlling for the effects generated by levels of math learning and testing anxiety, an analysis of covariance was also applied. The results obtained showed that after controlling for the two previously mentioned variables, no substantial differences were observed with respect of gender regarding the level of cognitive test anxiety ($F(1, 269) = 2.155$, $p = .143 > .01$, see Table 12), highlighting that gender plays a insignificant influence, although the effects of the covariates are significant (for math learning anxiety: $F(1, 269) = 53.295$, $p < .01$; for math testing anxiety: $F(1, 269) = 27.833$, $p < .01$), which suggests that these are important predictors of cognitive test anxiety.

Table 12. *Analysis of covariance for the effect of gender on cognitive test anxiety, controlling for math learning anxiety and math testing anxiety*

	Source of variance	SS	df	MS	F	Sig.
Before NE	Math Learning Anxiety	5943.945	1	5943.945	53.295	.000
	Math Testing Anxiety	3104.230	1	3104.230	27.833	.000
	Gender	240.384	1	240.384	2.155	.143
	Residual (error)	30001.494	269			
	Total (corrected)	66312.139	272			
After NE	Math Learning Anxiety	7615.093	1	7615.093	72.477	.000
	Math Testing Anxiety	1302.803	1	1302.803	12.399	.001
	Gender	102.785	1	102.785	.978	.324
	Residual (error)	28263.587	269			
	Total (corrected)	65047.524	272			

We observed in Table 13 that the difference between female and male subjects regarding the cognitive test anxiety level was greater when the levels of math-related anxieties were controlled (the adjusted means being 63.396 and 61.513, with a difference of 1.883), compared to the situation where the levels of the two math anxieties were not controlled (63.23 and 61.7, with a difference of 1.53, see Table 13). Even so, the difference was not substantial enough to achieve statistical significance. In practical terms, although no significant differences between genders were observed after adjusting for math anxieties, these variables should be of interest for interventions, as reducing math anxiety could diminish cognitive test anxiety overall. The effect size of gender on the cognitive test anxiety level, while controlling for math anxieties, was $r = 0.174$, a value that indicates a small effect, according to Cohen's criteria (1988).

Table 13. *Adjusted and unadjusted means and variance indicators for cognitive test anxiety level, for each level of the variable gender, controlling for the effects of math learning anxiety and math testing anxiety*

	Gender	N	Unadjusted		Adjusted	
			M	SD	M	SE
Before NE	Female	146	63.23	16.55	63.396	.87
	Male	127	61.70	14.48	61.513	.93
After NE	Female	146	59.31	16.46	58.66	.85
	Male	127	59.16	14.29	59.9	.91

Pertaining to how gender impacts the level of cognitive test anxiety following the NE while controlling for the influences of math learning and math testing anxiety, the results indicated that there were insignificant variations based on gender ($F(1, 269) = .978$, $p = .324 > .01$, see Table 12), suggesting that the effect of gender insignificant. However, the effects of the covariates are significant (for math learning anxiety: $F(1, 269) = 72.477$, $p < .01$; for math testing anxiety: $F(1, 269) = 12.399$, $p < .01$), showing that these variables serve as significant predictors of cognitive test anxiety. Additionally, the difference between female and male subjects regarding the level of cognitive test anxiety was greater when controlling for math-related anxieties (with adjusted means of 58.662 and 59.900, respectively, resulting in a difference of 1.238, see Table 13) compared to the scenario where the levels of the two math anxieties are not controlled (59.31 and 59.16, with a difference of .15). The effect size of gender on cognitive test anxiety level, following the assessments while controlling for math anxieties, was $r = .06$, indicating a small effect.

Focusing on the role played by gender in variation of math learning anxiety prior to the NE, while controlling for the effects generated by cognitive and math testing anxiety, the results indicated that there were no notable differences related to gender ($F(1, 269) = 1.317$, $p = .252 > .01$, see Table 14), suggesting that the effect of it was insignificant, although the impact of the covariates was significant (for cognitive test anxiety: $F(1, 269) = 53.295$, $p < .01$; for math testing anxiety: $F(1, 269) = 106.319$, $p < .01$, see Table 14), which implies that these variables may predict anxiety within the study of this discipline.

Table 14. *Analysis of covariance for the effect of gender on cognitive test anxiety, controlling for math learning anxiety and math testing anxiety*

	Source of variance	SS	df	MS	F	Sig.
Before NE	Cognitive Test Anxiety	367.055	1	367.055	53.295	.000
	Math Testing Anxiety	732.247	1	732.247	106.319	.000
	Gender	9.073	1	9.073	1.317	.252
	Residual (error)	1852.676	269			
	Total (corrected)	5168.33	272			
After NE	Cognitive Test Anxiety	455.438	1	455.438	72.477	.000
	Math Testing Anxiety	892.922	1	892.922	142.097	.000
	Gender	26.805	1	26.805	4.266	.040
	Residual (error)	1690.37	269			
	Total (corrected)	5716.227	272			

It was observed that the difference between female and male subjects regarding the level of math learning anxiety was greater when controlling for math-related anxieties (with adjusted means of 11.928 for girls and 12.295 for boys, resulting in a difference of .367, see Table 15), compared to the situation where the levels of the two math anxieties were not controlled (12 and 12.21, respectively, with a difference of .21). The effect size of gender on the level of math learning anxiety, while controlling for testing anxieties, was $r = .069$, highlighting a small effect.

Table 15. *Adjusted and unadjusted means and variance indicators for math learning anxiety level, for each level of the variable gender, controlling for the effects of cognitive test anxiety and math testing anxiety*

	Gender	N	Unadjusted		Adjusted	
			M	SD	M	SE
Before NE	Female	146	12	4.37	11.928	.21
	Male	127	12.21	4.35	12.295	.23
After NE	Female	146	11.81	4.85	11.783	.20
	Male	127	11.11	4.24	11.155	.22

Surprisingly, the situation was distinct in the results collected after the NE, as significant gender differences were noted. More specifically, the results from Table 14 revealed that after controlling for levels of test anxiety, girls exhibited significantly higher scores of math learning anxiety compared to boys ($F(1, 269) = 4.266$, $p = .04 < .05$, see Table 14). The effect size was $r = .124$, indicating that gender exerts a significant but minimal influence on math learning anxiety while maintaining constant levels of cognitive test and math testing anxieties.

Analyzing the role of gender in math testing anxiety prior to the NE revealed the absence of notable differences ($F(1, 269) = .000$, $p = .986 > .01$; see Table 16), suggesting that gender has an insignificant influence. In contrast, cognitive test anxiety ($F(1, 269) = 27.833$, $p < .01$) and math learning anxiety ($F(1, 269) = 106.319$, $p < .01$) were significant predictors of anxiety within this context (see Table 16).

Table 16. *Analysis of covariance for the effect of gender on cognitive test anxiety, controlling for math learning anxiety and math testing anxiety*

	Source of variance	SS	df	MS	F	Sig.
Before NE	Cognitive Test Anxiety	99.291	1	99.291	27.833	.000
	Math Learning Anxiety	379.276	1	379.276	106.319	.000
	Gender	.001	1	.001	.000	.283
	Residual (error)	959.617	269			
	Total (corrected)	2464.051	272			
After NE	Cognitive Test Anxiety	53.690	1	53.690	12.399	.001
	Math Learning Anxiety	615.277	1	615.277	142.097	.000
	Gender	5.024	1	5.024	1.160	.282
	Residual (error)	1164.767	269			
	Total (corrected)	3227.480	272			

The disparity in math testing across genders was more pronounced when controlling for the other two types of anxiety (adjusted means: 8.588 for girls and 8.592 for boys, resulting in a difference of .004), compared to the situation without control (8.59 for girls and 8.59 for boys, with a difference of .000, see Table 17). The effect size of gender on math testing anxiety, while controlling for math learning anxiety and cognitive test anxiety, was $r = .000$, signifying the absence of a gender effect. The same absence of significant differences based on gender was observed in the post-assessment results. After controlling for the anxiety related to learning in math, and the one regarding cognitive testing, gender did not have a significant effect ($F(1, 269) = 1.16$, $p = .282 > .05$), and the effect size was $r = .004$.

Table 17. *Adjusted and unadjusted means and variance indicators for math testing anxiety level, for each level of the variable gender, controlling for the effects of cognitive test anxiety and math learning anxiety*

	Gender	N	Unadjusted		Adjusted	
			M	SD	M	SE
Before NE	Female	146	8.59	3.075	8.588	.157
	Male	127	8.59	2.945	8.592	.168
After NE	Female	146	8.30	3.620	8.140	.173
	Male	127	8.26	3.244	8.414	.185

Therefore, research hypothesis (H_3) is rejected, as data analysis indicated that gender did not exert a significant impact on all types of anxiety, both preceding and following the NE.

6. Discussion and Conclusion

The study revealed significant differences between test anxiety across the time points, showing that students' test anxiety levels were lower after NE compared to before. The same trend was observed in both test-related anxiety, and study-related anxiety in mathematics, following the application of the Paired T-Test. Thus, the first research hypothesis (H1) was confirmed.

The noticed very strong significant decrease in test anxiety levels and the significant, and strong decrease in math testing anxiety following the National Evaluation period can be linked to the relief from the pressure to perform well on the announced exam. The reduction can be also attributed to the students’ awareness of the absence of grades in the evaluation process. Without the pressure of graded assessments, students experience reduced performance-related stress, which may contribute to a more significant drop in anxiety after the evaluation period ends. Moreover, the pressure typically associated with academic performance diminished, possibly due to the absence of grading, which prevented their parents or legal tutors from imposing expectations based on grades, and from chastising students for the potential unsatisfactory outcomes they might achieve on the examination. This suggests that the grading system serves as a critical factor in shaping anxiety levels, and its absence can alleviate stress, normalize anxiety across different grade levels, and minimize performance-related stress which typically increases with age.

The differences in anxiety levels observed through the test-retest analysis conducted before and after the Romanian NE, specifically the decrease in anxiety levels post-assessment, can be also attributed to other several factors. One key factor may be the increased confidence expressed by students (82.4%) before the NE regarding their preparation for the NE and knowledge of mathematical content. Additionally, the reduction in pressure from parents after the completion of the evaluation period may play a role, particularly following potential criticisms or reprimands. However, 40.3% of students reported that they were never subjected to disciplinary measures, while 43.6% claimed that such measures were applied sometimes if they failed to meet their parents’ expectations regarding grades and academic performance.

Moreover, prior to the NE, students had positive expectations, with most reporting that they anticipated correctly solving the proposed mathematical tasks and achieving at least a good result (59.3% FB, 35.5% B). Although they are still quite young, these students exhibit a high level of awareness regarding the expectations their parents have of them, perceiving a significant pressure to meet successfully their high standards and set goals. The majority of students (94.8%) reported that their parents expect them to achieve the highest grade, while 90.1% indicated that their parents mantain high expectations at least often concerning their academic performance.

Although many students reported not being scoulded, the findings indicate that they are aware of the high expectations held by important adults in their lives, and understand the the significance of these assessments for their academic trajectories, even though they did not receive any grade. It is possible that, prior to the NE, the verbalization of these expectations by parents, or their gestures indicating a desire for good results, may cause students to experience heightened emotions and increased anxiety. Subsequently, after completing the assessments, students likely experience a gradual reduction in anxiety as the pressure and the expression of expectations by parents diminished. The reduction in anxiety can also be associated to the interaction students had with their parents, teachers a few days after the assessments, and before the administration of the questionnaires related to anxiety. During these conversations, students likely discuss their strengths, areas where they struggled, and aspects they need to work on. This exchange likely alleviates the pressure they felt, as the expectations from their parents may be reassessed and communicated more constructively. As a result, this reduction in perceived pressure is reflected in the lowered anxiety levels observed in students after the national evaluations.

Despite evidence that age significantly impacts test anxiety, which tends to escalate with aging (Hembree, 1988; Sorvo et al., 2017; von der Embse et al., 2018), our research hypothesis (H_2) was rejected, as the analysis revealed no statistically significant differences in test and math anxiety levels based on the grade variable (second-graders and fourth-graders), when two types of anxiety at a time were controlled using the Analysis of Covariance (ANCOVA). When controlling for math learning anxiety and test anxiety in math, insignificant differences were revealed between educational levels in terms of cognitive test anxiety, before the NE. However, after the NE, a week effect of the educational level on cognitive test anxiety was noted. Moreover, the results revealed no differences in math anxiety or test anxiety in math based on educational level when the other two types of anxiety were controlled for in each case, both before and after NE.

These findings corroborate previous research indicating similar math anxiety scores across different grade levels. For instance, Gierl and Bisanz (1995) discovered no variations in math anxiety between third and sixth graders in problem-solving contexts. Likewise, Ramirez et al. (2013) revealed similar math anxiety scores among first and second grade students, while Young et al. (2012) identified no significant disparities in math anxiety between second and third graders. Similarly, Erturan and Jansen (2015) observed no statistically significant grade-based differences in math anxiety between third and sixth grade students. On the contrary, Popa et al. (2018) reported meaningful differences in test anxiety between pupils of the second and third grades. Similarly, Van Mier et al. (2019) found that grade level had a substantial impact on math anxiety, with second-grade students reporting higher levels of math anxiety than those in fourth grade. Furthermore, Sorvo et al. (2017) observed that math-learning-related anxiety in stuents from second to fifth grade was more prevalent among younger students compared to their older classmates.

The absence of a significant impact of educational level on test-related anxiety, as well as on math learning and math-testing anxiety both before and after NE, may be associated to the standardization of educational experiences, exposure to similar teaching meathods, and assessment formats. Another possible justification for the lack of variance in anxiety levels across age groups, regardless their educational stage, is that students are likely exposed to similar social pressures from various sources, such as parental or teacher expectations, peer influence, and standardized testing, which remain relatively constant across different educational levels.

Consistent with the previous research hypothesis, hypothesis (H_3) was rejected due to the absence of evidence supporting a gender difference in cognitive test and math testing anxiety levels, either before or after the NE. Likewise, no significant gender influence emerged on math learning anxiety prior to the NE. The only notable difference was observed in math learning anxiety, when both types of test anxiety were controlled for using the Analysis of Covariance. In this case, a significant small effect of gender was identified, with female students exhibiting higher levels of math learning anxiety compared to male students. Except for this case, the findings showed that gender has no influence on test and math anxiety. This result aligns with the findings of other researchers (Ahmed, 2018; Birgin et al., 2010; Chiu & Henry, Crișan & Copaci, 2014; 1990*;* Dowker et al., 2012; Erturan & Jansen, 2015; Harari et al., 2013; Jameson, 2014; Ma & Xu, 2004; Ma & Xu, 2004; Moore, 2006; Popa et al., 2018). According to Szczygieł et al. (2024), during the initial stages of schooling, students exhibited similar levels of math anxiety due to their young age and lack of familiarity with the expectations surrounding math classes. However, by the end of first grade, the researchers identified significant disparities in math anxiety based on gender. Notably, these discrepancies diminished by the end of second grade, which the authors attribute to the emergence of mathematical achievement as a key predictor of anxiety related to math. In contrast, our findings are not congruous to other existing results in the literature, which demonstrate statistically significant gender differences in test and math anxiety, with females reporting higher anxiety levels (Carey et al., 2017; Cassady & Johnson, 2002; Devine et al., 2012; Farooqi et al., 2012; Hembree, 1988; Hill et al., 2016; von der Embse et al., 2018).

The lack of pronounced gender distinctions in test anxiety, math learning and math-testing anxiety can be attributed to the equitable access to educational resources, and the similar external pressure faced by both boys and girls during the Romaninan NE. Factors such as parental expectations, peer comparison, and perceived significance of these assessments, instilled by parents or legal tutors, exert a consistent influence on all students, regardless of gender. These pressures are silimar for both boys and girls, which may contribute to uniform anxiety levels between the two groups.

7. Limitations and future research

Given the age group of 8-12 years, the primary limitation is the potential for personal overestimation or underestimation in the students' self-assessments when completing the questionnaire. This may have impacted the accuracy of their responses and, in turn, affected the evaluation of their both test and math anxiety. To this limitation, one may add a the more general one derived from the measures' self-administration procedure.

To reduce students' anxiety, all the school activities implemented in school should be rooted in their everyday experiences, or embedded in fictional stories that provide realistic context. This approach provides a realistic context, facilitating robust correlations between mathematical concepts and real-life situations. It can be effectively implemented through the integration of technology-mediated strategies like gamification in mathematics pedagogy. The application of this innovative strategy aims to assess its potential impact on students' anxiety levels.

Future research could investigate how environmental factors such as parenting styles, parental expectations, peer support, overall well-being, and outcomes of high-stakes examinations enhance the severity of test anxiety and math anxiety in this age group. Additionally, upcoming research may explore the effectiveness of educational interventions that incorporate modern strategies, including digital games, in reducing anxiety levels.

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