CBWA
CENTRE FOR BEHAVIOUR & WELLNESS ADVOCACY

Publisher: Centre for Behaviour and Wellness Advocacy, Ghana
Co-publisher: Cherkas Global University, USA
Has been issued since 2014
ISSN 2410-4981. E-ISSN 2508-1055
2024. 11(3): 346-361

DOI: 10.13187/jare.2024.3.346

Journal homepage:
http://kadint.net/our-journal.html

Levels of Anxiety Towards Mathematics in Elementary School Students

Teresa Zamora-Lobato [a, *], Lizzeth Navarro-Ibarra [b], Rosalba Cabrera Gutiérrez [c]

[a] Tecnológico Nacional de México – Sede ITSM, Veracruz, Mexico
[b] Instituto Tecnológico de Sonora, Ciudad Obregón, Mexico
[c] Centro de Estudios de Posgrado & Universidad Autónoma de Aguascalientes, Mexico

Abstract

This study aims to examine the existence of anxiety towards mathematics in elementary school students. For such purpose, it was determined that sixth-grade public school students would be examined. Employing a non-probability, self-selection sampling, an Anxiety Towards Mathematics test, designed by Muñoz-Cantero and Mato-Vázquez, was applied to 183 students. These students stemmed from four different public schools; some attended school in the morning and others in the evening. The reliability of said test showed a Cronbach's Alpha of 0.94, which also meets the function of normality. The Exploratory Factor Analysis was used to obtain the underlying factor solution, which was confirmed subsequently through the Structural Equations Model method. The main findings present the underlying structure of a four-factor model obtained with the Exploratory Factor Analysis validated through the Structural Equations Model method. Regarding gender differences, it was proven that in the dimensions of anxiety towards evaluation, temporality, understanding math problems, and numbers and math operations, there is a difference between males and females, except for anxiety towards mathematical situations in daily life. This last result can be linked to how independent they are in their daily life and not precisely inside a classroom.

Keywords: Anxiety Towards Mathematics, Evaluation, Gender, Teacher's Performance.

1. Introduction

Nowadays, the topic of learning and teaching mathematics does not go unnoticed in educational institutions, especially when the student's performance is consistently deficient (Sarfo et al., 2020). An interesting fact that stands out is the most recent report made from the 2024 Programme for International Students Assessment (PISA) test, which indicates a significant decrease in the level of mathematical competence since only 34% reached level 2, a percentage below the average (69 %) of all Organization for Economic Co-operation and Development (OECD) members. The result obtained between 2018 and 2022 displays a setback in mathematics and sciences in relation to what was observed from 2003 to 2009. Specifically for mathematics, the students' scores decreased, and even those who reached a high performance decreased by a greater percentage than those who got a lesser performance (OECD, 2022).

* Corresponding author
E-mail addresses: mtjzamora@itsm.edu.mx (T. Zamora-Lobato)
Received: 04 July 2024 Revised: 25 November 2024 Accepted: 27 November 2024
Published: 31 December 2024

Thus, the score appearing in the OECD (2022) places Mexico at a low level in mathematics. This is related to the results of the study conducted by Larracilla-Salazar et al. (2019). Firstly, the results exhibited an ongoing concern regarding the students enrolled in Economics, Business Administration and related fields, who could be deemed as having a more solid background in mathematics. Secondly, it also allows for the possibility of considering the teachers' education as an element that likely affects the students' performance. When the performance is low, it is associated with the levels of anxiety caused by the process of learning mathematics. These facts are alarming since mathematics is essential to our education, regardless of our profession. A low score in mathematical skills negatively affects our professional development as well as our everyday activities. For instance, the study conducted by Suri et al. (2013) indicates how certain consumers cannot calculate the prices accurately. If there are items on sale whose price is easy to calculate but the consumers cannot, they would overlook them.

The low performance of a student in mathematics can obey different situations, among which we could reference the teaching strategies or the complexity of developing equations. However, some studies have cited that the main reasons could be related to the characteristics of the mathematical discipline, the performance and how prepared the educational staff is for teaching mathematics, the assessments and, most importantly, the students' traits (Sepúlveda-Obreque et al., 2019). Considering these arguments makes it interesting to question whether the process of learning mathematics causes anxiety in a student. In this regard, anxiety towards mathematics has been an ongoing topic in literature where several scales that assess this phenomenon can be identified, such as the pioneering works of Richardson and Suinn (1972), Fennema and Sherman (1976, 1978), Alexander and Martray (1989), McLeod (1992, 1999), Larracilla-Salazar et al. (2019), among others.

However, how can anxiety be defined? Szucs and Mammarella (2020) developed a study on anxiety towards mathematics sponsored by the United Nations Educational, Scientific and Cultural Organization (UNESCO), a specialized organism from the United Nations. This research references that anxiety towards mathematics is presented in the students' fear or discomfort towards the subject of mathematics, which can also occur towards making calculations or solving mathematical problems. In addition, it is worth mentioning that both perception and attitude also have an influence on this topic (McLeod, 1994).

Other predictors associated with mathematics and on which the studies have focused are the numeric system, comparison of symbolic numbers, verbal and spatially short-term memory ability, and job performance. In their study, Caviola et al. (2020) proved that, on the one hand, homework was not adequately set up for the development of mathematical skills in school-age students; on the other hand, this did not occur with the rest of the predictors in which a very significant correlation was observed.

Furthermore, there is no doubt that anxiety towards mathematics is a phenomenon that affects people throughout their school careers from an early age, since it is linked to how worried students feel about said subject (Fernández-Blanco et al., 2023). On this matter, it is worth emphasizing that neither the students' knowledge nor their ability influences it, given that some existing studies have been designed to measure this phenomenon, such as the Mathematics Anxiety Rating Scale (MARS) made by Richardson and Suinn (1972); the Abbreviated Math Anxiety Scale (AMAS) designed by Hopko et al. (2003), whose results have shown that there are different causes and even symptoms regardless of how solid the set of skills the students possess.

Negative experiences and even beliefs can produce anxiety towards mathematics. In relation to this, Soni and Kumari (2017) studied the background and its consequences on anxiety and attitude towards mathematics in 595 native children from India from schools in the southeast of Punjab, and their ages ranged from 10 to 15 years old. For such purpose, the parent or tutor participated in the test by using a shortened version of the Mathematics Anxiety Scale. The results indicated that parents' anxiety and attitude towards mathematics acted as precursors to the students' own anxiety and attitude towards mathematics. Also, Evangelopoulou et al. (2023) influenced even more in their children's mathematical performance.

While there are several strategies to address anxiety towards mathematics inside and outside of the classroom, it is necessary to identify the causes of anxiety in each specific group since it could vary from one population to another depending on the students' traits. Based on this, Evangelopoulou et al. (2023) mention that anxiety will have a significant emotional impact on the students who experience it by affecting their performance in mathematics. In their recommendations, they emphasize the need for all school personnel to implement some activities as a means to reduce anxiety levels from an early age.

The following question emerges: what is the anxiety level towards mathematics in sixth grade children currently enrolled in public schools in the region of Xalapa, Veracruz, Mexico? In addition, what is the underlying structure that explains mathematics anxiety in students? As a result, this study aims to measure the anxiety level towards mathematics in sixth-grade students currently enrolled in public schools in the region of Xalapa, Veracruz, Mexico. Finally, to determine the underlying structure which explains mathematics anxiety in students.

Therefore, the hypotheses are as follows:

Ho_1 = The level of anxiety in sixth-grade students is high.

Hi_1 = The level of anxiety in sixth-grade students is low.

Ho_2 = There are no variables that explain anxiety towards mathematics expressed in sixth-grade public school students from Xalapa, Veracruz.

Hi_2 = The set of variables explains the anxiety about mathematics expressed by sixth-grade public school students from Xalapa, Veracruz.

2. Literature review

Anxiety towards mathematics has been analyzed for a while now. One of the pioneering works was made by Taylor (1952), who designed the Manifest Anxiety Scale to measure cognitive task performance. Likewise, another work was conducted by Gough (1954), to whom the term mathemaphobia is attributed, which is defined as a sort of anxiety towards numbers. Several studies followed this work, such as those by Dreger and Aiken (1957), who tried to identify the origin of the condition. To better understand the feelings of tension and anxiety presented by students, which certainly affect the comprehension and the skill to solve algebraic problems, the study of Richardson and Suinn (1972) took place.

Furthermore, the topic of mathematical anxiety is addressed in several studies focusing on different aspects such as mathematical performance (Hembree, 1990; Ashcraft, 2002), the existence of negative emotions like fear, panic and mathemaphobia (Gough, 1954), and how disorders and mathematical anxiety are conditions that affect performance (Hembree 1990; Iglesias, 1972; Lazarus, 1974; Tobias, 1976; Tobias, 1978).

Moreover, anxiety towards mathematics is not related to the student's intelligence but rather the emotions caused by this subject, like fear or dread (Moreno-García et al., 2022; García-Santillán et al., 2022). New tests were created to measure this phenomenon alongside the interest in studying this topic. For example, Richardson and Suinn (1972) designed the Mathematics Anxiety Rating Scale (MARS) scale, which contains 98 items on a five-level Likert scale, where the subject considers how much anxiety they feel towards mathematics. This scale contributed to the creation of several more, such as the scale by Alexander and Martray (1989), Plake and Parker (1982), and Hopko et al. (2003), who only took twenty-five items, all focused on the level of anxiety. In addition, Dreger and Aiken (1957) posited a hypothesis which allowed for the conceptualization of anxiety towards mathematics vs general anxiety. Consequently, Spielberger (1977), in his Anxiety Inventory Test, exhibited the existing relation between these two types of anxiety.

Other studies, such as Dew et al. (1983), used several instruments to measure anxiety during mathematics tests. In the same line, Hunsley (1978) shows the similarities and differences in mathematics anxiety during tests. Similarly, LeFevre et al. (1992) pointed out that students perceive this subject as terrifying. Therefore, they will likely avoid it as much as possible and look for careers in which mathematics is not an essential requirement (Ashcraft, Krause, 2007). In fact, the Organization for Economic Co-operation and Development (OECD, 2015) denotes in its report on anxiety towards mathematics that 59 % of 15-year-old students consider mathematics class challenging, 33 % tend to feel stressed while solving mathematics homework, and 30 % indicate fear of obtaining low grades in mathematics.

Nowadays, the state of the art regarding anxiety towards mathematics is constantly evolving and dynamic (Chang, Beilock, 2016). Suppose we also add the permanent results provided by the PISA test, where one of the indicators assessed is mathematics performance in each country. In that case, this fact triggers the ongoing interest that researchers have in explaining the low scores in mathematics. From these results, Radišić et al. (2015) conducted a study in Serbia, which reports that over 50 % of Serbian students tend to worry due to the difficulties experienced in mathematics class, while also getting low grades, which in turn leads to high levels of anxiety.

Different studies that use an approach based on emotions towards learning and mathematical performance have noted that emotions tend to be negative, resulting in anxiety towards mathematics. Based on a positive approach, Villavicencio and Bernardo (2016) made a study on Filipino college students who were enrolled in trigonometry courses. The Academic Emotions Questionnaire-Mathematics test was applied, and scales were used to assess self-efficacy and self-regulation in trigonometry. This study concluded that if positive emotions are looked for while learning mathematics, they can contribute towards achieving a more balanced picture regarding the role of affective states in mathematics learning.

Anxiety has been studied depending on school level and beliefs, and the results have proven a negative effect on the high level of anxiety caused by homework, even higher when parents or tutors want to help (Szczygieł, 2020). On the contrary, if a student can answer any assessment, it is because the teacher is interested in the student's learning, which reduces anxiety, as Visscher and White (2020) pointed out. Their study analyzes the validation of fifteen items from the Revised Mathematics Anxiety Scale (RMARS), a standardized test that measures students' anxiety based on their responses to calculations and assessments. What is important to emphasize is that when the level of anxiety towards mathematics is low, the student's performance improves in any domain, whether in assessments or in doing homework, whereas a high level of anxiety deeply affects said performance.

As a result, from the referred arguments, to respond to the questions and achieve the objectives proposed, after testing the hypothesis, the method employed will be defined below.

3. Method

Research Design and Sample

The study was conducted by using a hypothetic-deductive approach. Through a non-probabilistic self-selection sampling, a scale was applied to 183 students of sixth grade, 44 % male (n = 80) and 56 % female (n = 103), enrolled in public schools from a middle-class background in the city of Xalapa, Veracruz, Mexico. The ages of all participants ranged from 11 to 12 years old.

Instrument

To gather the data, the test designed by Muñoz-Cantero and Mato-Vázquez (2007), called "Anxiety Towards Mathematics" was used. Which consists of 24 items grouped into five factors or dimensions: the factor "Anxiety towards evaluation", which contains 11 items; "Anxiety towards temporality" with 4 items; "Anxiety towards the understanding of math problems" with 3 items; and "Anxiety towards a mathematical situation in daily life" also comprising 3 items. (See Table 1 and Appendix)

Table 1. Dimensions of the scale

Dimension	Code	Items
Anxiety towards evaluation	ATE	1, 2, 8, 10, 11, 14, 15, 18, 20, 22, 23
Anxiety towards temporality	ATT	4, 6, 7, 12
Anxiety towards the understanding of math problems	ATUMP	5, 17, 19
Anxiety towards numbers and math operations	ATNMO	3, 13, 16
Anxiety towards mathematical situation in daily life	ATMSDL	9, 21, 24

Source: based on the test by Muñoz-Cantero, Mato-Vázquez, 2007

Statistical procedure

To validate the data obtained from the test, first, the internal consistency of the items is assessed by using Cronbach's Alpha (CA) and Omega coefficient. The AC is a reliability indicator of psychometric scales used in social sciences. Theoretically, if the internal consistency of all the items on a scale is high, we can infer that said scale is consistent and it can measure the construct that we are analyzing. Therefore, if we use the variances to calculate the CA, the equation is as follows:

$$\alpha = \frac{K}{K-1}\left(\frac{\sum_{i}^{K} = 1\sigma^2 Yi}{\sigma_X^2}\right.$$

Where:
K = Number of items in the scale
$\sigma^2 Yi$ = variance of item i
$\sigma^2 X$ = variance of all the individuals' observed scores.

As a way of calculating omega coefficient, factorial loadings are employed to obtain a more stable coefficient of reliability (Gerbing, Anderson, 1988) by using the following equation:

$$\omega = \frac{\left[\sum_{i=1}^{i}\lambda\right]^2}{\left[\sum_{i=1}^{i}\lambda\right]^2 + \left[\sum_{i=1}^{i}1-\lambda_1^2\right]}$$

Where:
ω = omega coefficient
ʎi = standardized factorial loading of i

Since the absence of normality could be a possibility, the employment of a polychoric correlation matrix is suggested for carrying out an exploratory factor analysis (Richaud, 2005; Ogasawara, 2011). The exploratory factor analysis (EFA) calculates Bartlett's test of sphericity, which is complemented by Kaiser-Meyer-Olkin's test (KMO), the value of Chi-square with *n* degrees of freedom and the p-value, as well as the measures obtained by a Measurement system analysis (MSA). Therefore, the null hypothesis (H0) will be rejected if the value of the Chi-square calculated is higher than the critical value shown in the tables. It is essential to identify that the value of the determinant approaches zero (d = from 0 to 1), which is a key indicator for the validity of the analysis and will assist in verifying whether it corresponds to an identity matrix or not. After the EFA, with the factor solution obtained, the measurement model is validated using a Structural Equation Modeling (SEM) method. This method validates the model's adjustment, structural adjustment, and parsimony (Ho, 2006; Schreiber et al., 2006; Hooper et al., 2008; Hair et al., 1999). For designing the diagrams and the SEM calculations, the software IBM SPSS AMOS v23 was used.

The assessed indicators are: χ^2 (Chi-square), Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Root Mean Squared Error of Approximation (RMSEA), Root Mean Squared Residuals (RMR), Tucker Lewis Index (TLI), and Comparative Fit Index (CFI).

Analysis

The values of Cronbach's alpha and Omega coefficient are presented in Table 2, Table 2b and Table 3, as well as the values if the element was deleted for both cases.

Table 2. Reliability statistics

Valid N	%	Cronbach's alpha	McDonald's Omega
183	100	.940	.939
Excluded [a] 0	0	N elements 24	N elements 24
[a]. The elimination for each list is based on all the variables from the procedure.			

Table 2b. Statistics for each item if the element is deleted (Cronbach's alpha)

Items	Mean of scale if the element is deleted	Variance of scale if the element is deleted	Corrected total correlation of elements	Cronbach's alpha if the element is deleted
Gender	77.8525	467.907	-.271	.935
Mood	76.3443	461.293	.006	.934
Age	77.6721	462.815	-.035	.933

Items	Mean of scale if the element is deleted	Variance of scale if the element is deleted	Corrected total correlation of elements	Cronbach's alpha if the element is deleted
V1	77.0273	428.104	.596	.928
V2	76.6776	430.516	.555	.929
V3	76.5464	423.733	.615	.928
V4	76.9016	431.309	.584	.929
V5	76.3552	422.186	.654	.927
V6	75.7978	422.041	.681	.927
V7	76.2568	424.445	.650	.928
V8	76.1421	424.848	.548	.929
V9	75.5574	434.270	.483	.930
V10	76.0273	424.906	.616	.928
V11	76.6448	423.945	.644	.928
V12	76.6831	425.020	.583	.929
V13	75.9945	423.709	.634	.928
V14	77.0328	421.076	.694	.927
V15	76.9727	427.060	.585	.928
V16	76.1858	421.767	.712	.927
V17	76.1475	419.192	.684	.927
V18	76.3169	423.525	.617	.928
V19	75.7541	424.879	.621	.928
V20	77.0984	432.474	.489	.930
V21	75.8907	430.933	.506	.930
V22	76.4317	418.840	.645	.928
V23	76.9344	426.985	.580	.929
V24	75.5519	428.227	.605	.928

Table 3. Statistics for each item if the element is deleted (Omega coefficient)

	Mean of scale if the element is deleted	Variance of scale if the element is deleted	Corrected total correlation of elements	Squared multiple correlation	Cronbach's alpha if the element is deleted	McDonald's omega if the element is deleted
V1	70.6503	432.404	.606	.542	.937	.936
V2	70.3005	435.200	.557	.544	.938	.937
V3	70.1694	428.680	.612	.513	.937	.936
V4	70.5246	436.053	.586	.466	.938	.936
V5	69.9781	426.835	.657	.622	.937	.935
V6	69.4208	426.531	.686	.606	.936	.935
V7	69.8798	428.942	.655	.621	.937	.935
V8	69.7650	429.719	.547	.384	.938	.937
V9	69.1803	439.171	.482	.420	.939	.938
V10	69.6503	429.723	.615	.538	.937	.936
V11	70.2678	428.714	.645	.620	.937	.936
V12	70.3060	429.697	.585	.448	.938	.936
V13	69.6175	428.655	.632	.534	.937	.936
V14	70.6557	425.963	.692	.638	.936	.935
V15	70.5956	431.770	.586	.565	.938	.937
V16	69.8087	426.441	.714	.590	.936	.934
V17	69.7705	423.760	.688	.602	.936	.935
V18	69.9399	428.299	.618	.477	.937	.936
V19	69.3770	429.786	.619	.595	.937	.936
V20	70.7213	437.257	.491	.482	.939	.938

	Mean of scale if the element is deleted	Variance of scale if the element is deleted	Corrected total correlation of elements	Squared multiple correlation	Cronbach's alpha if the element is deleted	McDonald's omega if the element is deleted
V21	69.5137	435.801	.505	.415	.939	.938
V22	70.0546	423.579	.645	.589	.937	.936
V23	70.5574	431.896	.578	.479	.938	.936
V24	69.1749	432.903	.607	.579	.937	.936

In both Cronbach's alpha and Omega coefficient tests, the scale proves internal consistency and reliability in the items, which in turn makes the database reliable for the corresponding analysis. To verify the hypothesis of normality, we established the following: Ho: data must have a normal distribution; Ha: data has no normal distribution. Therefore, if Ho <0.05, Ho is then rejected and Ha accepted; whereas if Ho >0.05, there is no evidence to reject Ho.

4. Results

To verify the normality of the data, the Kolmogorov-Smirnov test (KS-1) was applied since the sample consists of 183 subjects, thus n >50, and the cases are assessed with the items grouped for each dimension. The result of the KS-1 test shows an absence of normality in the data (Table 4). As a result, it is suggested that an exploratory factor analysis is applied to identify underlying variables, which explains the structure of correlations in the set of observed variables. Therefore, the EFA was used to obtain the factor solution by extracting the main components and applying the Varimax rotation (Ogasawara, 2011; Timmerman, Lorenzo-Seva, 2011).

Table 4. Kolmogorov-Smirnov test of normality for one sample

			ATE	ATT	ATUMP	ATNMO	ATMSDL
N			183	183	183	183	183
Normal parameters [a, b]	Mean		30.26	12.021	9.989	9.519	11.245
	Standard deviation		10.511	4.1043	3.3083	3.3803	3.1378
Most extreme differences	Absolute		.082	.087	.095	.085	.127
	Positive		.082	.087	.074	.080	.116
	Negative		-.041	-.073	-.095	-.085	-.127
Test statistic			.082	.087	.095	.085	.127
Asymp. Sig. (two-tailed) [c]			.004	.002	<.001	.002	<.001
Monte Carlo Sig. (two-tailed) [d]	Sig.		.005	.003	<.001	.003	<.001
	Confidence interval on 99%	Lower Limit	.003	.001	.000	.002	.000
		Upper limit	.007	.004	.001	.005	.000

[a] Test distribution is normal. [b] Calculated from data. [c] Correction of Lilliefors significance test. [d] Lilliefors method based on the samples of 10000 Monte Carlo with an initial seed of 2000000.

Exploratory factorial analysis

Both Bartlett's test of sphericity and the KMO test obtained adequate values, the latter with a sampling adequacy of .930, a Chi-square of 2317.419 with 276 degrees of freedom and p-value <.001, which suggests an adequate set of data for analysis. Furthermore, the correlation matrices present moderate correlations which are appropriate for grouping factors, and since the determinant's value is close to zero, this demonstrates that the correlation matrix is adequate. There was no multicollinearity observed, and the usage of an exploratory factor analysis is justified to reduce the group of data into an underlying structure that better explains the variance (see Table 5 and Table 5b).

Table 5. Correlations matrix and MSA

	V1	V2	V3	V4	V5	V6	V7	V8	V9	V10	V11	V12	MSA
V1	1.000												.918[a]
V2	0.474	1.000											.897[a]
V3	0.484	0.447	1.000										.945[a]
V4	0.478	0.485	0.392	1.000									.953[a]
V5	0.529	0.373	0.568	0.434	1.000								.905[a]
V6	0.441	0.424	0.507	0.358	0.542	1.000							.941[a]
V7	0.455	0.498	0.534	0.536	0.659	0.469	1.000						.911[a]
V8	0.343	0.247	0.293	0.260	0.357	0.384	0.365	1.000					.954[a]
V9	0.195	0.116	0.316	0.218	0.348	0.483	0.218	0.235	1.000				.926[a]
V10	0.282	0.245	0.418	0.309	0.487	0.573	0.364	0.374	0.492	1.000			.930[a]
V11	0.505	0.589	0.444	0.504	0.483	0.416	0.568	0.344	0.174	0.435	1.000		.932[a]
V12	0.365	0.322	0.384	0.392	0.429	0.424	0.437	0.371	0.318	0.338	0.420	1.000	.951[a]

[a.]Determinant = 1.542E-6

Table 5b. Correlations matrix and MSA

	V13	V14	V15	V16	V17	V18	V19	V20	V21	V22	V23	V24	MSA
V13	1.000												.944a
V14	0.401	1.000											.923a
V15	0.297	0.625	1.000										.912a
V16	0.494	0.560	0.400	1.000									.953a
V17	0.391	0.463	0.379	0.579	1.000								.935a
V18	0.361	0.487	0.429	0.550	0.411	1.000							.956a
V19	0.544	0.372	0.334	0.567	0.496	0.414	1.000						.923a
V20	0.230	0.506	0.516	0.355	0.425	0.255	0.183	1.000					.892a
V21	0.448	0.310	0.197	0.384	0.480	0.289	0.456	0.164	1.000				.939a
V22	0.496	0.394	0.351	0.467	0.537	0.335	0.508	0.378	0.475	1.000			.921a
V23	0.295	0.606	0.454	0.442	0.448	0.388	0.380	0.411	0.317	0.421	1.000		.935a
V24	0.449	0.349	0.313	0.501	0.550	0.447	0.649	0.197	0.493	0.503	0.298	1.000	.922a

[a.]Determinant = 1.542E-6

After verifying the correlation matrix, which does not constitute an identity matrix, it contains values that surpass the 0.5 threshold in the Measurement System Analysis (MSA) as well as in Bartlett's test of sphericity with KMO. Table 6 describes the total variance and Table 7 the rotated factor matrix. The extraction of four components under the criterion of eigenvalues higher than one provides 52.979% of accumulated variance before rotating the original variables of the phenomenon studied. Table 7 displays the rotated factor matrix with Varimax, where only four factors with >.5 loadings were extracted, the same factor solution with which the initial measurement model is confirmed.

Table 6. Total variance explained

Factor	Sum of squared loadings from the rotation		
	Total	Variance %	Accumulated %
1	4.499	18.745	18.745
2	3.792	15.799	34.544
3	3.297	13.737	48.282
4	1.127	4.697	52.979
Extraction method: maximum likelihood.			

Items that were excluded from the rotated factor matrix for <.5 loadings

V18. I feel nervous when I solve a mathematics assessment test
V8. I get nervous when someone looks at me while I do my math homework
V4. I feel nervous when I think about the math test, one hour before the start of it
V1. I get nervous when I think about the math test the day before

Table 7. Rotated factor matrix [a]

Indicators	F11	F2	F3	F4	Initial measurement model
V19. I feel nervous when I see / hear my teacher explain a math problem	.713				
V24. I feel nervous when I start working on my homework	.708				
V10. I feel nervous when I start studying for a math test	.615				
V6. I get nervous when I realize that next year I will still have math classes	.609				
V21. I feel nervous when I try to find out the change after purchasing something in a store	.577				
V9. I feel nervous when I check the purchase ticket after paying for something	.572				
V16. I feel nervous when I am assigned a list of math problems	.558				
V17. I feel nervous when I try to understand a classmate who is explaining a math problem	.556				
V13. Math operations make me nervous	.521				
V15. I get nervous when I take the final math test		.695			
V14. I feel nervous when I need to explain a math problem to the teacher		.679			
V20. I am nervous when I receive the math test final grades		.643			
V11. Math tests make me nervous		.590			
V23. I feel nervous when I need to explain a problem in math class		.576			
V2. I feel nervous when I receive the questions from the math test		.508			
V5. I feel nervous when I hear other classmates solving a math problem			.677		
V7. I feel nervous when I think about next week's math test			.676		
V3. I get nervous when I open the math book and find a page full of problems			.621		

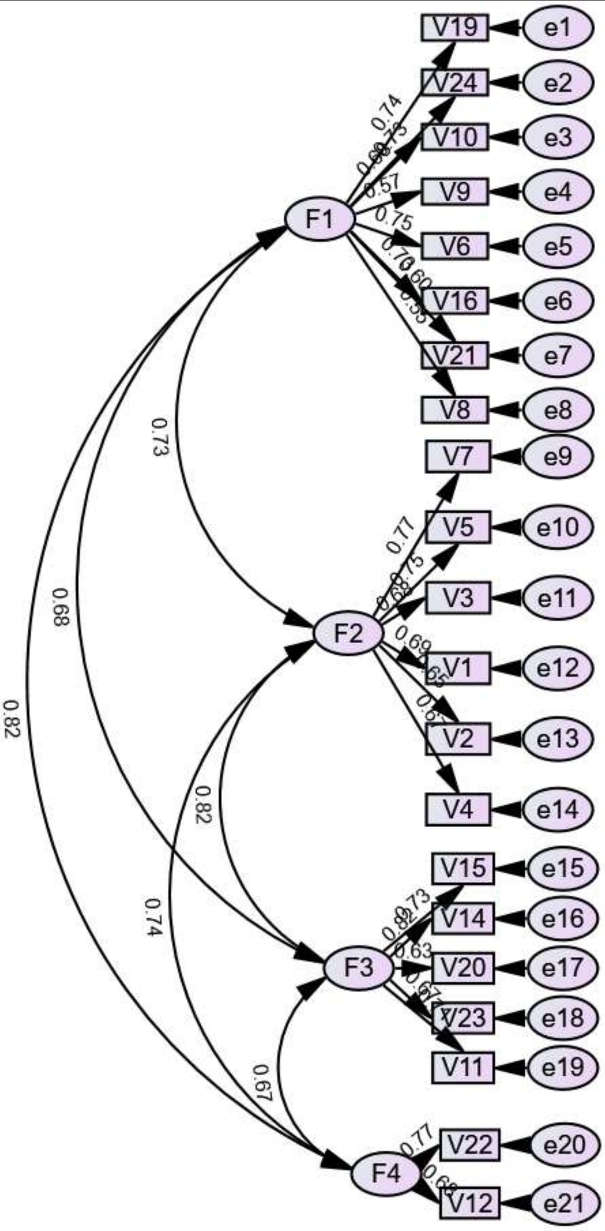

Fig 1. Initial measurement model
(Chi-square = 378.766; Degrees of freedom = 183; Probability level = .000)

Indicators	F11	F2	F3	F4	Initial measurement model
V22. I feel nervous when a math problem is assigned, and I hear that a classmate solves it before me				.726	
V12. I feel nervous when I am assigned difficult math problems for homework and I have to bring them solved for next class				.651	

Extraction method: maximum likelihood. Rotation method: Varimax with Kaiser Normalization. a. The rotation has converged in 7 iterations.

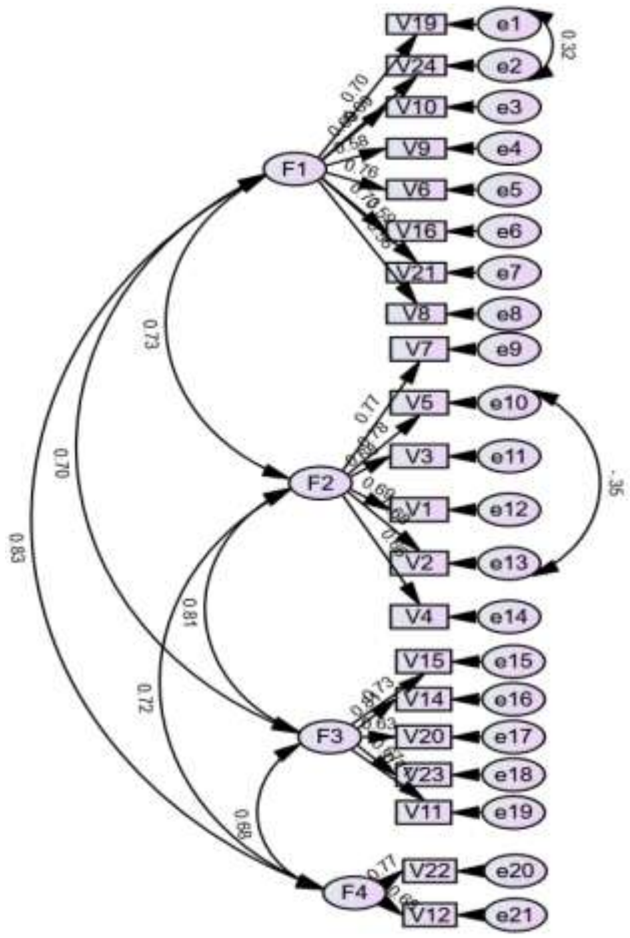

Fig. 2. Measure model
(Chi-square = 349.429; Degrees of freedom = 181; Probability level = .000)

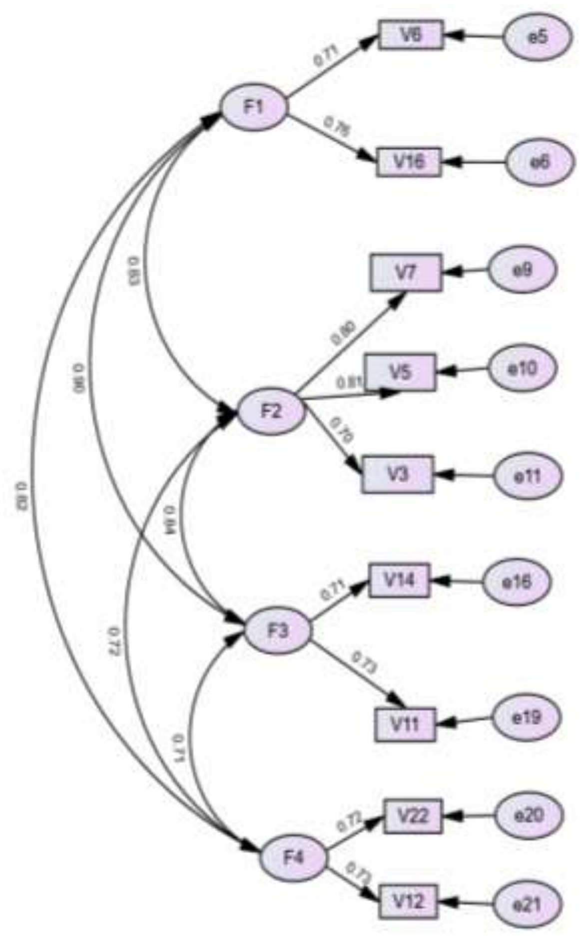

Fig. 3. Measure model
(Chi-square = 35.649; Degrees of freedom = 21; Probability level = .024)

After excluding the indicators below .60 in the initial measurement model (diagram 1), diagram 2 shows the model that contained the best adjustment. Table 8 displays the acceptable values in CMIN/DF (1.698), CFI (.968), GFI (.957), TLI (.962), RMSEA (.062) indicators, among others.

Table 8. Models obtained

	RMSEA	CMIN/DF	RMR	GFI	AGFI	PGFI	TLI	CFI	PRATIO	PNFI	PCFI
Model 1	.077	2.070	.123	.834	.791	.661	.876	.892	.871	.708	.777
Model 2	.072	1.931	.119	.846	.804	.663	.892	.907	.862	.712	.782
Model 3	.062	1.698	.070	.957	.908	.447	.962	.968	.583	.554	.570

5. Discussion

The four-factor model obtained by the confirmatory factor analysis allows us to discuss the results in the following terms: the structure presented in Muñoz-Cantero and Mato-Vázquez (2007) test could not be confirmed in this sample since the component matrix is obtained from a Varimax orthogonal rotation. Subsequently, during the validation of the factor solution model, an adjustment was needed, which caused the exclusion of some indicators.

The four factors better aligned with the purpose of this study regarding the level of anxiety of elementary school students are explained as follows. In factor number one, students feel nervous when realizing that they will keep having math classes next school year and are assigned a list of math problems for them to solve. As for factor two, they get nervous just by thinking about next week's math test, as well as when they listen to their classmates who are solving the math problems, and finally feel nervous just by opening a math book and seeing pages full of problems that need to be solved. This corresponds to what Sepúlveda-Obreque et al. (2019) exposed, who argue that the student's low performance is linked, among other situations, to how complex the equations and the assessments are and, of course, each student's traits.

Regarding factor three, nervousness appears in the students when they need to explain a math problem to the teacher, but generally, they get nervous due to the math test. Lastly, factor four occurs when the students realize that a classmate finished solving a math problem before them, as well as due to the math problems assigned for homework that need to be already solved for the next day's class.

The results provided by these four factors allow us to understand that anxiety towards mathematics among students is not necessarily linked to their abilities or intelligence since the items are more associated with nervousness and fear produced by mathematics, as Gough (1954) pointed out in his pioneering studies. Moreover, the students' nervousness is what provokes that anxiety and affects their performance, just as several authors have emphasized, such as the pioneering studies in this field made by Iglesias (1972), Lazarus (1974), Tobias (1976, 1978), and Hembree (1990); and more recently, Larracilla-Salazar et al. (2019), Moreno-García et al. (2022), and García-Santillán et al. (2022).

The student's low performance in mathematics can arise from several situations, among which we could cite the teaching strategy or the complexity of developing equations. However, some studies have referenced that the main causes are related to the characteristics of the mathematical discipline, the preparation and the performance of the math-teaching staff, the assessment, and, above all, the students' own traits (Sepúlveda-Obreque et al., 2019).

6. Limitations and suggestions for future research

Limitations

This study presents several limitations that should be considered when interpreting its results. Firstly, one of the main limiting factors was the lack of financial resources, which restricted the possibility of conducting a more extensive study and having a more diverse and representative sample. The shortage of resources also prevented the implementation of additional measures, such as qualitative interviews or direct observation, which could have provided a deeper understanding of students' mathematical anxiety experiences. Moreover, the limited time available to carry out the survey was another significant limitation. Due to the short period during which the questionnaires were administered, it was not possible to conduct long-term follow-up or explore the impact of mathematical anxiety on academic performance over time. This time limitation may also have affected the quality of participants' responses, as many students may have felt pressured to complete the survey quickly, potentially influencing the accuracy of their answers.

Recommended future studies

To better understand mathematical anxiety and its impact on academic performance, future studies could adopt longitudinal approaches to track how anxiety evolves over time and how various factors (such as pedagogical interventions, emotional support, and individual student characteristics) influence the experience of mathematical anxiety. Such studies would provide a more comprehensive and dynamic perspective on how students manage anxiety as they progress through their education.

Additionally, it would be valuable to expand the sample to include different educational contexts, such as public and private schools, and explore whether mathematical anxiety varies based on social and cultural contexts. Including students of various ages and educational levels would also allow for a more accurate understanding of how anxiety manifests in different student groups.

7. Conclusion and implications

Conclusion

This research consisted of a review on the topic of anxiety towards mathematics, specifically among sixth-grade public school students from the city of Xalapa, Veracruz, Mexico and the variables that appeared. A correlation analysis confirms that students show levels of mathematical anxiety, just as indicated by the scientific papers referenced in this work. Said works are being produced internationally since this topic is continuously developing, even in the field of teaching mathematics.

As for the determining variables regarding anxiety towards mathematics, the results from the regression analysis suggest that students present this anxiety while facing assessment situations or an activity that includes some mathematical skill. To conclude, mathematics anxiety creates a problem among students, which is a relevant and yet ignored fact despite all the studies conducted to this day. It is also worth noting that the consequences of mathematics anxiety have been proved on an educational performance level. Thus, students with a high level of anxiety tend to evade all sorts of education and professions related to mathematics. The results obtained propose that the mathematics anxiety phenomenon is essentially associated with both a negative perception towards its field and the lack of mathematical skills. It is considered that these factors can contribute to the teaching curriculum and even to the creation of strategies while planning for classes which could help the students overcome mathematics anxiety.

Theoretical implications

The results of this study have significant theoretical implications for the fields of educational psychology and mathematics education. First, the study reinforces the idea that mathematical anxiety is not exclusively related to students' cognitive abilities or intelligence, but also involves emotional factors such as nervousness and fear. This finding aligns with Gough's (1954) pioneering work, which emphasized the emotional dimension of mathematical anxiety. Based on the four factors identified in this study, it can be argued that anxiety towards mathematics should be conceptualized as a complex phenomenon that affects students regardless of their level of ability in the subject. This perspective suggests that existing theoretical models of learning and performance in mathematics should incorporate the emotional dimension of anxiety as a crucial component that influences the acquisition of mathematical skills.

Furthermore, the results suggest the need to expand theoretical models of academic anxiety by integrating the idea that nervousness and fear related to specific mathematical situations (such as exams, interaction with peers, or simply the visualization of problems) are key factors in the experience of anxiety. This model of mathematical anxiety, based on specific factors such as exams, social comparison, and task assignments, offers a more nuanced perspective on how students perceive and experience mathematics. Future studies could explore how these factors interact and contribute to academic performance in mathematics, considering not only the negative effects of anxiety but also possible strategies for mitigating it.

Practical Implications

From a practical standpoint, the findings of this study have several implications for improving the teaching and learning of mathematics in the classroom. First, it becomes clear that mathematical anxiety must be addressed comprehensively in the classroom, as it directly affects student performance. Teachers could adopt pedagogical approaches that foster a more relaxed and less threatening learning environment. This could include implementing activities that reduce stress, such as math games, group dynamics, or relaxation techniques before assessments. Furthermore, promoting a school culture that values effort and the learning process, rather than focusing solely on outcomes, could help alleviate the pressure generated by mathematical anxiety.

Another key implication is the need for continuous professional development for teachers. Educators should be trained to recognize signs of anxiety in their students and to apply strategies that help manage it. Incorporating modules on emotional management and techniques for reducing anxiety into teacher training programs could be an important step. Teachers should also receive guidance on how to structure assessments in a way that does not exacerbate anxiety, using formative assessments or more frequent evaluations that provide continuous feedback, rather than relying solely on final exams that induce high levels of stress.

Finally, the results suggest that mathematical assessments should be designed with consideration for the emotional impact they have on students. Rather than administering strict or competitive exams, more flexible and collaborative approaches could be adopted to allow students to approach mathematics with greater confidence and less anxiety. Assessments that include constructive feedback, as well as group tasks or collaborative projects, could help reduce pressure and improve students' attitudes toward mathematics.

8. Declarations

Ethics approval and consent to participate

This study is carried out in accordance with the recommendations of the Code of Ethics of the National Technology of Mexico. The Research Ethics Committee of the Division of Graduate Studies and Research approved the protocol. In accordance with the Declaration of Helsinki, all participants gave their consent to participate in the study.

Consent for publication

Not applicable.

Availability of data and materials

Data and materials associated with this study are available upon request.

Conflict of interest statement

The author's declares no conflict of interest.

Funding

This research received no external funding. However, the authors sincerely thank the Centre for Behaviour and Wellness Advocacy, Ghana, for providing financial support through the Institutional Open Access Publication Fund.

Authors' contributions

This document is the authors' work, as an intellectual contribution of their academic work, which they approved for publication. Conceptualization: TZL, LNI and RCG, methodology, data curation, data analysis: TZL and LNI, writing—original draft preparation, writing: TZL, LNI and RCG; writing—review and editing: RCG, and TZL; writing—supervision: TZL AND LNI; funding – TZL and RCG. All authors have read and agreed to the final version of the manuscript for publication.

Acknowledgements

Our gratitude goes to the public schools that support us in applying the test.

Authors' ORCID

Teresa Zamora-Lobato https://orcid.org/0000-0001-5564-3976
Lizzeth Navarro-Ibarra https://orcid.org/0000-0003-4537-9248
Rosalba Cabrera Gutiérrez https://orcid.org/0009-0006-5119-7175

References

Alexander, Martray, 1989 – *Alexander, L., Martray, C.* (1989). The development of an abbreviated version of the Mathematics Anxiety Rating Scale. Measurement and Evaluation in Counseling and Development. 22(3): 143-150. DOI: https://doi.org/10.1080/07481756.1989.12022923

Ashcraft, 2002 – *Ashcraft, M.H.* (2002). Ansiedad matemática: consecuencias personales, educativas y cognitivas. *Direcciones actuales en la ciencia psicológica*. 11: 181-185.

Ashcraft, Krause, 2007 – *Ashcraft, M.H., Krause, J.A.* (2007). Working memory, math performance, and math anxiety. *Psychonomic Bulletin & Review*. 14: 243-248. DOI: https://doi.org/10.3758/BF03194059

Caviola et al., 2020 – *Caviola, S., Colling, L.J., Mammarella, I.C., Szűcs, D.* (2020). Predictors of mathematics in primary school: Magnitude comparison, verbal and spatial working memory measures. *Developmental Science*. 23(6): e12957. DOI: https://doi.org/10.1111/desc.12957

Chang, Beilock, 2016 – *Chang, H., Beilock, S.L.* (2016). The math anxiety-math performance link and its relation to individual and environmental factors: A review of current behavioral and psychophysiological research. *Current Opinion in Behavioral Sciences*. 10: 33-38.

Dew et al., 1983 – *Dew, K.M.H., Galassi, J.P., Galassi, M.D.* (1983). Mathematics anxiety: Some basic issues. *Journal of Counseling Psychology*. 30: 443-446.

Dreger, Aiken, 1957 – *Dreger, R.M., Aiken, L.R.* (1957). The identification of number anxiety in a college population. *Journal of Educational Psychology*. 48: 344-351.

Evangelopoulou et al., 2023 – *Evangelopoulou, M., Jiménez-Fanjul, N., Madrid, M.* (2023). Classroom-Based Mathematics Anxiety Among Students in Greek Secondary Education: A Perspective from Math Teachers. *Operations Research Forum*. 4(74). DOI: https://doi.org/10.1007/s43069-023-00253-0

Fennema, Sherman, 1976 – *Fennema, E., Sherman, J.A.* (1976). Fennema-Sherman mathematics attitude scales. Instruments designed to measure attitudes toward the learning of mathematics by males and females. *JSAS Catalog of Selected Documents of Psychology*. 6(31).

Fennema, Sherman, 1978 – *Fennema, E., Sherman, J.A.* (1978). Sex-related differences in mathematics achievement and related factors: A further study. *Journal for Research in Mathematics Education*. 9: 189-203.

Fernández-Blanco et al., 2024 – *Fernández-Blanco, A., Rojas-Barahona, C.A., Dib, M.N., Orbach, L.* (2024). Math anxiety assessment within the sate-trait anxiety model: Psychometric analysis of the "Mathematics Anxiety Questionnaire" and "State-Mathematics Anxiety Questionnaire" in Chilean school-aged children. *Current Psychology: A Journal of Diverse Perspectives on Diverse Psychological Issues*. 43(10): 8812-8824. DOI: https://doi.org/10.1007/s12144-023-05032-y

García-Santillán et al., 2022 – *García-Santillán, A., Navarro-Ibarra, L., Tejeda-Peña, E.* (2022). Characterization of Anxiety Towards Mathematics in Middle School Students: Empirical Evidence. *TEAM Journal*. 11(1): 256-263. DOI: https://doi.org/10.18421/TEM111-32

Gerbing, Anderson, 1988 – *Gerbing, D.W., Anderson J.C.* (1988). An update paradigm for scale development incorporating unidimentionality and its assessment. *Journal of Marketing Research*. 25(2): 186-192. DOI: https://doi.org/10.2307/3172650

Gough, 1954 – *Gough, M.F.* (1954). Mathemaphobia: Causes and treatments. *Clearing House*. 28: 290-294.

Hair et al., 1998 – *Hair, J.F., Anderson, R.E., Tatham, R.L., Black, W.C.* (1998). Multivariate Data Analysis (5th ed.). NJ Prentice Hall.

Hembree, 1990 – *Hembree, R.* (1990). The nature, effects, and relief of mathematics anxiety. *Journal for Research in Mathematics Education*. 21: 33-46.

Ho, 2006 – *Ho, R.* (2006). Handbook of univariate and multivariate data analysis and interpretation with SPSS. CRC Press.

Hooper et al., 2008 – *Hooper, D., Coughlan, J., Mullen, M.R.* (2008). Structural Equation Modelling: Guidelines for Determining Model Fit. *The Electronic Journal of Business Research Methods*. 6: 53-60.

Hopko et al., 2003 – *Hopko, D.R., Mahadevan, R., Bare, R.L., y Hunt, M.* (2003). The Abbreviated Math Anxiety Scale (AMAS). Construction, validity and reliability. *Assessment*. 10: 178-182.

Hunsley, 1978 – *Hunsley, J.* (1978). Cognitive processes in mathematics anxiety and test anxiety: The role of appraisals, internal dialogue and attributions. *Journal of Educational Psychology*. 79: 388-392.

Iglesias, 1972 – *Iglesias, S.* (1972). Jean Piaget: Epistemología Matemática y Psicología. UANL.

Larracilla-Salazar et al., 2019 – *Larracilla-Salazar, N., Moreno- García, E., García-Santillán, A.* (2019). Factores que explican la ansiedad hacia las matemáticas en estudiantes de Economía en México. *Investigación administrativa*. 48(124).

Lazarus, 1974 – *Lazarus, M.* (1974). Mathophobia: Some personal speculations. *National Elementary Principal*. 53: 16-22.

LeFevre et al., 1992 – *LeFevre, J., Kulak, A., Heymans, S.* (1992). Factors influencing the selection of university majors varying in mathematical content. *Canadian Journal of Behavioural Science*. 24: 276-289.

McLeod, 1992 – *McLeod, D.* (1992). Research on affect in mathematics education: A reconceptualization. En D. A. Grows (ed.). Handbook of research on mathematics teaching and learning. Macmillan.

McLeod, 1994 – *McLeod, D.B.* (1994). Research on affect and mathematics learning in the JRME: 1970 to the present. *Journal for Research in Mathematics Education*. 25: 637-647.

McLeod, 1999 – *McLeod, C.* (1999). Anxiety and anxiety disorders. En T. Dalgleish y M. Power (eds.). Handbook of cognition an emotion. Wiley.

Moreno-García et al., 2022 – *Moreno-García, E., García-Santillán, A., Molchanova, V.S.* (2022). Anxiety towards mathematics in middle school students in Tuxtepec, Oaxaca *European Journal of Contemporary Education*. 11 (1): 99-109. DOI: https://doi.org/10.13187/ejced.2022.1.99

Muñoz-Cantero, Mato-Vázquez, 2007 – *Muñoz-Cantero, J.M., Mato-Vázquez, D.* (2007). Elaboración y estructura factorial de un cuestionario para medir la ansiedad hacia las Matemáticas" en alumnos de Educación Secundaria Obligatoria. *Revista galego-portuguesa de Psicoloxía e Educación*. 14: 221-231.

OCDE, 2015 – OCDE. Does math make you anxious? PISA in focus 48. 2015.

OCDE, 2022 – OCDE. PISA 2022 Country Notes. 2022. [Electronic resource]. URL: https://www.oecd.org/pisa/publications/Countrynote_MEX_Spanish.pdf

Ogasawara, 2011 – *Ogasawara, H.* (2011). Asymptotic expansions of the distributions of the polyserial correlations coeficients. *Behaviormetrika*. 38(2): 153-168.

Plake, Parker, 1982 – *Plake, B.S., Parker, C.S.* (1982). The Development and Validation of a Revised Version of the Mathematics Anxiety Rating Scale. *Educational and psychological measurement*. 42(2): 551-557. DOI: https://doi.org/10.1177/001316448204200218

Radišić et al., 2015 – *Radišić, J., Videnović, M., Baucal, A.* (2015). Math anxiety—contributing school and individual level factors. *European Journal of Psychology of Education*. 30: 1-20. DOI: https://doi.org/10.1007/s10212-014-0224-7

Richardson, Suinn, 1972 – *Richardson, F.C., Suinn, R.M.* (1972). The Mathematics Anxiety Rating Scale: Psychometric data. *Journal of Counseling Psychology*. 19: 551-554.

Richaud, 2005 – *Richaud, M.C.* (2005). Desarrollos del análisis factorial para el estudio de ítem dicotómicos y ordinales. *Interdisciplinaria*. 22(2): 237-251.

Sarfo et al., 2020 – *Sarfo, J.O., García-Santillán, A., Adusei, H., Molchanova, V.S., Drushlyak, M., Semenikhina, O., ... , Vally, Z.* (2020). Gender differences in mathematics anxiety across cultures: A univariate analysis of variance among samples from twelve countries. *European Journal of Contemporary Education*. 9(4): 878-885.

Schreiber et al., 2006 – *Schreiber, J.B., Stage, F.K., King, J., Nora, A., Barlow, E.A.* (2006). Reporting Structural Equation Modeling and Confirmatory Factor Analysis Results: A Review. *The Journal of Educational Research*. 99(6): 323-337. DOI: https://doi.org/10.3200/JOER.99.6.323-338

Sepúlveda-Obreque et al., 2019 – *Sepúlveda-Obreque, A., Díaz-Levicoy, D., Minte-Münzenmayer, A.* (2019). Deficiente rendimiento en matemática: análisis desde la perspectiva de los alumnos de Educación Básica chilena [Educational underachievement in mathematics: analysis from the perspective of Chilean primary school students]. *Revista Espacios*. 40(23): 27.

Soni, Kumari, 2017 – *Soni, A., Kumari, S.* (2017). The Role of Parental Math Anxiety and Math Attitude in Their Children's Math Achievement. *International Journal of Science and Mathematics Education*. 15: 331-347. DOI: https://doi.org/10.1007/s10763-015-9687-5

Spielberger, 1977 – *Spielberger, C.D.* (1977). The Test Anxiety Inventory. Consulting Psychologists Press.

Suri et al., 2013 – *Suri, R., Monroe, K.B., Koe, U.* (2013). Math anxiety and its effects on consumers' preference for price promotion formats. *Journal of the Academy of Marketing Science*. 41: 271-282.

Szczygieł, 2020 – *Szczygieł, M.* (2020). When does math anxiety in parents and teachers predict math anxiety and math achievement in elementary school children? The role of gender and grade year. *Social Psychology of Education*. 23: 1023-1054. DOI: https://doi.org/10.1007/s11218-020-09570-2

Szucs, Mammarella, 2020 – *Szucs, D., Mammarella, I.* (2020). *Math anxiety*. UNESCO Biblioteca Digital.

Taylor, 1952 – *Taylor, J.* (1952). A personality scale of manifest anxiety. *Journal of Abnormal and Social Psychology*. 48: 285-290.

Timmerman, Lorenzo-Seva, 2011 – *Timmerman, M.E., Lorenzo-Seva, U.* (2011). Dimensionality Assessment of Ordered Polytomous Items with Parallel Analysis. *Psychological Methods*. 16: 209-220. DOI: https://doi.org/10.1037/a0023353

Tobías, 1976 – *Tobías, S.* (1976). Math Anxiety: What it is and what can be done about it? *Ms Magazine*. 56-59.

Tobias, 1978 – *Tobias, S.* (1978). Overcoming math anxiety. Boston, MA: Houghton Mifflin.

Villavicencio, Bernardo, 2016 – *Villavicencio, F.T., Bernardo, A.B.I.* (2016). Beyond Math Anxiety: Positive Emotions Predict Mathematics Achievement, Self-Regulation, and Self-Efficacy. *The Asia-Pacific Education Researcher*. 25: 415-422. DOI: https://doi.org/10.1007/s40299-015-0251-4

Visscher, White, 2020 – *Visscher, D., White, N.* (2020). Measuring Mathematics Engagement Anxiety. *International Journal of Research in Undergraduate Mathematics Education*. 6: 113-144. DOI: https://doi.org/10.1007/s40753-019-00104-6

Appendix 1. Instrument

	SA	A	N	D	SD
1. Do I get nervous (a) when I think of the mathematics exam the day before?					
2. Do I feel nervous when they give me the questions for the mathematics exam?					
3. Do I get nervous when I open the mathematics book and I find a page full of problems?					
4. Do I feel nervous when I think of the mathematics exam when there is an hour before doing it?					
5. Do I feel nervous when I listen how other co-students solve a mathematics problem?					
6. Do I get nervous when I realize that the next year I will still have a mathematics course?					
7. Do I feel nervous when I think of the mathematics exam that I will take the next week?					
8. Do I get nervous when somebody looks at me when I am doing the mathematics homework?					
9. Do I feel nervous when I review the purchase receipt after having paid?					
10. Do I feel nervous when I get to study for a mathematics exam?					
11. Do mathematics exams get me nervous?					
12. Do I feel nervous when they assign me difficult problems to do at home and that I have to deliver done for the next session?					
13. Me pone nervioso hacer operaciones matemáticas calculations?					
14. Do I feel nervous when I have to explain a mathematics problem to the teacher?					
15. Do I get nervous when I am doing the final mathematics exam?					
16. Do I feel nervous when they give me a list of mathematics exercises?					
17. Do I feel nervous when I try to understand another costudent who is explaining a mathematics problem?					
18. Do I feel nervous when doing an mathematics evaluation exam?					
19. Do I feel nervous when I see/ listen my teacher explaining a mathematics problem?					
20. Do I feel nervous when I get the final grades of the mathematics exam?					
21. Do I feel nervous when I want to find out the change at the grocery store?					
22. Do I feel nervous when they give us a math problem and a co-student finishes it before me?					
23. Do I feel nervous when I have to explain a problem at the mathematics class?					
24. Do I feel nervous when I begin doing my homework?					