LEOTECH: Journal of Learning Education and Technology
Vol. 2, No. 1, Juni 2025, pp. 20~30
ISSN: 3062-9543

The Mediating Role of Math Anxiety in the Relationship Between Self-Concept and Resilience Among Elementary School Students

Afra Munifah[1], Olivia Amelizky[2], Suci Nurhayati[3]
[1,2,3] Institut Prima Bangsa, Cirebon, Indonesia

Article Info

Article history:

Received 05, 08, 2025
Revised 05, 30, 2025
Accepted 05, 30, 2025

Keywords:

Elementary school students
Mathematics anxiety
Mathematics learning
Resilience
Self-concept

ABSTRACT

Learning mathematics in elementary school often causes anxiety in students, which has an impact on their low self-concept and resilience in solving problems. This study aims to examine the mediating role of anxiety on the relationship between self-concept and resilience in learning mathematics in elementary school students. This study used a quantitative research type of non-experimental design survey method. The research sample consisted of 260 elementary school students in grades 3 and 4 who were purposively selected. Data were collected through a scale questionnaire of self-concept, math anxiety, and student resilience. The data analysis technique used was path analysis with the help of SmartPLS 4 software. The results showed that there was a negative relationship between self-concept and anxiety, as well as a positive relationship between self-concept and resilience. Anxiety mediates the relationship between self-concept and student resilience. This study highlight the critical role on affective factors in mathematics learning at the primary school level. The findings are significant for the development of educational interventions that emphasize strengthening self-concept and reducing anxiety to enhance students' future learning resilience.

Corresponding Author:

Afra Munifah
Institut Prima Bangsa, Cirebon, Indonesia
Jl. Brigjend Dharsono Bypass No.20, Kertawinangun, Kec. Kedawung, Kabupaten Cirebon, Jawa Barat 45153
Email: aframunifah04@gmail.com

1. INTRODUCTION

Mathematics is an important area of education that plays a crucial role in supporting students' academic success and the development of critical thinking and problem-solving skills, where learning achievement and motivation are strongly influenced by students' perceptions of learning mathematics (Wang, 2023). A number of studies have shown that psychological factors such as anxiety, self-concept and resilience are closely related to learning mathematics, even from primary school age, and can be both enabling and inhibiting factors (Mammarella et al., 2018) . It was also found that math anxiety encourages students to avoid challenges, but high emotional self-efficacy helps them face difficult problems with courage and better results (Tarkar et al., 2022).

Math anxiety refers to feelings of tension, anxiety, or fear that can inhibit one's ability to complete math tasks and often leads individuals to avoid math-related activities (Carey et al., 2016). It is widespread globally and negatively impacts math performance, with factors such as working memory and task type moderating its effect on math outcomes (Caviola et al., 2022). Math test anxiety, triggered by poor concept understanding, fear of failure, and inadequate test preparation, significantly hinders students' academic performance and lowers their achievement (Yarkwah et al., 2024).

Mathematics self-concept refers to students' perceptions of their abilities in mathematics, where students with high self-concept are generally more confident in completing mathematics tasks and experience lower levels of anxiety, contributing to better academic achievement (Delima & Cahyawati, 2021). Conversely, low self-concept in mathematics can lead to increased anxiety towards the subject which adversely affects students' learning process and academic outcomes (Lubis & Nuriadin, 2022). It was found that students in profiles with

high math self-concept and low anxiety showed better math achievement, while profiles with low self-concept and high anxiety were associated with lower achievement (Broda et al., 2023).

Resilience in the context of mathematics refers to students' capacity to remain resilient in the face of academic difficulties and emotional distress that arise during the learning process. Students with high levels of resilience are able to manage stress effectively, stay motivated, and maintain consistency in their learning performance despite challenges (Gulsun Turgut & Bakir, 2024). It was found that academic resilience significantly predicted math achievement among students (Duru et al., 2024). While another study showed that students with high levels of resilience tend to experience lower academic stress, so they are able to maintain better motivation and consistency in learning (Istiqomah & Qudsyi, 2023).

A number of previous studies have shown that developing a positive mathematics self-concept can reduce learning anxiety and improve students' academic achievement (Wang, 2023). In addition, there is a significant negative relationship between self-efficacy and math anxiety, where the higher students' belief in their abilities, the lower the level of anxiety they experience while learning (Hendral & Hidayati, 2023). Recent findings also suggest that ego-resilience acts as a predictor of decreased math anxiety and improved learning performance, thus confirming the importance of personal assets in supporting student success in math learning (Duru et al., 2024).

Although previous studies show that a positive mathematics self-concept can reduce anxiety and improve achievement, the mechanisms linking resilience to academic outcomesespecially in math remain unclear. While resilience is known to reduce math anxiety and enhance performance, this relationship is underexplored among elementary students (Duru et al., 2024). Moreover, despite recognition of psychological factors like anxiety and resilience, deeper insights are still needed to inform more effective interventions in math learning (Mammarella et al., 2018).

This study offers a novel contribution by examining the mediating role of math anxiety in the relationship between self-concept and resilience in an elementary school student population that has received relatively little attention in this context. By integrating the three psychological constructs into a single analytical model, this study provides a more comprehensive understanding of the affective dynamics that influence mathematics learning. It is hoped that the findings from this study will inform the development of early educational interventions that not only strengthen students' self-concept, but also reduce their anxiety and increase their learning resilience.

The general objective of this study is to analyze the relationship between self-concept, anxiety, and resilience in elementary school students in the context of mathematics. This study aims to examine the effect of anxiety on resilience, as well as the effect of self-concept on anxiety, and resilience, taking into account the mediating role of anxiety. In addition, this study also aims to understand the extent to which self-concept affects anxiety, which in turn can affect students' resilience in learning mathematics.

- H1: There is a significant influence of Anxiety on Resilience.
- H2: There is a significant influence of Self-Concept on Anxiety.
- H3: There is an insignificant influence of Self-Concept on Resilience.
- H4: There is a significant influence of Self-Concept on Anxiety on Resilience.

2. METHOD

This study uses a type of quantitative research with a non-experimental design and survey method. This type of research was chosen to analyze the role of anxiety in moderating the relationship between self-concept and resilience. This study is relevant because it does not manipulate the independent variables and examines the relationship between psychological variables in the context of mathematics education (Shimizu, 2025). Nonexperimental research is multifaceted. Cohorts and case-control studies can be used to test cause-and-effect relationships where experimental research is unethical or impractical (Kotronoulas & Papadopoulou, 2023). The survey method was chosen because it is effective in collecting quantitative data from a broad population in a short period of time and allows for in-depth statistical analysis (Delima & Cahyawati, 2021).

The study was conducted in 10 primary schools with a total population of 260 students from grades III and IV. The sample taken in this study totaled 260 students, with 130 students from grade III and 130 students from grade IV, which showed a balanced distribution between the two grades, each representing 50% of the total sample. Based on demographic data, there were 137 female students and 123 male students, with an age distribution that included 21 students aged 8 years, 111 students aged 9 years, 101 students aged 10 years, and 27 students aged 11 years, reflecting the age variation of students in both grades. This composition shows adequate diversity in representing the primary school student population, which is important to support the external validity of the research (Okpon Ekaette et al., 2020) as well as reflecting the application of gender equality principles in the learning environment (Chasanah & Bs, 2025).

This study used a questionnaire as the main tool in data collection, due to its ability to measure abstract psychological variables such as self-concept, anxiety towards mathematics, and academic resilience, which allows subjective data to be converted into quantitative for statistical analysis (Putri et al., 2020). This questionnaire instrument is designed based on the synthesis of various relevant theories, with a balance between positive and negative statements to increase its validity, and uses a closed form to make it easier for respondents to answer and facilitate data processing (Setiawan et al., 2023). The main purpose of using this questionnaire is to obtain accurate and reliable data on the relationship between self-concept, math anxiety, and academic resilience in elementary school students (Sujadi, 2022).

Data measurement in this study was carried out using a Likert scale to assess statements in a questionnaire, because this method is commonly used to measure attitudes, perceptions, and opinions in social and psychological research. Each item is weighted based on the respondent's level of agreement, with four options, namely: Strongly Agree (SS), Agree (S), Disagree (TS), and Strongly Disagree (STS), where an even scale like this encourages respondents to take a firm position without a neutral option (Ow-Yeong et al., 2023). On positive statements, scores are assigned from 4 (SS) to 1 (STS), while on negative statements, the scoring is reversed from 1 (SS) to 4 (STS) to prevent agreement bias and improve construct validity (Zeng et al., 2024). This weighting aims to ensure proper interpretation of the respondent's attitude or psychological condition and maintain consistency of assessment in the instrument used (Jebb et al., 2021).

Students' mathematics self-concept includes aspects of self-beliefs, perceptions of academic ability, evaluation of achievement, views on the subject, and social comparison. Students' beliefs about their ability to learn mathematics affect their motivation and interest (Sabando-García et al., 2024). Positive perceptions of academic ability can improve learning outcomes (Alfansuri et al., 2018), while good self-evaluations, such as grade attainment, strengthen students' beliefs in their abilities (Okigbo & Onoshakpokaiye, 2023). Students' view that math is one of the top subjects increases their interest and engagement in learning. Social comparison also plays an important role in shaping self-concept, as feeling compared to classmates can affect their self-perception (Alfansuri et al., 2018). The self-concept instrument in this study was adapted from the Mathematics Self-Concept Scale which was developed based on the theoretical framework of academic self-concept by Marsh and Shavelson, and has been validated to measure students' perceptions of their mathematical abilities (Van der Beek et al., 2017).

Table 1. Self-Concept Instrument

No.	Statement
1.	I can learn math quickly.
2.	I am able to understand and comprehend even the most difficult tasks in mathematics.
3.	I get good grades in math.
4.	I have always believed that math is one of my best subjects.
5.	I usually do well in math.
6.	I will have difficulty completing almost all tasks in math if I give up.
7.	I am able to learn math assignments even though they are difficult.
8.	I am confident that I can learn the skills taught in math class well.
9.	I feel that math is more difficult compared to many of my classmates.
10.	I feel less confident in my math abilities.

Mathematics anxiety includes cognitive, affective and physiological aspects that affect how students perceive their abilities and experiences in mathematics learning. Cognitive aspects relate to students' beliefs about their competence in understanding the material and completing math tasks, which directly impacts motivation and academic achievement (Jebb et al., 2021). Affective aspects include negative emotions such as anxiety, fear and nervousness that often arise in math learning or evaluation situations, and these emotions are known to reduce students' self-confidence and academic performance (Zeng et al., 2024). Meanwhile, physiological aspects include physical reactions such as tension or discomfort experienced by students when facing mathematical activities, which shows the relationship between emotions and bodily responses in the context of learning (Pekrun, 2006). The anxiety instrument in this study was adapted from the Mathematics Self-Concept Scale which was developed based on Marsh and Shavelson's theoretical framework of academic self-concept, and has been validated to measure students' perceptions of their mathematical abilities (Van der Beek et al., 2017).

Table 2. Anxiety Instrument

No.	Statement
1.	I feel powerless when doing math problems.

2.	I feel worried about struggling to keep up with math lessons like my classmates.
3.	I feel very nervous when doing math problems.
4.	I feel tense when I have to do math homework.
5.	I often worry that I will struggle during math class.
6.	I feel scared about having to take advanced math classes in the future.
7.	I feel worried if I'm called on in math class.
8.	I feel increasingly nervous the harder I study math.
9.	I feel physically uncomfortable when I have to take math classes.
10.	I feel like I'm going to get sick when the teacher hands out the math test.

There are four aspects of math resilience: value, struggle, growth and persistence. The value aspect is the belief that math is a valuable subject and worth learning. The struggle aspect, which is the belief that more effort in learning mathematics is normal, even for people who have a high level of math skills. Growth aspect, which is the belief that everyone can develop math skills and the belief that everyone can learn math deeply with effort and support. The persistence aspect, which is the belief that situations or difficulties when learning mathematics can be overcome with diligent effort (Kooken et al., 2013). From these four aspects, instrument items were derived to measure students' mathematics resilience, which was designed to reflect students' belief in the value of mathematics, readiness to face challenges, views on the potential development of abilities, and perseverance in overcoming difficulties in learning mathematics.

Table 3. Resilience Instrument

No.	Statement
1.	I feel that learning mathematics in school is beneficial for everyday life.
2.	I believe that future career success is less determined by learning mathematics.
3.	I need to learn math in order to solve problems.
4.	I see that learning mathematics has less long-term benefits.
5.	I realize that the difficulties in learning mathematics are part of the process.
6.	I easily give up when facing difficulties in learning math.
7.	I realize that even math experts still need to struggle hard to understand a certain concept
8.	I lack the extra effort to master difficult math concepts.
9.	I see that mistakes while learning mathematics are a great opportunity to learn.
10.	I feel that mathematical ability is difficult to develop through practice and effort.
11.	I believe that success in learning mathematics requires time and ongoing commitment.
12.	I easily give up on opportunities in learning mathematics.
13.	I always learn to find solutions in solving math problems.
14.	I tend to stop trying to solve difficult math problems with many obstacles.
15.	I get good math grades because I have been diligent and persistent in studying.
16.	I easily give up when faced with math failures.

The instrument in this study initially consisted of 36 statements covering three main variables: 10 statements for self-concept, 10 statements for math anxiety, and 16 statements for academic resilience. After validity testing using confirmatory factor analysis (CFA), statements with factor load values below 0.5 were eliminated to ensure the quality of the instrument (Arafah et al., 2024). This step is in line with the general principle in factor analysis, which suggests the removal of items with loading factor values below 0.5 to improve construct validity and overall instrument reliability (Saptono, 2017). As a result, the total number of statements used in this study became 22 items. Thus, the instrument used is expected to measure the variables studied accurately and reliably.

LEOTECH: Journal of Learning Education and Technology
Vol. 2, No. 1, Juni 2025, pp. 20~30
ISSN: 3062-9543

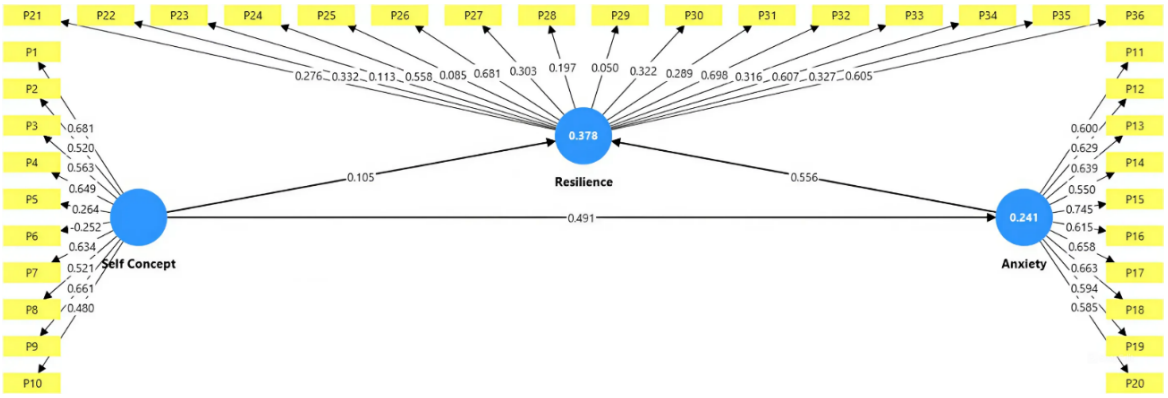

Figure 1. Result of Convergent Validity

The figure shows the structural relationship model between self-concept, resilience, and anxiety in learning mathematics with a path analysis approach. The path coefficient value shows that self-concept has a direct effect on resilience (0.105) and anxiety (-0.491), while resilience also has an influence on anxiety (0.556), which indicates a partial mediation effect. In addition, the factor loading value on the indicators of each variable is above 0.5, which indicates that all items have good convergent validity and are suitable for measuring the construct.

Table 4. Result of Convergent Validity

Construct	Item	Outer Loading	Decision	Cronbach's Alpha	Decision
Self Concept	P1	0.681	Valid	0.698	Reliable
	P2	0.520	Valid		
	P3	0.563	Valid		
	P4	0.649	Valid		
	P5	0.264	Not Valid		
	P6	-0.252	Not Valid		
	P7	0.634	Valid		
	P8	0.521	Valid		
	P9	0.661	Valid		
	P10	0.480	Not Valid		
Anxiety	P11	0.600	Valid	0.830	Reliable
	P12	0.629	Valid		
	P13	0.639	Valid		
	P14	0.550	Valid		
	P15	0.745	Valid		
	P16	0.615	Valid		
	P17	0.658	Valid		
	P18	0.663	Valid		
	P19	0.594	Valid		
	P20	0.585	Valid		
Resilience	P21	0.276	Not Valid	0.640	Reliable
	P22	0.332	Not Valid		
	P23	0.113	Not Valid		
	P24	0.558	Valid		
	P25	0.085	Not Valid		
	P26	0.681	Valid		
	P27	0.303	Not Valid		
	P28	0.197	Not Valid		
	P29	0.050	Not Valid		
	P30	0.322	Not Valid		
	P31	0.289	Not Valid		
	P32	0.698	Not Valid		

	P33	0.316	Not Valid		
	P34	0.607	Valid		
	P35	0.327	Not Valid		
	P36	0.605	Valid		

Construct validity is measured through the loading factor value, with the criteria that items are considered valid if they have a value of more than 0.5 (Hair et al., 2021). The analysis results show that the Self Concept construct is mostly valid, except for items P5, P6, and P10 which have values below 0.5. In the Anxiety construct, all items are valid with values above 0.5. However, the Resilience construct is only partially valid items, while the rest require revision because the loading factor value is below 0.5. Instrument reliability is measured by Cronbach's Alpha, with a criterion value of more than 0.6 as an indication of good reliability (Hair et al., 2021). The Self Concept and Anxiety constructs have Cronbach's Alpha values of 0.698 and 0.830, which indicates good reliability. The Resilience construct has a value of 0.640, which is still above the minimum limit, but lower than the other two constructs.

Table 5. Result of Discriminant Validity

Construct	**Fornell-Larcker**	**Heterotrait-monotrait ratio (HTMT)**
Resilience –> Anxiety	0.650	
Self Concept –> Anxiety	0.553	
Self Concept –> Resilience	0.571	
Resilience –> Anxiety		0.650
Self Concept –> Anxiety		0.553
Self Concept –> Resilience		0.571

The table presents two types of discriminant validity tests used in SEM-PLS analysis, namely the Fornell-Larcker Criterion and the Heterotrait-Monotrait Ratio (HTMT). The Fornell-Larcker test shows that the correlation values between constructs (resilience, self-concept, and anxiety) are all below the square root AVE value of their respective constructs, indicating that each construct has adequate discrimination against other constructs. Similarly, all HTMT values are below the threshold of 0.90 (Henseler et al., 2015), which means there is no discriminant validity issue between constructs in this model.

The data analysis technique in this study uses Structural Equation Modeling based on Partial Least Squares (SEM-PLS) with the help of SmartPLS 4 software. The choice of this method is based on its ability to estimate complex causal relationships between latent variables, especially in conditions of limited sample size (Hair et al., 2021). In addition, SEM-PLS also allows testing of the measurement model, including construct validity and reliability tests, as well as discriminant validity, before proceeding to hypothesis testing on the structural model (Grigg et al., 2018). In this study, the structural model approach was used to test hypotheses, both direct and indirect relationships between constructs such as self-concept, resilience, and anxiety. Testing is done through path coefficient analysis, t-statistic value, and p-value to determine the significance of the relationship, as well as the R-square value to assess the contribution of independent variables in explaining the dependent variable (Hair et al., 2021).

3. RESULT AND DISCUSSION

3.1 Results

Statistical descriptions were used to describe the data characteristics of each research construct, namely anxiety, resilience, and self-concept, prior to further analysis. Statistical parameters such as mean, median, standard deviation, kurtosis, and skewness were calculated to understand the distribution and tendency of the data. The results of the descriptive statistics summary of the three constructs are shown in the following table.

Table 6. Result of Data Description

Construct	**Mean**	**Median**	**Standard deviation**	**Excess kurtosis**	**Skewness**
Anxiety	-0.000	0.046	1.000	-0.308	-0.091
Resilience	-0.000	0.050	1.ooo	-0.240	-0.384
Self Concept	-0.000	0.107	1.ooo	-0.399	-0.275

LEOTECH: Journal of Learning Education and Technology
Vol. 2, No. 1, Juni 2025, pp. 20~30
ISSN: 3062-9543

The descriptive statistics table shows that the mean and median values for the anxiety, resilience and self-concept constructs are around zero, with a standard deviation of 1,000. This indicates that the data has been normalized, allowing for a balanced comparison between constructs. Excess kurtosis and skewness values close to zero indicate a near-normal distribution of the data, with no significant extremes or asymmetry.

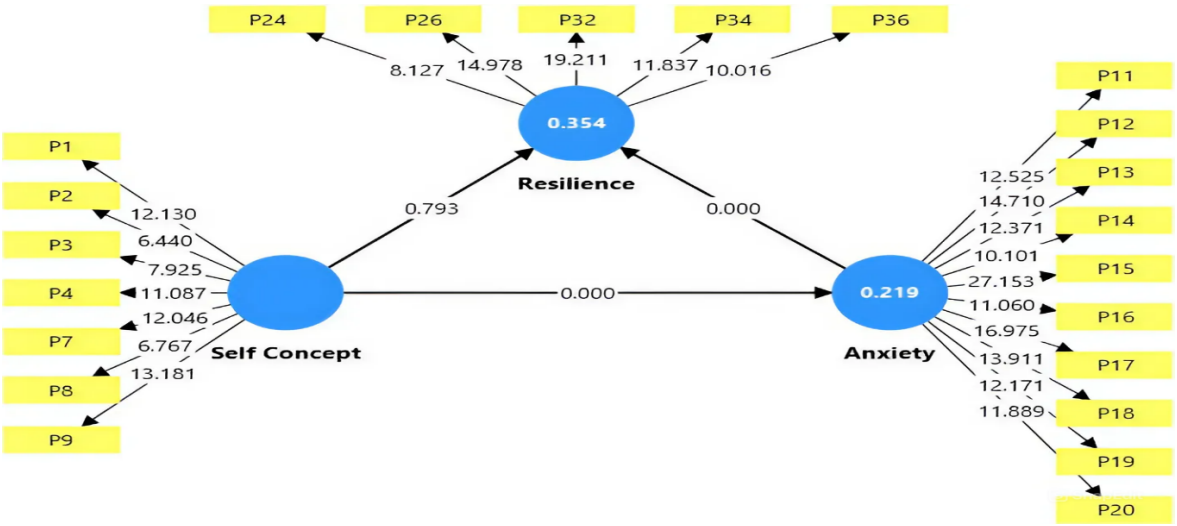

Figure 1. Result of Structural Model

The figure shows a path model that illustrates the relationship between the constructs of Self-Concept, Anxiety, and Resilience. It can be seen that Self-Concept has a direct effect on Anxiety, and Anxiety has a direct effect on Resilience, while the direct path from Self-Concept to Resilience appears very weak. This indicates that the effect of Self-Concept on Resilience occurs indirectly through Anxiety as a mediator.

Table 7. Result of Path Coefficients

Construct	**O**	**M**	**STDEV**	**T statistics**	**P values**	**Hypotesis**
Anxiety -> Resilence	0.587	0.596	0.051	11.526	0.000	H1 Accepted
Self Concept -> Anxiety	0.468	0.482	0.045	10.359	0.000	H2 Accepted
Self Concept -> Resilence	0.017	0.020	0.066	0.262	0.793	H3 Not Accepted
Self Concept -> Anxiety -> Resilence	0.000	0.000	0.000	0.000	0.000	H4 Accepted

The table shows the results of the path analysis that tests the relationships between constructs in the structural model, including the path coefficient (β), mean value (M), standard deviation (STDEV), t-statistic, and p-value. The analysis results show that hypotheses H1 and H2 are accepted, while H3 is not accepted, and H4 is accepted. The relationship between anxiety and resilience has a path coefficient of 0.587 with a t-statistic value of 11.526 and a p-value of 0.000, which indicates a significant direct effect. Likewise, the relationship between self-concept and anxiety was significant with a path coefficient of 0.468, t-statistic of 10.359, and p-value of 0.000. However, the direct relationship between self-concept and resilience was not significant, with a path coefficient of 0.017, t-statistic of 0.262, and p-value of 0.793. The indirect effect of self-concept on resilience through anxiety showed significance, with a p-value of 0.000, indicating the mediating role of anxiety.

Table 8. Result of Quality Criteria

Construct	**R-square**	**R-square adjusted**	**f-square**	**T statistics**	**P values**
Anxiety	0.219			5.056	0.000
Resilence	0.354			7.225	0.000
Anxiety		0.216		4.967	0.000
Resilence		0.349		7.068	0.000

Anxiety -> Resilence			0.416	3.996	0.000
Self Concept -> Anxiety			0.280	3.722	0.000
Self Concept -> Resilence			0.000	0.043	0.965

The table presents the results of the R-square, f-square, and T-statistic and p-value analysis to see the strength of the relationship between variables in the model. The R-square value shows that the Self-Concept and Anxiety variables are able to explain 21.9% of the variability in Anxiety, and 35.4% of the variability in Resilience, which is considered moderate. Meanwhile, the f-square value shows the effect of each relationship, where Anxiety has a large influence on Resilience ($f^2 = 0.416$), Self-Concept has a moderate influence on Anxiety ($f^2 = 0.280$), but has no influence on Resilience ($f^2 = 0.000$), as also seen from the very low T-statistic value and insignificant p-value.

Table 9. Result of Model Fit

Model Fit	**SRMR**	**d_ULS**	**d_G**	**M**	**CI**	
					95%	**99%**
Saturated model	0.082			0.062	0.067	0.070
Estimated model	0.082			0.062	0.067	0.070
Saturated model		1.681		0.963	1.140	1.237
Estimated model		1.681		0.963	1.140	1.237
Saturated model			0.352	0.228	0.278	0.303
Estimated model			0.352	0.228	0.278	0.303

The table above shows the results of evaluating the fit model using several indicators such as SRMR, d_ULS, and d_G, both for the saturated model and the estimated model. The SRMR value of 0.082 is below the threshold limit of 0.10, which indicates that the model has a good fit. In addition, the d_ULS and d_G values for both models are also within the 95% and 99% confidence interval (CI) ranges, which further reinforces that the structural model used is appropriate and statistically acceptable.

3.2. Disscussion

The analysis of data for the constructs of Anxiety, Resilience, and Self-Concept demonstrates a relatively normal distribution. The mean values for all three constructs are near zero, with a standard deviation of 1.0, indicating consistent data distribution. Both skewness and kurtosis values fall within acceptable ranges, suggesting a normal distribution in line with the criteria established (Kooken et al., 2013). Normality testing using the Cramér-von Mises statistic revealed p-values above 0.05 for Anxiety and Self-Concept, and slightly below 0.05 for Resilience. These findings indicate that the majority of the data adheres to the assumption of normality. Previous research has supported this, stating that skewness and kurtosis values within the range of ±1.5 indicate a normal distribution (Bela et al., 2022). Additionally, a study on nursing students in Greece also found that skewness and kurtosis values close to zero for the Resilience construct supported the use of parametric analysis (Antoniou et al., 2024). Therefore, the data description supports the applicability of structural modeling in exploring the relationships between constructs within the context of primary school students' mathematics learning.

The results from the path analysis reveal significant insights into the relationships between the constructs in the structural model. Hypotheses H1 and H2 are confirmed, while H3 is rejected, and H4 is accepted. Specifically, the direct relationship between Anxiety and Resilience shows a significant effect with a path coefficient of 0.587, a t-statistic of 11.526, and a p-value of 0.000. Similarly, the relationship between Self-Concept and Anxiety is significant, with a path coefficient of 0.468, t-statistic of 10.359, and p-value of 0.000. However, the direct relationship between Self-Concept and Resilience is not significant, as reflected in the path coefficient of 0.017, t-statistic of 0.262, and p-value of 0.793. Notably, the indirect effect of Self-Concept on

Resilience through Anxiety is significant (p-value = 0.000), emphasizing Anxiety's role as a mediator in this relationship.

These findings align with prior research that identifies a negative relationship between Self-Concept and anxiety in children (Mammarella et al., 2018). Additionally, other studies suggest that diverse coping strategies can enhance resilience to stress (Aza N.I et al., 2019). Recent research also underscores the need for interventions that foster mental resilience within educational contexts to address mental health issues in adolescents (Antoniou et al., 2024). Thus, Anxiety plays a crucial mediating role in strengthening the connection between Self-Concept and Resilience, highlighting its importance in educational settings.

The statistical significance of the Anxiety and Resilience constructs is further demonstrated by the R-square values of 0.219 and 0.354, respectively. These values indicate substantial contributions of both variables to the model. The Anxiety-to-Resilience relationship, with an f-square value of 0.416, reveals a strong impact within the model. All relationships have p-values below 0.001, indicating robust statistical significance. Previous studies support these results, showing that mindfulness, self-compassion, and resilience significantly affect academic anxiety, with resilience acting as a mediator (Sujadi, 2022). Furthermore, other research demonstrates that self-concept and resilience are related to anxiety levels in children, with resilience being more stable at moderate risk levels and self-concept correlating with higher risk levels (Mammarella et al., 2018). Additional findings indicate that psychological resilience negatively impacts future anxiety, with subjective well-being acting as a mediator (Morales-Navarro et al., 2023).

Finally, the model fit test results confirm that the estimated model aligns well with the observed data. The SRMR value of 0.082, along with d_ULS of 1.681, d_G of 0.963, and M values of 1.140, and confidence intervals ranging from 0.062 to 0.070, indicate that the model provides a good fit. These findings are consistent with studies that suggest SRMR is a more accurate measure of model fit for ordinal data than RMSEA (Shi & Maydeu-Olivares, 2020). Moreover, findings using ULS in Structural Equation Modeling (SEM) highlight that fit indices such as SRMR, d_ULS, and d_G effectively capture model adequacy (Amanathi et al., 2023). This supports previous research, confirming that these model fit tests yield reliable results consistent with similar research estimates.

The findings of this study are in line with previous research showing that academic anxiety has a significant influence on students' psychological resilience, so interventions that reduce anxiety can improve resilience and learning achievement (Fang et al., 2024). In addition, another study found that a positive self-concept contributed to decreased anxiety and increased resilience in elementary school-aged children, supporting the result that Self-Concept affects Resilience indirectly through Anxiety (Wang, 2023). While further research emphasizes that strengthening resilience in primary education settings requires a holistic approach involving the management of emotional and cognitive aspects, consistent with the role of anxiety as a mediator in this model (Zhao et al., 2024). These studies corroborate the use of Structural Equation Modeling in this study to explain the complex relationships among psychological constructs and provide an empirical basis for the development of effective interventions in improving students' mental well-being in primary schools.

4. CONCLUSION

Based on the results of the study, it can be concluded that math anxiety acts as a mediator in the relationship between self-concept and academic resilience of elementary school students. The findings suggest that a positive self-concept can enhance students' academic perseverance, especially if anxiety levels can be effectively managed. Theoretically, this study contributes to a strengthened understanding of the psychological mechanisms that influence students' learning resilience in the context of mathematics learning. Practically, the implications of these results support the importance of targeted interventions to strengthen self-concept and reduce anxiety, in order to sustainably improve students' resilience and learning achievement.

REFERENCES

Alfansuri, D. U., Rusilowati, A., & Ridlo, S. (2018). Development of instrument self-concept assessmen student on learning mathematics in junior high school smp nu al-amin Dukuhturi , Tegal , Indonesia. *Jere*, *7*(10), 1–8. http://journal.unnes.ac.id/sju/index.php/jere

Amanathi, A., Setiawan, E., & Usman, M. (2023). Goodness of fit test in structural equation modeling with unweighted least square (ULS) estimation method. *Sciencestatistics: Journal of Statistics, Probability, and Its Application*, *1*(2), 65–73. https://doi.org/10.24127/sciencestatistics.v1i2.5021

Antoniou, M., Fradelos, E. C., Roumeliotaki, T., Malli, F., Emmanouil, K. S., & Papagiannis, D. (2024). Assessing mental resilience with individual and lifestyle determinants among nursing students: an observational study from Greece. *AIMS Public Health*, *11*(3), 946–961. https://doi.org/10.3934/publichealth.2024049

Arafah, S. M., Sumiati, N. T., Psikologi, F., & Hidayatullah, U. I. N. S. (2024). Uji validitas konstruk instrumen pengukuran school climate dengan metode confirmatory factor analysis (CFA). *Jurnal Penelitian Dan Pengukuran Psikologi*, *13*(02), 111–117. https://doi.org/http://doi.org/10.21009/JPPP.132.04

Aza N.I, Atmoko A, & Hitipeuw I. (2019). Kontribusi dukungan sosial, self-esteem, dan resiliensi terhadap stres skademik siswa SMA. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *4*(4), 491–498.

Broda, M. D., Ross, E., Sorhagen, N., & Ekholm, E. (2023). Exploring control-value motivational profiles of mathematics anxiety, self-concept, and interest in adolescents. *Frontiers in Psychology*, *14*(2023), 1–12. https://doi.org/10.3389/fpsyg.2023.1140924

Carey, E., Hill, F., Devine, A., & Szücs, D. (2016). The chicken or the egg? The direction of the relationship between mathematics anxiety and mathematics performance. *Frontiers in Psychology*, *6*(JAN), 1–6. https://doi.org/10.3389/fpsyg.2015.01987

Caviola, S., Toffalini, E., Giofrè, D., Ruiz, J. M., Szűcs, D., & Mammarella, I. C. (2022). Math performance and academic anxiety forms, from sociodemographic to cognitive aspects: a meta-analysis on 906,311 participants. In *Educational Psychology Review* (Vol. 34, Issue 1). https://doi.org/10.1007/s10648-021-09618-5

Chasanah, M., & Bs, A. W. (2025). Gender equality in the implementation of the independent curriculum at madrasah elementary school : a case study at min 1 Banyumas. *International Journal of Social Science and Human Research*, *08*(02), 924–937. https://doi.org/10.47191/ijsshr/v8-i2-16

Delima, N., & Cahyawati, D. (2021). Students' mathematics self-concept, mathematics anxiety and mathematics self-regulated learning during the covid-19 pandemic. *Jurnal Pendidikan Matematika*, *15*(2), 103–114. https://doi.org/10.22342/jpm.15.2.13200.103-114

Duru, D. C., Obasi, C. V., & Oguoma, C. (2024). Predictive analysis: academic resilience as a determinant of mathematics achievement among senior secondary school students in Nigeria. *Brillo Journal*, *3*(2), 72–82. https://doi.org/10.56773/bj.v3i2.48

Fang, S., Barker, E., Arasaratnam, G., Lane, V., Rabinovich, D., Panaccio, A., O'Connor, R. M., Nguyen, C. T., & Doucerain, M. M. (2024). Resilience, stress, and mental health among university students: a test of the resilience portfolio model. *Stress and Health*, *2024*, 1–12. https://doi.org/10.1002/smi.3508

Grigg, S., Perera, H. N., McIlveen, P., & Svetleff, Z. (2018). Relations among math self efficacy, interest, intentions, and achievement: A social cognitive perspective. *Contemporary Educational Psychology*, *53*, 73–86. https://doi.org/10.1016/j.cedpsych.2018.01.007

Gulsen, T. I., & Bakir, N. S. (2024). The mediating role of mathematics anxiety in the relationship between high school students' metacognitive awareness and mathematical resilience. *HAYEF: Journal of Education*, *21*(2), 183–191. https://doi.org/10.5152/hayef.2024.23064

Hendral, H. N., & Hidayati, K. (2023). The relationship between students' self-efficacy and mathematics anxiety: meta-analysis investigation. *THE 3RD INTERNATIONAL CONFERENCE ON SCIENCE, MATHEMATICS, ENVIRONMENT, AND EDUCATION: Flexibility in Research and Innovation on Science, Mathematics, Environment, and Education for Sustainable Development*, *2540*(January), 070008. https://doi.org/10.1063/5.0105860

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135. https://doi.org/10.1007/s11747-014-0403-8

Istiqomah, I., & Qudsyi, H. (2023). *Building academic resilience: a key to overcoming stress during the covid-19 pandemic* (Vol. 2). Atlantis Press SARL. https://doi.org/10.2991/978-2-38476-052-7_14

Jebb, A. T., Ng, V., & Tay, L. (2021). A review of key likert scale development advances: 1995–2019. *Frontiers in Psychology*, *12*(May), 1–14. https://doi.org/10.3389/fpsyg.2021.637547

Kooken, J., Welsh, M., McCoach, D. B., Johnston-Wilder, S., & Lee, C. (2013). Mathematical resilience: an application and exploration of motivational constructs related to resilience in the study of mathematics. *American Educational Research Association (AERA) 2013 Annual Meeting*, 1–34.

Kotronoulas, G., & Papadopoulou, C. (2023). Seminars in Oncology Nursing A Primer to Experimental and Nonexperimental Quantitative Research : The Example Case of Tobacco-Related Mouth Cancer. *Seminars in Oncology Nursing*, *39*(2023), 0–6. https://doi.org/10.1016/j.soncn.2023.151396

Lubis, A. P., & Nuriadin, I. (2022). Efektivitas aplikasi wordwall untuk meningkatkan hasil belajar siswa dalam pembelajaran matematika sekolah dasar. *Jurnal Basicedu*, *6*(4), 6884–6892. https://doi.org/10.31004/basicedu.v6i4.3400

Mammarella, I. C., Donolato, E., Caviola, S., & Giofrè, D. (2018). Anxiety profiles and protective factors: a latent profile analysis in children. *Personality and Individual Differences*, *124*(2018), 201–208. https://doi.org/10.1016/j.paid.2017.12.017

Morales-Navarro, L., Giang, M. T., Fields, D. A., & Kafai, Y. B. (2023). Connecting beliefs, mindsets, anxiety and self-efficacy in computer science learning: an instrument for capturing secondary school students' self-beliefs. *Computer Science Education*, 1–29. https://doi.org/10.1080/08993408.2023.2201548

Okigbo, E. C., & Onoshakpokaiye, O. E. (2023). Relationship between academic self-concept and academic performance in mathematics of secondary school students in Delta State, Nigeria. *Indonesian Journal of Mathematics Education*, *6*(2), 63–71. https://doi.org/10.31002/ijome.v6i2.991

Okpon Ekaette, S., Ameh, E., & Joseph Owan, V. (2020). Statistical trends of school size, location and enrolment: an evaluation of public junior secondary schools for sustainable development. *World Journal of Vocational Education and Training*, *2*(2), 76–88. https://doi.org/10.18488/journal.119.2020.22.76.88

Ow-Yeong, Y. K., Yeter, I. H., & Ali, F. (2023). Learning data science in elementary school mathematics: a comparative curriculum analysis. *International Journal of STEM Education*, *10*(1). https://doi.org/10.1186/s40594-023-00397-9

Pekrun, R. (2006). The control-value theory of achievement emotions: assumptions, corollaries, and implications for educational research and practice. *Educational Psychology Review*, *18*(4), 315–341. https://doi.org/10.1007/s10648-006-9029-9

Putri, H. E., Wahyudy, M. A., Yuliyanto, A., & Nuraeni, F. (2020). Development of instruments to measure mathematical anxiety of elementary school students. *International Journal of Learning, Teaching and Educational Research*, *19*(6), 282–302. https://doi.org/10.26803/IJLTER.19.6.17

Sabando-García, A. R., Jiménez-Bustillo, O. J., Llacsa-Puma, L. J., Castro-Castillo, G. J., Moreira-Choez, J. S., & Rengifo-Lozano, R. A. (2024). Measurement through structural equations of the self-concept instrument in high-school students. *Frontiers in Education*, *9*(January), 1–14. https://doi.org/10.3389/feduc.2024.1507106

Saptono, A. (2017). Development instruments through confirmatory factor analysis (CFA) in appropriate intensity assessment. *Dinamika Pendidikan*, *12*(1), 13–19. https://doi.org/10.15294/dp.v12i1.10578

Setiawan, A., Cendana, W., Ayres, M., Yuldashev, A. A., & Setyawati, S. P. (2023). Development and validation of a self-assessment-based instrument to measure elementary school students' attitudes in online learning. *REID (Research and Evaluation in Education)*, *9*(2), 184–197. https://doi.org/10.21831/reid.v9i2.52083

Shi, D., & Maydeu-Olivares, A. (2020). The effect of estimation methods on SEM fit indices. *Educational and Psychological Measurement*, *80*(3), 421–445. https://doi.org/10.1177/0013164419885164

Shimizu, Y. (2025). Learning engagement as moderator between self-efficacy , math anxiety , use of diagrams , and complex plane problem-solving. *Eurasia Journal of Mathematics, Science and Technology Education*, *21*(2), 1–12. https://doi.org/https://doi.org/10.29333/ejmste/15956

Sujadi, E. (2022). Mindfulness, self-compassion, resilience, and academic anxiety among college students: a structural equation modeling approach. *Tarbawi : Jurnal Ilmu Pendidikan*, *18*(2), 122–139. https://doi.org/10.32939/tarbawi.v18i2.2460

Tarkar, A., Matalka, B., Cartwright, M., & Kloos, H. (2022). Student-guided math practice in elementary school: eelation among math anxiety, emotional self-efficacy, and children's choices when practicing math. *Education Sciences*, *12*(9), 1–12. https://doi.org/10.3390/educsci12090611

Van der Beek, J. P. J., Van der Ven, S. H. G., Kroesbergen, E. H., & Leseman, P. P. M. (2017). Self-concept mediates the relation between achievement and emotions in mathematics. *British Journal of Educational Psychology*, *87*(3), 478–495. https://doi.org/10.1111/bjep.12160

Wang, Y. (2023). Self-concept, learning anxiety, and performance in mathematics learning: the moderating effect of teacher cognitive activation. *Eurasia Journal of Mathematics, Science and Technology Education*, *19*(9), 1–13. https://doi.org/10.29333/ejmste/13499

Yarkwah, C., Kpotosu, C. K., & Gbormittah, D. (2024). Effect of test anxiety on students' academic performance in mathematics at the senior high school level. *Discover Education*, *3*(1). https://doi.org/10.1007/s44217-024-00343-z

Zeng, B., Jeon, M., & Wen, H. (2024). How does item wording affect participants' responses in likert scale? evidence from IRT analysis. *Frontiers in Psychology*, *15*(October), 1–10. https://doi.org/10.3389/fpsyg.2024.1304870

Zhao, S., Zhang, K., Lin, Y., Han, L., Liao, C., Ye, R., Na, M., & Alam, S. S. (2024). Fostering resilience and post-traumatic growth in overseas Chinese left-behind children: The role of autonomy, competence, and relatedness. *Brain and Behavior*, *14*(9), 1–17. https://doi.org/10.1002/brb3.70025