

Bridging resilience and mathematics success: the mediating role of teacher emotional support

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ABSTRACT

This study investigated the mediating role of teacher emotional support (TES) in the relationship between academic resilience (AR) and mathematics performance (MP) among 563 randomly selected Grade 7 students from public secondary schools in Mandaue City, Cebu, Philippines. Employing a descriptive correlational design, data were collected through an adopted questionnaire—academic resilience scale (ARS-30), emotional support scale, and the students' first quarter mathematics grade. The data collected were analyzed using frequency, percentage, weighted mean (WM), standard deviation (SD), Pearson r , and multiple regression analysis. Findings indicated high AR, very high TES, and satisfactory MP. Mediation analysis revealed that TES partially mediates the positive association between AR and MP. This analysis offers valuable guidance for educators, researchers, and policymakers in creating supportive learning environments that build AR and enhance TES, leading to better MP.

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1. INTRODUCTION

Mathematics is seen as one of the most important subjects in the school curriculum and plays an important role in daily life [1]. In fact, mathematics shapes one's skills and abilities, such as problem-solving skills, critical thinking, logical thinking, and the ability to understand any pattern or sequence, which is very important in both academic and even real-life situations [2]. Furthermore, students need to understand global challenges such as, financial crises, food security, climate change, and epidemic outbreaks, which are typically conveyed through visual aids and symbols that rely on mathematical skills [3].

Despite its significance, many students experience stress and anxiety when solving mathematical problems and find learning and participating in mathematics difficult and perceive mathematics as a challenge they face throughout their lives [4]–[6]. This perception is reflected in international assessments such as the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS), where Filipino students consistently perform below the global average in mathematics, with only a small percentage reaching basic proficiency levels [7]–[9]. At the local level, in the Schools Division of Mandaue City, Philippines, students' outcomes in the annual Metrobank-Mathematics Teachers Association of the Philippines (MTAP)-Department of Education (DepEd) mathematics challenge have been discouraging in both the written and oral components which indicate that students struggled to grasp the subject effectively [10].

In many cases, students find it hard to deal with challenges and difficulties in solving mathematical problems and give up easily without even trying to understand the given problems. This emotional reaction and lack of resilience slow down students' progress and are common issues, often marked by negative emotions like stress, frustration, and fear of mathematics [11]. Meanwhile, teachers have many tasks and responsibilities, making it hard for them to give students the emotional support they need because too much work can cause stress, burnout, and loss of interest, which can harm students' learning [12].

Given this situation, examining the factors influencing students' mathematics performance (MP) is crucial for tackling these challenges because failing to do so may slow the country's educational progress [13]. One factor that can help to address this poor performance in mathematics is resilience, as this can positively affect student performance in learning [14]. In fact, studies show that students with high resilience are capable of facing major educational challenges and recovering from setbacks [15]. As a result, students are less likely to give up when faced with difficult mathematics problems, maintain a high level of motivation, and achieve high performance despite challenges [16]. Moreover, researchers have determined that AR boosts students' academic performance based on a review of different studies [17]–[19].

In addition to student resilience, teacher emotional support (TES) is important for improving MP [20]. Specifically, students who are able to easily form a relationship with their teachers and are optimistic in their approach tend to have a higher level of satisfaction in school and greater chance to feel comfortable and confident in a learning-friendly environment [21]. Additionally, TES can positively impact students' engagement, motivation, and performance in school [17].

Together, these elements are essential in promoting the motivation and participation of students [22]. Furthermore, academic resilience (AR) and TES are connected and have a big impact on students' learning and well-being. In support of this, studies showed that TES directly affects the academic performance of a student, especially in MP [22]–[24]. Indeed, this positive connection between AR and TES is well documented by various studies [22], [25], [26].

To provide a strong conceptual basis for this investigation, the study is anchored on two important theories: the self-determination theory (SDT) by Deci and Ryan [27] and the resilience theory by Masten [28]. In addition, the cultural dimensions theory by Hofstede [29] and the ecological systems theory by Bronfenbrenner [30] are used to support the theoretical discussion. The relationships among these theories and the study variables are illustrated in the theoretical framework shown in Figure 1.

The SDT includes three core psychological needs: autonomy, competence, and relatedness. According to Deci and Ryan [27], motivation stems from a true sense of purpose and fulfillment rather than external rewards or pressure. Students who feel autonomous, competent, and connected with others, they become self-motivated and satisfied [31]. This theory supports the hypothesis that TES can fulfill these needs, thereby foster AR and enhance MP. In this study, SDT guides the role of the mediator, TES, in strengthening students' internal motivation and performance in mathematics.

Meanwhile, resilience theory looks at students' capacity to recover from setbacks and stay engaged despite challenges [28]. Masten [28] describes resilience as the ability to adapt and bounce back from disruptions. In the educational context, this refers to how students cope with the difficulties of learning mathematics. This theory supports the study's focus on AR as the independent variable (IV) that influences students' capacity to persist in math. It also explains how resilience, when supported by teachers emotionally, can lead to improved academic outcomes [32]. Wyk *et al.* [33] affirmed that resilient students tend to perform better academically, even in challenging subjects like mathematics.

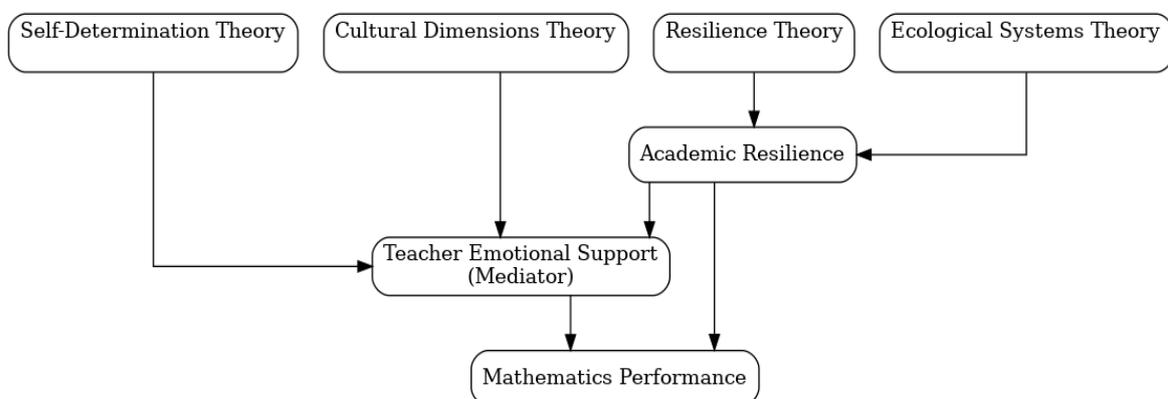


Figure 1. Theoretical framework

In addition, Hofstede's cultural dimensions theory, particularly the concept of collectivism, helps interpret how Filipino students respond to teacher support. In collectivist cultures like the Philippines, respect for authority and social harmony are emphasized [34], [35]. This theory supports the idea that TES is culturally reinforced, making it more likely to positively affect AR and MP.

Bronfenbrenner's ecological systems theory further strengthens the design of this study by showing how students' development is influenced by multiple social layers. This includes the microsystem (classroom and teacher-student relationships), where emotional support is directly experienced, and the mesosystem and macrosystem, which shape broader educational attitudes [36], [37]. This theory shows how the variables of this study, namely AR, TES, and MP, are connected and helps explain how resilience, support, and performance are influenced by different situations.

Research has shown the impact of TES on student outcomes, often considering mediators such as self-efficacy or engagement. However, little attention has been given to its role in AR or its direct link to MP. This study investigates TES as a mediator between AR and MP among Grade 7 students in Philippine public schools, using partial least squares structural equation modeling (PLS-SEM) in SmartPLS 4 to estimate direct and indirect paths simultaneously. This study seeks to bridge this gap by examining the role of TES in relation to AR and MP. Thus, the null hypothesis of the study: i) there is no significant relationship between respondents' AR and the respondents' MP (H1); ii) there is no significant relationship between the respondents' TES and their AR (H2); iii) there is no significant relationship between the respondents' TES and their MP (H3); iv) TES does not significantly mediate the relationship between the AR and MP of the respondents (H4).

Furthermore, the purpose of this study is to develop a plan to enhance student success in mathematics that can be incorporated into school programs. To do this effectively, it is essential to understand how AR and TES interact to influence students' MP. Through this investigation, the study intends to offer well-supported findings that can serve as a basis for school interventions and programs, with the goal of improving students' MP. This focus tackles an overlooked area in past studies and supports the goal of improving learners' resilience together with their academic achievement through supportive teaching methods. Specifically, this study had the following queries:

- What is the level of AR of the respondents in terms of: perseverance; reflecting and adaptive help-seeking; and negative affect and emotional response?
- What is the level of TES in terms of: positive climate; teacher sensitivity; and regards for the adolescent perspective?
- What is the level of MP of the respondents?
- Is there a significant relationship between the: respondents' TES and their AR; respondents' AR and the respondents' MP; and respondents' TES and their MP?
- Does TES significantly mediate the relationship between the AR and MP of the respondents?

2. METHOD

2.1. Research method

A descriptive correlational design was applied to determine how TES shapes the association of AR with MP. In this context, this design describes a relationship between variables and do not make any assumptions about the said relationship [38]. To gather data, the respondents' perceptions of TES and their AR were measured using adopted questionnaires: the academic resilience scale (ARS-30) and the emotional support scale. Additionally, the profile includes the age and gender, and the MP includes first quarter mathematic grades.

Specifically, AR scale adopted from Cassidy [39] to assess the AR of the students' flexible thinking, feelings, and actions when they face problems in school. The questionnaire is based on three dimensions which are perseverance with 14 items, reflecting and adaptive help-seeking with 9 items and negative affect and emotional response with 7 items [39]. The respondents answered each item using a five-point Likert scale (5–very likely, 4–likely, 3–neutral, 2–unlikely, 1–very unlikely), and before analyzing the scores for each factor, the positively worded items were reverse-coded. The Cronbach's alpha internal consistency reliability coefficients for the sub-dimensions of the scale were 0.83, 0.78, and 0.80, respectively, while the total score of the scale was 0.90. Moreover, the ARS-30 scale has demonstrated acceptable criterion validity through its notable beneficial correlations with the general self-efficacy scale ($r=0.55$, $p<0.05$) [40].

In parallel, to measure students' perspective of TES, this study adopted the instrument designed by Schenke *et al.* [41]. The tool consists of three components: positive climate (5 items), teacher sensitivity (6 items), and regard for adolescent perspective (4 items) [41]. People who take part in this research responded on a five-point Likert scale, with options ranging from 1 (not at all true) to 5 (very true). In the original validation, the scale showed strong reliability, with Cronbach's alpha values of 0.82 for positive

climate, 0.85 for teacher sensitivity, and 0.80 for regard for adolescent perspective [42]. Evidence of construct validity was also established, as the square root of the average variance extracted (AVE) for each factor (0.64, 0.79, and 0.75) exceeded the acceptable benchmark of 0.50, confirming sufficient convergent validity [42].

Prior Philippine studies that used the same instruments report strong local evidence of reliability and appropriateness. In a dedicated pilot with Filipino nursing students ($n=134$), the ARS-30 achieved excellent internal consistency (Cronbach's $\alpha=0.92$), supporting its use in this context [43]. In higher-education physical education (PE) settings, studies using the emotional support scale likewise found high internal consistency for its subscales—values typically ranging from about $\alpha\approx 0.86$ to 0.92 —along with significant associations among TES dimensions and student outcomes [44]. Complementing this, a multi-site Philippine higher education institutions (HEI) study that employed both ARS-30 and TES reported acceptable-to-good reliability across scales ($\alpha\approx 0.72$ – 0.86) and acceptable distributional properties, further attesting to the suitability of these measures for local student populations [26]. Meanwhile, the data on students' MP, including the respondents' first-quarter mathematics grades for school year 2024–2025, were obtained as secondary data from the school officials of the participating schools, and the researcher consulted the adviser to ensure proper collection and interpretation.

2.2. Participants

The respondents of this study were randomly selected Grade 7 students from three public secondary schools in Mandaue City, Cebu, Philippines, who are enrolled for the school year 2024–2025. The researcher chose Grade 7 students as the respondents because they are at a transitional stage where they are being exposed to a more challenging level of mathematics content [45], along with the expectations of increased academic expectations. Simple random sampling was employed so that respondents were proportionally distributed to the different public secondary schools. This sampling was employed because it provides each student with an equal opportunity to be selected, ensuring fairness in the process [46].

Additionally, the study used the Cochran formula to determine the sample size since the population size of the study is unknown and the number is high [47]. The Cochran formula was applied to determine the sample size, using a 95% confidence level, a 5% margin of error, and an estimated proportion of 0.5. The sample size was determined to be 563 Grade 7 students to guarantee sufficient representation across schools and to address potential non-responses, selected through simple random sampling from the target schools. Table 1 displays the demographic distribution of the students based on age and gender.

As shown in Table 1, over half the respondents are 12 years old, accounting for 56.13% (316 students), then 13-year-olds (39.43%, 222 students). The smallest percentage are those older than 14 years old (0.53% or 3 students), followed by 11 years old (1.11% or 7 students) and 14 years old (2.66% or 15 students) and this shows that most students are in the usual age range for Grade 7. Regarding gender, 54.17% or 305 of the students are female, while 45.83% or 258 students are male, meaning there are more female participants in the study.

To ensure the ethical standard and university protocol in the conduct of research, the researchers secured informed consent from the parents and informed assent from the participants before they were allowed to participate in the study. Moreover, the participants were informed of their right to withdraw at any time when they no longer feel comfortable with the data gathering process. The researchers further maintain the anonymity of the participants, and the collected data were stored properly in compliance with the data privacy act.

Table 1. Distribution of the respondents

Demographic profile		f	%
Age	>14	3	0.53
	14	15	2.66
	13	222	39.43
	12	316	56.13
	11	7	1.24
	Total	563	100.00
Gender	Female	305	54.17
	Male	258	45.83
	Total	563	100.00

2.3. Data analysis

Statistical analyses were performed by frequency counts and percentages to determine various demographic characteristics of the respondents. As well as weighted mean (WM) was used to determine the level of AR, TES, and MP, and standard deviations (SD) to describe the spread of the respondents in every

indicator of the variables. Furthermore, Pearson's r was used to calculate the significance of the relationships between AR and TES, AR and MP, and TES and MP. The researchers used mediation analysis of Preacher and Hayes [48] to examine whether the connection between AR and MP is significantly influenced by TES.

According to Preacher and Hayes [48], there were three types of mediation analysis: partial mediation, full mediation, and no mediation. Partial mediation is when the mediator partially explains the relations of the variables, while full mediation is when the mediator explains the relation fully, and no mediation contradicts it, which means the mediator does not explain the relationship at all. Preacher and Hayes [48] approach to mediation suggests two steps to assess the mediating effect using the bootstrapping method. First, bootstrapping the indirect effect in which the relationship between IV and dependent variable (DV) through mediating variable (MV) should be significant. Second, bootstrapping confidence interval lower level (LL) and upper level (UL). It means the confidence interval for this effect (lower and upper bounds) does not include zero [49].

Microsoft Excel was used for preliminary data processing, particularly to compute the mean and SD scores of AR and TES. Afterward, JAMOVI was employed to examine the relationships among variables through correlation analysis, given its user-friendly statistical interface and ability to handle descriptive and inferential tests. Finally, SmartPLS 4 was utilized to assess the mediation effect, as it specializes in PLS-SEM, allowing the estimation of both direct and indirect effects in the study's hypothesized model.

3. RESULTS AND DISCUSSION

3.1. Results

Table 2 presents the assessment of AR across three components: perseverance, reflecting and adaptive help-seeking, and negative affect and emotional response. The respondents showed a high level of perseverance (WM=3.88; SD=1.05), indicating they are determined to continue despite academic challenges. Reflecting and adaptive help-seeking also received a high rating (WM=3.72; SD=1.13), suggesting students are self-aware and seek assistance when needed. The highest score was in negative affect and emotional response (WM=3.93; SD=1.04), indicating students can manage their emotions well. The overall grand mean of 3.84 (SD=1.07) reflects a high level of AR among the respondents.

Table 3 presents the overall level of TES among the respondents, and it was evaluated through the three components, which are the positive climate, teacher sensitivity, and regard for adolescents' perspective. The data shows that TES grand mean was 4.26 with a SD of 1.00, which was at a very high level. Amongst the grand mean, the WM value of positive climate was very high (WM=4.48, SD=0.93) also in teacher sensitivity (WM=4.21, SD=0.99) and a high level in terms of regard for adolescents' perspective (WM=4.09, SD=1.08).

Table 2. Level of the respondents' academic resilience

Components	WM	SD	Verbal description
Perseverance	3.88	1.05	High
Reflecting and adaptive help seeking	3.72	1.13	High
Negative affect and emotional response	3.93	1.04	High
Grand mean	3.84		High
Grand SD		1.07	

4.21-5.00=very high; 3.41-4.20=high; 2.61-3.40=moderate; 1.81-2.60=low; 1.00-1.81=very low

Table 3. Level of the respondents' teacher emotional support

Components	WM	SD	Verbal description
Positive climate	4.48	0.93	Very high
Teacher sensitivity	4.21	0.99	Very high
Regards for adolescent perspective	4.09	1.08	High
Grand mean	4.26		Very high
Grand SD		1.00	

4.21-5.00=very high; 3.41-4.20=high; 2.61-3.40=moderate; 1.81-2.60=low; 1.00-1.81=very low

Table 4 displays the students' MP. This is essential to determine the students' progress in their academic, specifically in mathematics. As can be seen, out of 563 respondents, most of the respondents displayed satisfactory level of MP with 231 students (41.03%) and 116 students (20.60%) for the fairly satisfactory of the total sample population.

Table 5 highlights the level of AR of the respondents and indicates that female students (M=3.87; SD=0.37) exhibit slightly higher AR compared to male students (M=3.80; SD=0.43). Moreover, statistical analysis revealed that the mean difference of 0.07 is statistically significant ($t=2.080$; $p=0.036$). Table 6

presents data on the perceived emotional support from teachers, showing that female students ($M=4.31$; $SD=0.52$) report slightly higher levels of support than male students ($M=4.22$; $SD=0.60$). Moreover, statistical analysis revealed that the mean difference of 0.09 is not statistically significant ($t=1.918$; $p=0.056$).

Table 4. Level of the respondents' MP

Level	Numerical range	f	%
Outstanding	90-100	75	13.32
Very satisfactory	85-89	141	25.04
Satisfactory	80-84	231	41.03
Fairly satisfactory	75-79	116	20.60
Did not meet the expectations	Below 75	0	0.00
	Total	563	100.00
	Mean	83.41	
	SD	4.90	

Table 5. Test of difference on the AR of the respondents

Source of difference	Mean	SD	Mean difference	t- value	p-value
Female	3.87	0.37	0.07	2.080*	0.036
Male	3.80	0.43			

*significant at $p < 0.05$ (two-tailed)

Table 6. Test of difference on the TES received by the respondents

Source of difference	Mean	SD	Mean difference	t-value	p-value
Female	4.31	0.52	0.09	1.918*	0.056
Male	4.22	0.60			

*significant at $p < 0.05$ (two-tailed)

The correlation between respondents' age and their MP is shown in Table 7. The results indicate a negligible positive relationship, with an r -value of 0.023. Moreover, the p -value of 0.592 exceeds the significance level of 0.05, suggesting that the correlation between age and MP is not statistically significant.

Table 8 shows the correlation analysis between AR and TES, AR and MP, and TES and MP. In the correlation analysis between AR and TES, there was a weak positive correlation ($r=0.452$, $p < 0.001$). Following, AR and MP, the correlation analysis revealed a negligible positive correlation ($r=0.246$, $p < 0.001$). Lastly, the correlation between TES and MP also showed a negligible positive correlation ($r=0.224$, $p < 0.001$). These findings as indicated by the p -value being less than 0.001, which is below the significance level of 0.05, thereby leading to the rejection of the null hypothesis (H_0).

Table 7. Correlation analysis between age and MP

Variables	r-value	Strength of correlation	p-value	Decision	Remarks
Age and MP	0.023	Negligible positive	0.592	Do not reject H_0	Not significant

*significant at $p < 0.05$ (two-tailed)

Table 8. Correlation analysis

Variables	Statistics	AR	TES	MP
AR	Pearson's r	-		
	df	-		
	p-value	-		
TES	Pearson's r	0.452**	-	
	df	561	-	
	p-value	<0.001	-	
MP	Pearson's r	0.246**	0.224**	-
	df	561	561	-
	p-value	<0.001	<0.001	-

**significant at $p < 0.001$ (two-tailed)

Mediation analysis was performed to better understand the mediating role of TES in the relationship between AR and MP; the study employed a path analysis using SmartPLS 4. This statistical approach allowed for the estimation of both direct and indirect effects among the variables. According to Preacher and Hayes [48], mediation analysis helps determine whether the effect of an IV on a DV is transmitted through a mediator. The relationships among AR, TES, and MP were further examined using mediation and path analysis.

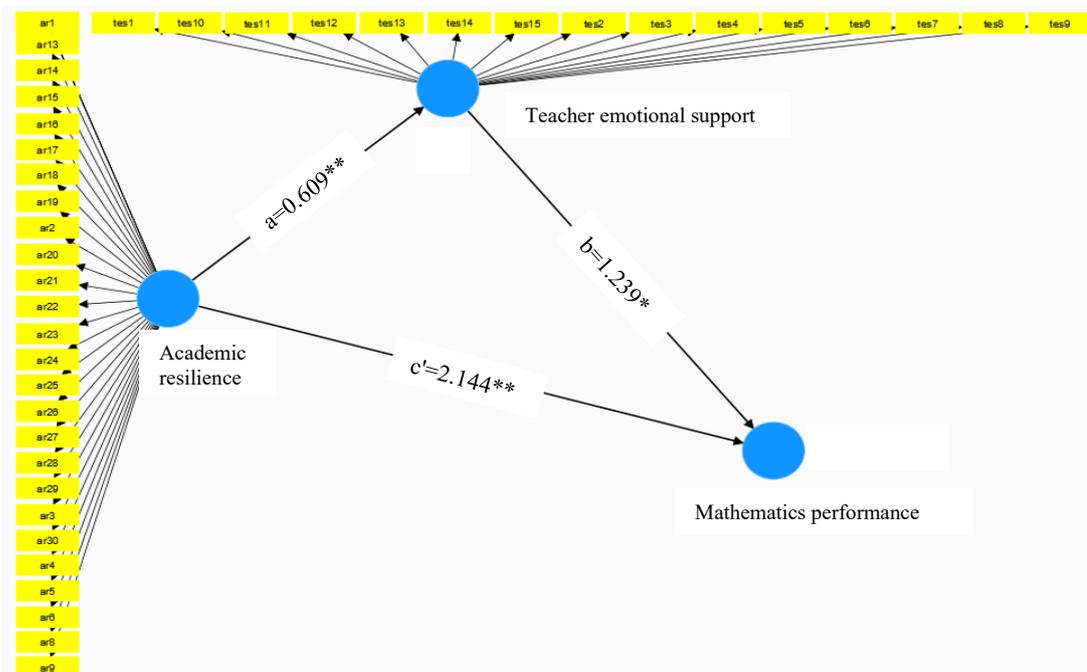
Table 9 presents the mediation analysis, showing the total, direct, and indirect effects of AR on MP through TES. The path estimates of the structural model are summarized in Table 10, illustrating the strength and significance of the relationships among the study variables. Finally, Figure 2 presents the path estimates of the variables derived from the mediation model.

Table 9. Mediation analysis

Statistics	Total effect	Direct effect	Indirect effect of TES
B	2.898	2.144	0.755
t-value	6.06	4.00	3.15
p-value	<0.001	<0.001	0.002
CI	(1.969;3.83)	(1.121;3.21)	(0.313;1.24)
Mediation (%)	100.0	74.0	26.0
R ²	0.0603	0.0762	-
f ²	-	0.0172	-

Table 10. Path estimates

Variables	Label	Estimate	SE	95% Confidence interval		t	p
				Lower	Upper		
AR→TES	a	0.609	0.0506	0.510	0.709	12.04	<0.001
TES→MP	b	1.239	0.3979	0.459	2.018	3.11	0.002
AR→MP	c'	2.144	0.5359	1.093	3.194	4.00	<0.001



*Significant at p<0.05 (two tailed), **significant at p<0.001 (two tailed)

Figure 2. Path estimates of the variables

Moreover, the R² for this model (AR+TES→MP) was 0.0762, showing that including TES increased the explained variance in MP to 7.62%. However, the indirect effect of AR on MP through TES was also found significant ($\beta=0.755$, $t=3.01$, $p=0.003$), accounting for 26% of the total effect. Since the beta values are entirely above zero and positive, we can conclude that the presence of mediating role of TES strengthens the relationship between AR and MP. Furthermore, the bias corrected bootstrap confidence interval for the indirect effect ($\beta=.76$) based on 5,000 bootstrap samples was entirely above zero (0.313; 1.24) which means that AR is both directly and indirectly related to MP through TES. Finally, the calculated Cohen's $f^2=0.0172$ indicates a small but meaningful effect size for TES as a mediator, showing that it contributes additional explanatory power to the model. Therefore, since the confidence interval does not include zero, the mediation effect is statistically significant thus we reject the null hypothesis and conclude that the mediation effect of TES on the relationship between AR and MP is significant.

3.2. Discussion

Reflecting on the findings, the high level of perseverance in Table 2 implies that students are motivated to persist through academic difficulties, especially in mathematics, where consistent effort builds problem-solving skills [50]. Their high scores in reflecting and adaptive help-seeking show self-awareness, as they monitor their performance and seek help when needed, supporting research that highlights the role of teachers in keeping students engaged [51]. Moreover, their ability to regulate emotions helps them manage stress and stay focused in class. These findings affirm the importance of fostering resilience to improve academic outcomes [52], particularly when supported by emotionally responsive teaching. Persistence, self-awareness, and emotional regulation together strengthen AR, boost confidence, and enhance MP, while also fostering deeper thinking that helps students not just succeed but continue improving over time.

Following this, in spite of the fact that the three components are not on the same level, respondents strongly feel emotionally connected to their teachers and perceive them as attentive and sensitive to their needs, responding positively to them. Having this level of emotional support from teachers can exert a positive influence on students' academic performance, particularly in mathematics [22]. However, the variation in SD suggests differences in students' experiences or perceptions. Positive climate, the highest-rated component, refers to the way teachers create a warm, respectful, and supportive environment where students feel valued. When students feel safe and accepted in class, they are more likely to participate, stay motivated, and take academic risks that lead to growth.

Building on these points, teacher sensitivity, which also received a very high rating, reflects how well teachers notice and respond to students' academic and emotional needs. Teachers who are attentive and quick to offer help can reduce students' stress and encourage a sense of belonging, which improves focus and learning outcomes. Meanwhile, although regard for adolescents' perspective was slightly lower, it still reached a high level. This component refers to how much teachers respect students' opinions, encourage autonomy, and involve them in decisions. When students feel that their voices are heard, they become more responsible and engaged in their learning process. Altogether, these findings highlight the need for teachers to create a welcoming and safe classroom environment while providing both emotional and academic support by being responsive to students' needs [53].

Subsequently, Table 4 presents a mean qualitative description of satisfactory, indicating that students met the basic expectations but still have room to improve [54]. This shows that even if students know the basics, they may still struggle with harder tasks that require deeper thinking. One reason for the satisfactory level could be differences in how students handle challenges and how much support they feel from their teachers. Students who are less motivated, easily stressed, or unsure when to ask for help may find it hard to do well in math. Helping students become more confident, emotionally strong, and supported by their teachers can lead to better performance in mathematics. Therefore, considering the factors that affect students' mathematics grades is essential; otherwise, neglecting these issues may hinder educational progress [13].

Moreover, in Table 5, the result showed that female students are more resilient academically, which may be attributed to their greater emotional regulation skills and proactive help-seeking behaviors. Research supports this conclusion, with Năstasă *et al.* [55] noting that female students often show higher AR due to stronger emotional intelligence and more supportive peer networks. Similarly, Sadia and Khurshid [56] emphasized that female students tend to adapt better in challenging academic environments, often due to societal socialization that encourages persistence and self-regulation. This suggests that female students are better able to manage stress and stay motivated when facing academic challenges. Their willingness to seek help when needed also allows them to stay on track, even in difficult subjects like mathematics.

In the same vein, Table 6 shows a trend suggesting that female students may experience slightly more TES. However, the lack of statistical significance means that both male and female students generally perceive similar levels of teacher support. This suggests that teachers provide emotional support equitably, regardless of gender. This finding aligns with Hejazi and Sadoughi [57], who observed no meaningful gender-based differences in TES within inclusive and supportive school environments. This indicates that the learning environment promotes fairness and emotional safety for all students. When students feel supported equally, they are more likely to feel secure and motivated to learn, no matter what their gender.

Moving forward, the results in Table 7 imply that students' performance in mathematics does not depend on their age. Therefore, it can be concluded that age is not a determining factor in how well students perform in the subject. This is supported by Alshammari *et al.* [58] who found that age had no significant influence on students' academic performance. On the other hand, Capinding [59] noted that when students are grouped by age, there are significant differences in aspects such as motivation, interest, attitude, anxiety, and achievement in mathematics. This means that while older or younger students may approach learning differently, their actual performance levels remain similar. Hence, educators should still consider age-related needs in teaching strategies, even if age alone does not affect final grades.

Nevertheless, in Table 8, despite statistical significance, the weak and negligible positive correlation values suggest that other contextual characteristics may also be influencing these relationships. A negligible correlation means the connection between variables is present but too small to have a meaningful effect. For instance, school culture that includes norms, values, and expectations within the educational environment has been found to significantly impact both student behavior and academic performance [60]. A positive school climate can foster resilience and encourage stronger emotional connections between students and teachers, which in turn supports academic achievement [61]. In addition, factors such as socioeconomic status, family support, peer relationships, and classroom practices may also play crucial roles in shaping students' resilience and learning outcomes [62].

In relation to this, Lobo [25] noted that students who perceive higher emotional support from instructors tend to exhibit greater AR and TES emotional support is positively associated with school engagement and partially mediates the relationship between AR and school engagement. Likewise, these findings agree with the study of DiNapoli and Miller [51], which found that AR—particularly perseverance in problem-solving—positively influences MP. Supporting this, Xenofontos and Mouroutsou [63] found that students with strong mathematical resilience, such as the ability to persist, adapt, and overcome difficulties, are more likely to succeed in solving mathematical application problems. These results suggest that even though the measured correlations were weak, the relationships between the variables may still be important when combined with other contributing factors.

Taken together, Table 9 and Table 10 reinforce the idea that AR has a meaningful impact on MP. The results show that students with high AR tend to perform better in mathematics because they are persistent, can manage their emotions, and seek help when needed to overcome difficulties. This result is supported by the study of Romano *et al.* [16] who found that students with high AR have higher grades because they are more motivated to perform well in school.

Similarly, the study of Abubakar *et al.* [64] found that students with high AR are more likely to improve their academic performance compared to those with lower AR. These studies emphasize the strong influence of AR on students' learning outcomes. Moreover, supporting students emotionally can significantly boost the positive effects of AR on their success in mathematics [22]. These findings provide evidence that resilient students are more likely to improve their MP, especially when they receive TES.

Although AR showed only a weak direct relationship with MP, the mediation analysis, a method used to test if one variable explains the connection between two other variables revealed a strong indirect effect. This shows that while resilience helps students face challenges, TES turns that resilience into real academic improvement. The presence of caring and responsive teachers helps students stay motivated, focused, and confident in solving difficult mathematics problems. Therefore, resilience alone may not be enough; students also need a nurturing and supportive environment to turn their resilience into academic success [65].

In this regard, TES serves as an added factor that strengthens students' achievements in mathematics [66]. Correspondingly, this result aligns with the previous findings of Romano *et al.* [16] who showed that perceived TES helps explain how resilience contributes to academic achievement. This highlights the critical role of emotionally supportive teaching in maximizing the benefits of AR on students' mathematics outcomes.

4. CONCLUSION

This study examined how AR, TES, and MP are related among Grade 7 students, with TES as the mediator. The results show that students have high AR, very high TES, and satisfactory MP. Significant positive relationships were found among the three variables, and TES partially mediated the effect of AR on MP. This means resilient students tend to perform better in mathematics, especially when they feel emotionally supported by their teachers.

These results highlight the important role of teachers in creating emotionally supportive classrooms. Schools and policymakers can use these findings to improve teacher training, mentoring programs, and curriculum planning, especially in integrating social and emotional learning into mathematics instruction. Such practices can help build resilience, improve emotional well-being, and enhance MP across grade levels and cultural settings where relationships and supportive environments are valued.

Future studies could use longitudinal designs to track students over several months or years, or experimental designs to test the impact of specific interventions, such as teacher training or SEL programs, on students' resilience and MP. Finally, a mixed-methods approach is recommended for future research to qualitatively explore students' perceptions for a more comprehensive understanding of their experiences and consider including cultural and socio-economic factors as possible moderating variables to gain a deeper understanding of how these may influence the relationship between AR, TES, and MP. Addressing these limitations can provide a deeper understanding of how emotional support and resilience influence academic outcomes across different settings and cultures.

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AUTHOR CONTRIBUTIONS STATEMENT

This journal uses the Contributor Roles Taxonomy (CRediT) to recognize individual author contributions, reduce authorship disputes, and facilitate collaboration.

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C : Conceptualization

M : Methodology

So : Software

Va : Validation

Fo : Formal analysis

I : Investigation

R : Resources

D : Data Curation

O : Writing - Original Draft

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CONFLICT OF INTEREST STATEMENT

Authors state no conflict of interest.

DATA AVAILABILITY

The data of this research are available upon request from the corresponding author, [JMO].

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