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The Relationship Between Academic Resilience and Mathematics Performance Among Form Two Students in Nakuru, Kenya

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Abstract Persistent underperformance in mathematics poses a significant challenge globally, particularly in regions like Sub-Saharan Africa. This study investigated the relationship between academic resilience and mathematics performance among Form Two students in Njoro Sub-County, Nakuru County, Kenya, a context where mathematics performance remains a concern despite governmental efforts. Employing a descriptive correlational design, the study targeted 3,359 students, from which a stratified random sample of 382 was drawn across 10 secondary schools. Data were collected using the Academic Resilience Scale (ARS-30) and end-of-term mathematics assessment scores. Regression analyses established that academic resilience significantly accounted for 8% of the change in mathematics performance, F (2, 378) = 11.01, p <001. Descriptive analyses indicated high levels of academic resilience among students with moderate mathematics performance. These findings align with positive psychology theory, highlighting the role of resilience in fostering academic success. The study underscores the importance of nurturing non-cognitive factors like perseverance and adaptive help-seeking to enhance mathematics performance. Implications include the need for teacher-led interventions that foster a growth mindset and self-efficacy. Future research should explore these relationships in diverse educational settings, including underprivileged contexts, to enhance generalizability and further validate the role of academic resilience in STEM education.

Keywords Academic Resilience, Mathematics Performance, Positive Psychology, Perseverance

1. Introduction

A country's bright future, to a larger degree, depends upon the education system that builds the citizens' behaviors and morality. This requires an attractive investment in education on a global scale (Jameel et al., 2016). Education is considered the optimal instrument to integrate an individual with society and to develop national goals, promote unity, and achieve high levels of progress, self-actualization, economic welfare, cultural consciousness, and technological progress. To acquire the aforementioned skills, mathematics is studied as a fundamental component of education.

Mathematics is a bedrock and an indispensable tool for any nation's scientific, technological, and economic advancement. It is elemental not only for national but also global development (Jameel et al., 2016). In a broad sense, it forms a basis for different fields of science, such as engineering, physics, chemistry, and astronomy (Okocha & Odinko, 2021). It is also important to note that science and technology plays a central role in economic growth which is key for development in the modern civilization.

Despite its crucial role, global literature indicates concerning trends in mathematics performance. It is evident in the existing literature globally that poor mathematics performance is increasingly a concern to stakeholders. Particularly, trends in mathematics performance have piqued the interest of such organizations as the United Nations Educational Scientific and Cultural Organization (UNESCO), as well as global standardized assessment bodies as Program for International Student Assessment (PISA). This research has, to a larger extent, been done in the developed world of Europe and America with a focus on comparison with emerging Asian giants such as China, Malysia and Korea. Nonetheless, there is some marginal interest in the subject in African countries such as Namibia, South Africa and Kenya.

UNESCO (2017) reported that mathematics performance has reached crisis levels globally, with more than 600 million students (56% of primary and 61% of secondary students) underperforming in mathematics and reading. According to the Institute of statistics (UIS), which is domiciled under UNESCO, over 600 million students globally are underperforming in mathematics and reading. In a nutshell,

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more than 387 million children of primary school, equivalent to 56% and 230 million adolescents 61% of secondary school are underperforming in mathematics and reading (UNESCO, 2017). Across the regions, the performance gaps were more pronounced in regions of low social economic status such as Sub-Saharan Africa and southern Asia. Such performance is a big threat to the attainment of Sustainable Development Goals (SDGs).

The PISA assessments note a global poor mathematics performance trend. In Spain, for instance, according to PISA report 2018, students' mathematics performance was ranked in the last positions within the OECD countries, falling seven points below the OECD average of 489 (Trigueros et al., 2020). Mathematics anxiety stemming from societal prejudices was linked to this underperformance. The situation is not any different with Filipino students as they performed poorly, over half the learners posting below average performance levels. Less than a fifth of the learners performed beyond the minimum performance level required (Lapinid et al., 2022). These low levels of performance were mainly linked to such affective variables as academic emotions and career aspirations. Holding the students' abilities constant, students who had higher aspirations and a positive outlook towards mathematics were established to be comparatively more likely to score better.

A similar trend is reflected in the world's industrialized nations. In the UK, curriculum depth and high-stakes assessments have contributed to underperformance, with the country ranking 18th in mathematics in PISA 2018 (Skipp & Dommett, 2021). Similarly, in the USA, students perform below the median of participating countries, lagging behind nations like China and Japan (Hanushek et al., 2019). This has been linked to disengagement and negative attitudes toward mathematics (Gjicali & Lipnevich, 2021). Given its critical role in career development, addressing these challenges is essential (OECD, 2018).

In Africa, underperformance in mathematics is a chronic issue that has attracted the attention of researchers and policy makers. According to Gjicali and Lipnevich (2021), Sub-Saharan Africa (SSA) needs better performance in mathematics and stem subjects. This has raised a threat to the economic growth and social outcomes in SSA at individual and national levels, as the situation is far worse in SSA as compared to Asia (World Bank, 2016). The standards in Mathematics in SSA are currently very low with predictions that it will take about 130 years to bridge the academic gap with the OECD countries (Gjicali & Lipnevich, 2021). It is concerning that the participants from SSA of Ghana (331), Botswana (397), and South Africa (352), scored below the international average of 500.

In Kenya, mathematics is compulsory in primary and secondary schools. It is also one of the key subjects under consideration for subject selection by Kenya Universities and Colleges Central Placement Service (KUCCPS). There remains a public objection to the low mathematics mean scores each time Kenya Certificate of Secondary Education results are out. In Kenya, performance in mathematics continues to deteriorate, as mirrored by the KCSE results for years, with the latest trends confirming the attainment of mathematics among students in secondary school to be less than average (Ruthiga, 2021). As the Standard newspaper highlights, students posted an improvement in mathematics in 2024 after a persistent drop since KCSE, 2015.Whereas most of the research into underperformance in mathematics has mostly focused on pedagogical approaches by teachers and resource availability, which the government has continually strived to address, the performance has nonetheless been dipping.

1.1. Academic Resilience

Mathematics underperformance extends beyond cognitive ability deficits and is strongly influenced by non-cognitive factors. Empirical research highlights that mathematics anxiety and perceived difficulty serve as significant impediments to performance (Mammarella et al., 2020). Negative attitudes, such as the belief that mathematics is inherently difficult, contribute to self-fulfilling prophecies that undermine motivation and engagement (Kaya & Karakoc, 2022). Findings from large-scale assessments, including PISA and TIMSS, demonstrate a strong correlation between cultural attitudes towards mathematics and student performance, even when cognitive abilities are accounted for (OECD, 2018). These socio-emotional barriers present substantial challenges to mathematical learning, irrespective of students' innate potential.

Given that perceived difficulty, rather than inherent inability, often drives mathematics underperformance, fostering academic resilience becomes crucial (Hall et al., 2022). If negative perceptions are the primary hurdle, then the ability to bounce back from setbacks and maintain motivation could be the missing link to bridge the performance gap. Academic resilience refers to students' likelihood to handle academic pressure, drawbacks, or stress in academics or rather school life. Academic resilience is the process or outcome of successful adaptation during exposure to adversity or difficulty in academics in order to succeed (Xenofontos & Mouroutsou, 2022). Academic resilience is characterized by perseverance, reflecting and adaptive help-seeking, and negative affect and emotional response. Cassidy (2016) elucidates that perseverance involves persisting despite adversity and maintaining goals. Reflecting and help-seeking refer to monitoring performance, altering study approaches, and seeking support. Negative affect relates to managing anxiety, catastrophizing thoughts, and optimism. Lastly, the negative affect and emotional response aspect deals with how students manage their emotions in response to academic stress and challenges.

Academic resilience can be nurtured and be strengthened over time as a result of an individual's interaction with various protective systems. Oktay et al. (2021) point out that academic resilience is characterized by sustained effort in challenges, stress and difficult situations in school set up. Academic resilience is therefore associated with a higher probability of success in academics. Broadly, academic resilience is a child's ability to maintain academic performance in the face of challenges. Every child has a capacity to be

academically resilient, but it can only be possible if it is nurtured properly. To help cope with the academic challenges, teacher-led support is key.

Literature has shown a link between academic resilience and increased mathematics performance. In Europe, García-Crespo (2022) investigated academic resilience in mathematics performance. Academic resilience was found to significantly predict mathematics performance. In Egypt, academic resilience was found to be significantly related to academic performance (Khalaf, 2014). Students who lack academic resilience and those who tend to be stressed often perform poorly in mathematics, conversely, academically resilient students portrayed good mathematics performance results.

Whilst it would universally agreed that academic resilience has incremental effects on students' academic outcomes, variations have been noted across literature. Studies have highlighted the significance of protective factors, such as parent-child relationships and supportive school environments, in shaping academic resilience. Notably, the impact of academic resilience varies across socioeconomic backgrounds, as access to these protective factors differs based on economic and social resources (Sheehan & Hadfield, 2024). Socioeconomic status (SES) consistently emerges as a powerful moderator in this relationship. Studies by Yeager et al. (2021) demonstrate that the correlation between resilience measures and mathematics achievement tends to be stronger for students from lower SES backgrounds compared to those from higher SES backgrounds. This suggests that resilience may function as a particularly critical protective factor when material resources and educational supports are limited. However, Nasciomento et al. (2023) noted this relationship is non-linear, with extremely disadvantaged conditions potentially overwhelming even strong resilience capabilities.

Cultural contexts have, across literature moderated the relationship between academic resilience and academic outcomes. It is noted that in collectivist cultures academic resilience measures that focused on perseverance and effort showed stronger correlations with mathematics achievement (Kim & Chen, 2020) as opposed to measures of individual adaptability. Western-developed resilience constructs may fail to capture culturally-specific resilience mechanisms, such as the concept of "grit" translating differently across cultural contexts (Datu et al., 2018). Additionally, the relationship bas been noted to vary across developmental stages. For instance, Lombardi et al. (2022) established strong correlations in secondary education as compared to primary schools highlighting its relevance on adolescent populations. Additionally, Rivera-Torres (2023) observed that resilience becomes increasingly domain-specific with age, with general academic resilience measures showing decreasing predictive power for mathematics performance as students advance through educational levels.

Additionally, the need for academic resilience has been found to be of higher utility in STEM subjects, with different manifestations across different disciplines (Xenofontos & Mouroutsou, 2022). Overall, academic resilience is generally linked to academic outcomes, with a more prominence in mathematics achievement. It is however fluid dependent on a variety of moderating factors such as gender, culture, specific subject domain. This means that the generalizability of the existing findings is limited to the above variables. Further, academic resilience has been found to be more relevant to adolescent samples, and students from lower social economic status. This study targets this specific population, this is extremely relevant in understanding the specific drivers of the relationship among the variables. Building on this, there was a need to conduct a study on the relationship between academic resilience and mathematics performance in an African educational context.

2. Materials and Methods

2.1. Research Design

The study employed a predictive correlational research design (Devi et al., 2023). The design is ideal since it does not involve manipulation and interventions, which is suitable when studying naturally occurring behaviors. Since the variables, academic resilience and mathematics ability are relatively enduring and it would not only be difficult to manipulate but would also be unethical to manipulate. The design also allows for inferential testing of objectives which allows for the generalization of findings outside the sample.

2.2. Participants and Procedures

The study targeted a population of 3359 form two students in Njoro Subcounty, Nakuru County, Kenya. The rationale behind the choice of form two students was, relative to form one students, had adjusted to the secondary school learning routine and started developing and using different internal resources, such as academic resilience, to deal with challenges and failures in mathematics subject and in life in general (Njoki, 2018). A resulting sample of 382 respondents across 10 schools was derived from the population through a multistage blend of stratified and simple random sampling respectively. Stratified random sampling was used to proportionately sample students across the different schools and genders whereas simple random sampling ensured bias free selection of individual respondents from the pool. 10 schools (Guest et al., 2020). The students' mean age was 16.29 (SD = 0.96) which girls having a modestly higher proportion of 201 (52.56%) as compared to boys (n = 182, 47.38%). The distribution of respondents by school type indicates that the majority were from coeducational schools, accounting for 217 (52.6%) of the total participants. Girls' boarding schools followed, with 90 (21.8%), while boys' boarding schools had the least representation at 76 (18.4%). The proportions in the distribution align with the national averages and gender parity index suggesting that the data was representative enough of the population (Ministry of

Education, 2021). The respondents were administered with a pen and paper questionnaire made up of Likert scale items. The students' scores on mathematics performance were assessed using the summative end of term assessment.

2.3. Instruments

2.3.1. Academic Resilience Scale (ARS-30; Cassidy, 2016)

The ARS-30 by Cassidy (2016) was adapted and used in measuring academic resilience. It is based on a vignette portraying an actual adversity students undergo in their learning (repeated failure and negative feedback from a tutor). The students' reactions on their probable actions were thereafter measured on a 30-item five-point summative scale ranging from unlikely (1) to likely (5). Sample Question: "I would just give up." The initial study the tool was established to be reliable with acceptable internal consistency of α =.80. The tool has been established as valid across different cultures with acceptable reliabilities recorded in Chinese (α = .90), Turkish (α =.94) and Spanish (α =.93) samples (Chisholm-Burns et al., 2019). The tool is ideal to be scored at both, the subscale and scale level, and involves computation of a single total score. To enhance comparability of the scores across the subscales, an average score was computed ranging between 1 and 5.

2.3.2. Mathematics Results Marks Sheets

Mathematics performance was based on end-of-term three 2023 mathematics scores. It was expected to be a reliable measure of mathematics performance since, in the majority of the cases, end-term examinations serve as a summative evaluation and have been used to make decisions about placement and grading for the KCSE index numbers (Soi, 2017). To compare students across schools scores will be converted to z-score then to t-scores.

3. Data Analysis and Discussion of Findings

The collected data was keyed into the SPSS software and the data cleaning exercise initiated where any data entry errors were looked into, and corrected and potential abandonment investigated. Missing values were further assessed. A systematic missing data identification was initiated. Srijan et al. (2023) advise that, to suitably address missing data, one ought to understand the type of missingness. Little's Missing Completely at Random (MCAR) test was performed to assess the missingness where a non-significant p-value of .758. According to Rioux and Little (2021) non-significant implies that there were no patterns of the missing values. These missing entries were therefore imputed using the linear interpolation.

3.1. Reliability of the Instruments

The reliability of the research instrument, the ARS-30 was evaluated using Cronbach's Alpha to assess internal consistency. The results are presented in Table 1.

Table 1 shows that the Academic Resilience scale an overall reliability of α = .75, which is above the recommended alpha level of α = .70. Of the three factors, the perseverance facet had the lowest suboptimal reliability of α = .59. Nonetheless, the reliability coefficients were comparable to those in literature in Chinese (α = .90), Turkish (α =.94) and Spanish (α =.93) samples (Chisholm-Burns et al., 2019).

Descriptive Analyses

The respondents reported scores of academic resilience and mathematics performance were computed and a description of the scores illustrated in Table 2.

Table 2 shows that the academic resilience scores were notably higher approaching the upper threshold of 5.00. The variable had a range between 2.43 to 4.87, with a mean of 4.13 (*SD* = 0.39). The distribution exhibited a moderate negative skew (*Sk* = -0.78) and slight leptokurtosis (*Kur* = 0.97), indicating a concentration of scores around the higher end of the scale. Mathematics Performance (Raw Scores) ranged from 3 to 96, with a mean of 42.11 (*SD* = 22.98). The distribution was approximately symmetric (*Sk* = 0.23) and slightly platykurtic (*Kur* = -0.91), suggesting a relatively even spread of scores. After transformation to T-scores, the range was adjusted to 37.26 – 81.21. The distribution remained within acceptable normality thresholds, with a skewness of 0.23 and a kurtosis of -0.91.

An additional analysis was performed on the subscales of the school climate assessment, with the findings presented in Table 3.

Table 3 shows that the negative affect and emotional response (reversed) had the highest scores of the three subscales (*M* = 4.73, *SD* = 0.75). This was followed by the reflective and adaptive seeking behavior (*M* = 4.35, *SD* = 0.54) and lastly perseverance had the lowest scores (*M* = 4.20, *SD* = 0.45). The range of scores was relatively narrower on the perseverance subscale (*Range* = 3.07) than the two additional subscales.

3.2. Hypothesis Testing

The study sought to determine the relationship between academic resilience and students' mathematics performance. The below null hypothesis was tested.

H_0: The is no significant prediction of mathematics performance from academic resilience.

Prior to testing the hypothesis, a test for the assumptions of the simple regression analyses was performed. This included tests for multicollinearity, outliers, homoscedasticity, and normality.

The test for multicollinearity checks if the variables are highly correlated. High correlations make it difficult to isolate individual effects of each predictor (Jeng, 2023). To assess this, a correlation matrix for the subdimensions of academic resilience and mathematics performance was generated as highlighted in Table 4.

Table 1. The Instruments' Reliability

Scale	No of Items	Author's α	Obtained α
Academic Resilience Scale	30	.90	.75
Perseverance	14	.83	.59
Reflecting and Adaptive Seeking Behavior	8	.78	.72
Negative Effect and Response	8	.80	.64

Table 2. Descriptive Analyses

Scale	Range	*M*	*SD*	*Sk*	*Kur*
Academic Resilience	2.43 – 4.87	4.13	0.39	-0.78	0.97
Mathematics Performance (Raw)	3 – 96	42.11	22.98	0.23	-0.91
Mathematics Performance (T Score)	37.26 -81.21	50.00	10.00	42.11	22.98

Table 3. Academic Resilience Subscales

	N	Range	M	SD	Sk	Kur
Perseverance	382	1.93 -5.00	4.20	0.45	-1.18	2.91
Reflecting and adaptive seeking behavior	282	1.50 – 5.00	4.35	0.54	-1.13	1.93
Negative effect and emotional response.	382	1.50- 5.00	4.73	0.75	0.12	-0.43

Table 4. Correlation Matrix

Variable/dimension	1	2	3	*VIF*
Perseverance	--			1.32
Reflecting and adaptive seeking behavior	.47**			1.30
Negative effect and emotional response.	.23**	.20**		1.07
Mathematics Performance	.26**	19**	.15**	

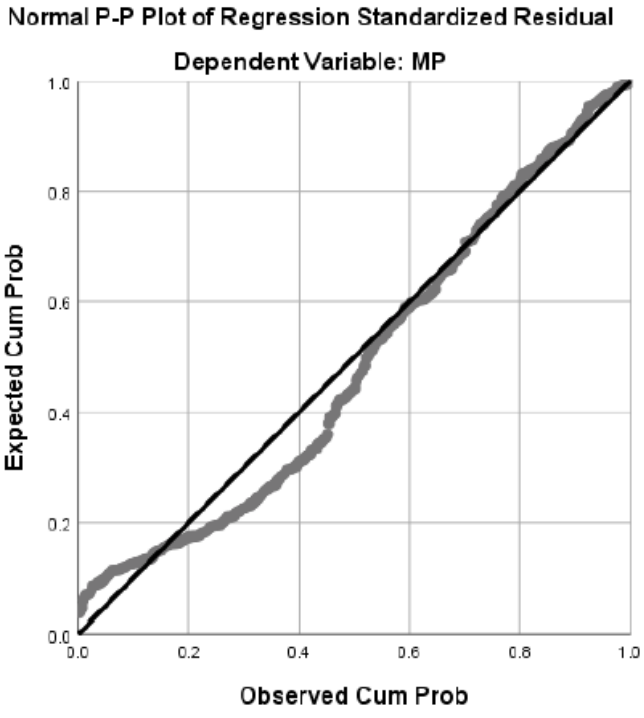

Figure 1. Normal Probability Plot

As observed in Table 4, although these were subdimensions of the variable, the correlations were moderate to low (r = .47 to r = .5). This indicates a low likelihood of autocorrelation among the variables, compared to the threshold of r = .70 suggested by Tsagris and Pandis (2021). This finding is further supported by the Variance Inflation Factor, which remains below the threshold of 10. Further, the test for normality was assessed using the normal probability plot as highlighted in Figure 1.

As illustrated in Figure 1, the data assumed a straight 45-degree angle, indicative of no violations to data normality (Rinehart et al., 2022). To assess homoscedasticity, the standardized residual plot was used. To check for homoscedasticity, the scatter plot should appear to be random without any funnel shaped or curved patterns observed in the data. The standardized residual plot is shown in Figure 2.

As shown in Figure 2, the standardized residual plot displayed no noticeable funneling or curvilinear patterns, suggesting that the variables maintained equal variances. Outliers were evaluated using the Mahalanobis Distance, with the highest observed value being 14.22, which falls below the recommended upper limit of 16.27. Having ascertained that the distribution met the regression analyses, a simple regression analysis was performed.

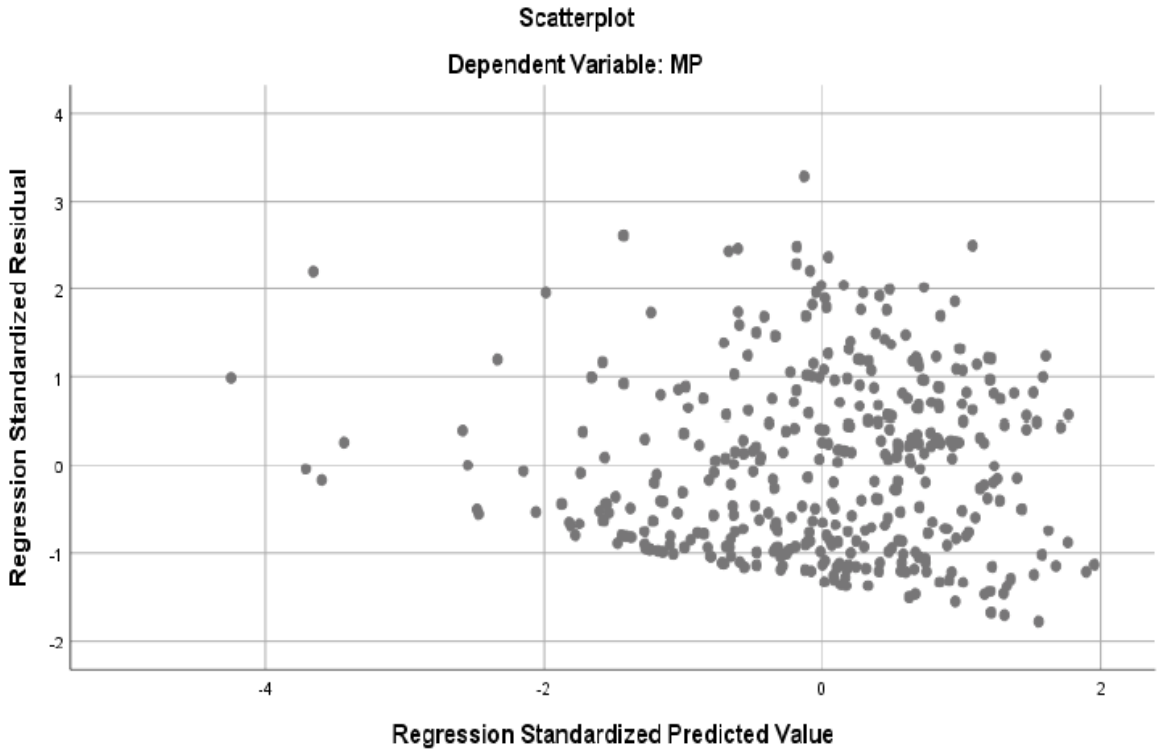

Figure 2. Standardized Residual Plot

3.3. Regression Analyses

The model summary is outlined in Table 5.

Table 5. Model Summary

r	r^2	Adjusted r^2	SEE
.28	.08	.07	9.63

Table 5 shows that the model of variables accounted for 8% of the variance in mathematics achievement scores (r = .28). To check whether the model was significant the ANOVA summary is provided in Table 6.

Table 6. ANOVA Summary

Model	Sum of Squares	*df*	Mean Square	*F*	*Sig*
Regression	3062.612	3	1020.87	11.01	.000
Residual	35037.38	378	92.69		
Total	38100.00	381			

Table 6 highlights that the 3-factor model significantly predicted the students' mathematics performance scores, F (2, 378) = 11.01, p <001. Thus, the null hypothesis was rejected and it was concluded that the academic resilience dimensions significantly predicted mathematics performance. To further understand the contribution of each of the subdimensions, the coefficients table (Table 7) is provided.

Table 7 shows that perseverance dimension was the most significant predictor of mathematics performance (β = 4.86, p < .001). this was followed by the reflecting and adaptive seeking behavior (β = 1.34, p < .01) and lastly negative effect and emotional response (β = 1.18, p < .05).

Table 7. Coefficients

Model	Unstandardized Coefficients		Standardized	*t*	*Sig*
	β	*SE*	*β*		
(Constant)	19.21	5.443		3.53	.000
Perseverance	4.86	1.33	.207	3.66	.000
Reflecting and adaptive seeking behavior	1.34	1.07	.070	1.25	.002
Negative effect and emotional response.	1.18	0.68	.089	1.71	.028

3.4. Discussion of Findings

The study sought to examine the relationship between academic resilience and mathematics performance. Descriptive analyses indicated that most respondents exhibited high levels of academic resilience (Table 2). Conversely, the majority of students achieved moderate mathematics performance. Hypothesis testing revealed that academic resilience significantly accounted for 08% of the change in mathematics performance, F (2, 378) = 11.01, p < 001 (Table 5 & 6). These findings align with previous research emphasizing the critical role of academic resilience in fostering academic success (Garcia – Crespo et al., 2020; Ishak et al., 2020; Nzioki & Ngunu, 2024; Yang & Wang, 2022).

Consistent with prior literature, the current study supports the findings of García-Crespo et al. (2022), who examined students across 22 European countries and found a positive association between academic resilience and performance in mathematics and science. Academically resilient students

were more likely to recover from academic setbacks and maintain a positive outlook, which is particularly crucial in subjects requiring problem-solving and persistence, such as mathematics. An adaptive mindset enables students to navigate complex mathematical challenges effectively, leading to improved performance.

These findings are comparable to those by Sheehan and Handfield (2024) on the academic resilience and mathematics achievement. The study established a significant relationship between academic resilience nad mathematics achievement (r = .251, p .01). The study found that these individual, family, and school-related factors are potential targets for interventions aimed at improving academic resilience and math achievement among young people in poverty.

Similarly, these findings align with those of Karabiyik (2020), who investigated the relationship between academic resilience and achievement among teacher trainees. It was noted that the students' GPA was significantly related to perseverance (r = .20, p < .05) and reflecting and adaptive help-seeking (r = .37, p < .01), indicating positive correlations between these variables. Despite differences in sample characteristics and cultural contexts, the results highlight the significance of resilience across educational levels. Resilience fosters perseverance, enabling students to persist through academic difficulties and engage constructively with feedback, ultimately enhancing performance. Additionally, resilient individuals often employ effective self-regulation strategies, such as time management and proactive help-seeking behaviors, which further contribute to success in mathematics.

The present findings are also consistent with Neshila's (2018) phenomenological study on underprivileged learners in Namibia. In adverse circumstances, such as poverty and challenging learning environments, resilience serves as a protective factor that helps students overcome obstacles. A strong sense of identity and purpose may encourage students to sustain effort and engagement, leading to improved performance. In mathematics, this may manifest in persistence with difficult problems, strategic problem-solving, and learning from mistakes—key factors in academic success.

Moreover, this study provides empirical support for the principles of positive psychology theory (Seligman et al., 2019), which emphasizes the importance of nurturing strengths and psychological resources to promote well-being and optimal functioning. By demonstrating the beneficial impact of academic resilience on mathematics performance, the findings underscore the relevance of positive psychology in academic achievement. Specifically, they highlight the potential of fostering resilience as a strategy to improve academic outcomes and support holistic student development (Seligman et al., 2019).

However, it is important to acknowledge that some studies have reported contradictory or mixed findings regarding this relationship. For instance, Layne et al. (2021) found no significant correlation between academic resilience and mathematics performance among middle school students. These discrepancies may be attributed to variations in the operationalization and measurement of academic resilience, as well as differences in educational and cultural contexts.

Additionally, the relationship between academic resilience and performance may vary across different academic disciplines. Zeng et al. (2023) reported mixed results, suggesting that academic resilience may have a stronger association with performance in certain subjects compared to others. These variations may stem from the distinct cognitive demands and problem-solving strategies required in different disciplines. Consequently, the extent to which academic resilience influences academic performance may depend on the specific skills and knowledge being assessed.

4. Limitations, Implications and Conclusions

4.1. Limitations and Future Directions

The study contributes significantly to the discourse on academic resilience as a protective factor towards students' academic performance especially in mathematics. The study further enhances the validity of the tenets of the positive psychology theory to the educational outcomes of adolescent learners. It is however important to contextualize the findings to their limitations. Firstly, the study relied only on students' reports academic resilience which could be blurred by subjective judgements. Further, sample limitations may deter the generalizability of the findings outside the current educational context as well as to other educational levels. Lastly the study used a correlational approach; caution should be taken in the interpretation of these findings as the findings do not infer causal links between the variables.

4.2. Implications and Conclusion

These findings have implications for practice. Teachers could consider adopting interventions that nurture perseverance and interest in the subject. This can be achieved for instance through developing learners' growth mindsets and promoting self-efficacy for learners when faced with challenges. As a result, academic resilience in mathematics will be enhanced. Building on this study, future research may consider conducting such as study in other settings, with different educational practices, cultural norms or especially on underprivileged backgrounds such as refugee camps, special needs schools and students in poverty stricken and those facing strife. This would go further in enhancing the validity of the findings outside the current cultural and educational context.

In summary, the findings show the incremental role of cultivating academic resilience through encouraging effort despite challenges and perseverance as a non-cognitive enhancer of academic performance in STEM. While the study shows a weak link between the variables, the study adds on to literature on the subject.

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