

Academic Resilience as Correlate of Mathematics Performance among form Three Students in Kirinyaga County, Kenya

Purity Ndinda Kimilu; Dr. Rosemary Olendo

Educational Psychology, Kenyatta University

DOI: <https://doi.org/10.47772/IJRISS.2026.100701107>

Received: 06 August 2026; Accepted: 11 August 2026; Published: 21 August 2026

ABSTRACT

Good performance in mathematics serves as a gateway to national development and personal growth. Students who perform well in mathematics have access to many career opportunities which boost their confidence and enhances problem-solving skills which are essential in modern society. However, despite extensive research on determinants of mathematics performance, little attention has been given to psychological constructs such as academic resilience, especially within the Kenyan school setting. Over the last five years, mathematics performance in Kirinyaga West Sub-County has been below the average. This study therefore aimed to: determine the association between academic resilience and mathematics performance. The research was grounded in Albert Bandura's (1986) Social Cognitive Theory and the research design employed was correlational. The target population comprised 1,900 students drawn from 32 public secondary schools. Participants were chosen through purposive, stratified sampling and random sampling techniques, giving a sample size of 384 learners. A total of 340 out of the 384 distributed questionnaires were completed and returned. Data were gathered using an adapted version of Academic Resilience scale by (Cassidy, 2016). To establish the validity and reliability of the research instruments, the researcher conducted a pilot study in a secondary school in Kirinyaga West Sub-County. To ascertain the validity of the research instruments, they were presented to the research supervisors for review and scrutiny. The reliability of the research instruments was determined using Cronbach's alpha coefficient. The data analysis incorporated both descriptive and inferential statistical techniques, including regression analysis and Pearson's Product- Moment Correlation. Moreover, the findings indicated a significant positive correlation between academic resilience and mathematics performance ($r(338) = .64, p < 0.05$). Regression analysis indicated that academic resilience explained 41.1% of the variance in mathematics performance, $F(1, 338) = 235.62, p < .001$. The study concludes that higher levels of academic resilience are associated with improved mathematics performance. The study provides meaningful insights for policymakers and educators, highlighting the significance of fostering academic resilience to enhance learners' performance in mathematics. The study recommends integrating strategies that promote, academic resilience especially in classroom activities.

Keywords: Academic resilience, mathematics performance, Secondary school learners

INTRODUCTION

Globally, students' performance in mathematics has been of major interest to many educators. This is due to the great significance attached to mathematics worldwide. Performance in mathematics is very important, especially in predicting the future careers of learners in various fields. Mathematics provides learners with essential skills needed to succeed in fields such as technology, commerce, science, and industry. Its significance in education is evident in its inclusion as a core subject in most educational systems worldwide (Okaka, 2024). Moreover, good performance in mathematics is associated with enhanced decision-making, higher income, increased job opportunities, improved critical thinking, and the overall well-being of an individual (Wilson & Reddy, 2023). Owing to the importance attached to this subject, learners are required to achieve good performance in mathematics despite facing various challenges.

Despite its importance, performance in mathematics remains a challenge for students in many countries. This is consistent with the report published by the European Commission on Education in response to data released in

2023 by the Programme for International Student Assessment (PISA). Mathematics performance showed a declining trend compared to the 2018 PISA results. The report indicated considerable underachievement in mathematics when compared to other subjects, such as science (PISA, 2024). Various factors have been associated with this trend, including instructional methods, curriculum design, learner attitudes, and psychological factors such as anxiety and resilience (Garcia et al., 2022; Alcover, 2024).

In Africa, poor performance in mathematics continues to be a major concern. Evidence from South Africa, based on a study conducted by Mabena et al. (2021), indicated that despite the reforms implemented to improve mathematics performance at the Grade 8 level, performance remained low. Similarly, poor performance in mathematics in sub-Saharan Africa has been attributed to ineffective teaching practices (Nsengimana et al., 2020). According to Oribhabor (2020), the activity-based teaching method in Nigeria contributes to higher mathematics performance compared to the lecture method.

Similarly, in East Africa, factors such as the policy environment, teacher attitudes, and student motivation have been found to influence mathematics outcomes (Mazana et al., 2020; Wakhata et al., 2024). In Kenya, considerable emphasis has been placed on promoting industrial and technological development (Kenya Institute of Curriculum Development [KICD], 2023). However, despite the crucial role of mathematics in fields associated with industrial development, the subject continues to record low performance at the Kenya Certificate of Secondary Education (KCSE) level. Therefore, the current study sought to determine whether academic resilience is related to mathematics performance.

Academic Resilience

Academic resilience refers to a learner's ability to overcome academic challenges and persist despite difficulties. It focuses on four key dimensions: self-efficacy, social support, emotional regulation, and perseverance among learners (Cassidy, 2016).

Self-efficacy refers to students' confidence in their ability to perform academic tasks successfully. Students with high self-efficacy believe that they can successfully solve mathematical problems. Self-efficacy has been found to have a strong relationship with mathematics performance (Yang et al., 2024).

Social support refers to the assistance and comfort provided by other people. In a school setting, students receive support from their peers, teachers, and parents. Students who participate in mathematics-related groups, such as clubs and discussion groups, tend to perform better in mathematics (Williams, 2020). According to Indimuli (2022) and Apeh and Nteh (2020), parents provide emotional, financial, and moral support, which contributes to improved mathematics performance.

Perseverance in mathematics is the ability of students to continue making efforts despite setbacks associated with difficult mathematical concepts and poor grades. According to Dinapoli and Miller (2022), perseverance is the process of initiating and maintaining constructive effort despite difficulties. Students with high levels of perseverance achieve better mathematics performance than those with low levels of perseverance. Perseverance is positively associated with mathematics performance (Chusna et al., 2023).

Furthermore, emotional regulation refers to the ability to manage emotions and respond appropriately to challenges encountered in mathematics. Students who are unable to regulate and communicate their emotions effectively tend to perform poorly in mathematics (Akhtar et al., 2020).

Although several studies have examined factors associated with mathematics performance, limited attention has been given to the role of academic resilience, particularly in the Kenyan secondary school context. Moreover, little is known about the relationship between academic resilience and mathematics performance among students in Kirinyaga West Sub-County. This gap necessitated the present study.

MATERIALS AND METHODS

Research Design

The study employed a correlational research design, which is appropriate for examining relationships between variables without manipulation (Taherdoost, 2022).

Participants and Procedures

To obtain the sample, purposive, stratified, and simple random sampling techniques were utilized. Public secondary schools in Kirinyaga West Sub-County that had consistently performed poorly in mathematics were selected using purposive sampling. The selected schools were then classified into four strata based on gender and school category (national, extra-county, county, and sub-county schools). Thereafter, participants were selected using simple random sampling. Out of the 384 questionnaires distributed, 340 were fully completed and returned during school hours, yielding a response rate of 88.5%.

Instruments

Academic Resilience Scale (ARS- 3, Cassidy, 2016)

The adapted scale contained thirty items assessing levels of self-efficacy, emotional regulation, perseverance and social support. The number of items in each subscale was accurately recorded. Self-efficacy (8 items), social support (3 items), emotional regulation (8 items) and perseverance (11 items). The adapted scale was revised to align with research objectives. E.g., item 11 will be changed from 'I would use the feedback to improve my work' to 'I will use the feedback to improve mathematics performance. The item's rating was guided by likert scale with 5 opinions which ranges from disagree totally to agree totally. Scoring involved adding all points, yielding scores ranging from 30 to 150. The scores will be as follows 25-66, 67-108, 109 -150 showing low to highest academic resilience. The instrument demonstrated high reliability (Cronbach's $\alpha=0.94$).

Mathematics Performance Pro forma

The researcher obtained the end of term 1 year 2025 mathematics scores from respective mathematics teachers. The scores were converted into T scores in order to standardize to facilitate meaningful comparisons among participants.

DATA ANALYSIS AND DISCUSSION OF FINDINGS

Data collected were first coded and entered into the system, after which they were analyzed using the most recent version of SPSS (Version 29).

Validity of the Instrument

The instruments were validated in consultation with the supervisor and faculty members of the Department of Educational Psychology at Kenyatta University, who assessed and endorsed their relevance.

Reliability of the instrument

Cronbach's alpha was used to measure the internal consistency and reliability of the research instrument. The results are indicated in table 1.

Table 1

Measurement Scale	No .of Items	α (literature)	α (Pilot study)
Academic resilience	30	0.90	0.94

According to Creswell and Creswell (2018), 0.70 alpha value or higher is tolerable.

Descriptive analysis of the variables were conducted, and the findings highlighted in Table 2

Table 2: Descriptive Statistics for Academic Resilience

Gender	N	Min	Max	Range	Mean	SD
	340	54	147	93	112	22

Note: N=340; Max=Maximum; Min=Minimum; SD=Standard Deviation

The minimum academic resilience score was 54, while the maximum score was 147, yielding a range of 93 points. The mean score of 112 indicates that, on average, the students' demonstrated comparatively strong academic resilience. Moreover, standard deviation (SD) of 22 recommends that there is moderate variability in resilience scores among the students, meaning that while many students scored near the mean, some scored significantly higher or lower.

Table 3: Descriptive Statistics for academic resilience Subscales (N = 340)

AR Subscale	N	Min	Max	Range	Mean(M)	SD
Self – Efficacy	8	15	40	25	30.8	0.72
Social Support	3	5	15	10	11.04	0.75
Emotional Regulation	8	15	39	24	23.2	0.69
Perseverance	11	19	55	36	40.26	0.74

The results presented in Table 3 indicate that all subscales of academic resilience had comparatively high mean marks and low standard deviations, suggesting consistency in students' responses across the different dimensions. Perseverance had the highest mean score (M = 40.26), suggesting it is the most pronounced resilience component, followed by self-efficacy (M = 30.8). Emotional regulation and social support recorded comparatively lower mean scores, although still within a stable range. Overall, the low variability across the subscales suggests that students exhibit relatively uniform levels of academic resilience across the different dimensions.

Hypothesis Testing

The study sought to establish the relationship between academic resilience and mathematics performance. This was accomplished through testing the stated null hypothesis. The null hypothesis (H_0) posited that there is no statistically significant relationship between students' academic resilience and their performance in mathematics. The findings are indicated below in Table 4.

Table 4: Correlation between Academic Resilience and Mathematics Performance

		Mathematics Performance
Academic Resilience	Pearson Correlation	.64**
	Sig. (2-tailed)	.00
	N	340

Note. Correlation was found to be significant at the 0.01 level (2-tailed). r = Pearson correlation coefficient; $N = 340$.

The Pearson correlation coefficient results, $r(338) = .64, p < .01$, indicate a strong, positive, and statistically meaningful relationship between academic resilience and mathematics performance. Since the p -value is less than 0.01, the null hypothesis is rejected and the alternative hypothesis accepted, suggesting that academic resilience has positive correlation with mathematics performance.

This means that students with higher levels of resilience that is greater perseverance, emotional regulation, self-efficacy and social support tend to perform better in mathematics.

Regression analysis

Table 5. Model Summary Simple Linear Regression Results for Academic Resilience and Mathematics Performance

Model	R	R ²	Adjusted R ²	SEE
1	0.64	0.411	0.409	13.30

A simple linear regression was conducted to examine the relationship between academic resilience and mathematics performance. The results indicated a statistically significant relationship between academic resilience and mathematics performance, $F(1, 338) = 235.62, p < .001$. Academic resilience accounted for 41.1% of the variance in mathematics performance ($R^2 = .411$). The remaining variance may be explained by other factors that were not considered in this study.

Table 6: Correlation between Academic Resilience and Mathematics performance

Variable	N	Pearson's r	p-value	Effect size r^2	95% CI for r
Academic Resilience - Mathematics Performance	340	.64**	< .001	.410 (41.0%)	.573, .699

Table 6 demonstrates a strong and positive relationship between academic and mathematics performance. The Pearson correlation coefficient was $r(338) = .64, p < .001$. The effect size, $r^2 = .410$, indicates that 41.0% of the variance in mathematics performance is associated with academic resilience. The 95% confidence interval for the correlation was [.573, .699]. This indicates that student with higher levels of academic resilience tended to achieve to achieve higher mathematics scores

DISCUSSIONS OF THE FINDINGS

The objective of the study sought to determine the relationship between academic resilience and mathematics performance among Form Three students in Kirinyaga West Sub-County, Kenya. The findings established a positive and statistically significant relationship between academic resilience and mathematics performance, indicating that students with higher levels of academic resilience were more likely to achieve better results in mathematics. This finding suggests that students who can effectively cope with academic challenges, recover from setbacks, maintain motivation, and adapt to difficult learning situations are better positioned to succeed in mathematics.

Among the four dimensions of academic resilience, perseverance recorded the highest mean score ($M = 40.26, SD = 0.74$), suggesting that the participants demonstrated a strong tendency to persist despite academic difficulties. Mathematics is a cumulative subject that requires continuous practice, repeated problem-solving, and sustained effort. Therefore, students who demonstrate perseverance are more likely to continue working through challenging mathematical tasks until they achieve mastery. The high mean score for perseverance may

explain the positive relationship observed between academic resilience and mathematics performance, as students who persist despite obstacles are more likely to improve their mathematical understanding and performance.

Self-efficacy also recorded a relatively high mean score ($M = 30.8$, $SD = 0.72$), indicating that most students had confidence in their academic abilities. Self-efficacy is particularly important in mathematics because students frequently encounter abstract concepts and complex calculations that require confidence and determination. Students who believe in their ability to solve mathematical problems are more likely to participate actively in classroom activities, attempt difficult tasks, and remain motivated when faced with challenges. Consequently, higher levels of self-efficacy may contribute to improved mathematics performance.

The findings further revealed that emotional regulation had a mean score of 23.2 ($SD = 0.69$), suggesting that the students demonstrated a moderate ability to control their emotions during academic activities. Emotional regulation is especially important in mathematics because many students experience anxiety, frustration, and stress while learning mathematical concepts. Students who can regulate their emotions effectively are less likely to become discouraged when they encounter difficult problems. Instead, they can maintain concentration, manage academic pressure, and continue learning despite setbacks. Therefore, emotional regulation may have contributed to the positive relationship between academic resilience and mathematics performance observed in the current study.

Social support recorded a mean score of 11.04 ($SD = 0.75$), indicating that students generally perceived support from teachers, parents, peers, and the school environment. Social support plays an important role in promoting academic achievement because it provides learners with encouragement, guidance, and opportunities to seek assistance when they experience academic difficulties. Students who receive adequate support are more likely to develop confidence, remain motivated, and adopt effective learning strategies.

The findings suggest that supportive relationships may have strengthened students' resilience and enhanced their mathematics performance.

The findings of the present study are consistent with those reported by Almulla (2024), who found that academic resilience was positively associated with academic achievement. Almulla argued that resilient students are more capable of adapting to academic challenges and maintaining high levels of motivation. Similarly, Ojeye et al. (2023) found that resilient secondary school students achieved better academic outcomes because they demonstrated greater persistence and more effective coping strategies.

The findings also support those of Nkepah and Cheny (2024) and Sheehan and Hadfield (2024), who reported that academic resilience contributes significantly to academic success by strengthening students' ability to cope with educational challenges. These studies emphasized that self-efficacy, perseverance, emotional regulation, and social support are essential components of resilience that influence students' academic achievement.

Furthermore, Vergara (2021) examined the relationship between academic resilience and mathematics performance among undergraduate students in the Philippines and reported a positive association between the two variables. The study demonstrated that students with higher levels of resilience achieved better mathematics outcomes because they were more capable of overcoming academic challenges and sustaining their efforts. The similarity between Vergara's findings and those of the current study suggests that academic resilience is an important factor influencing mathematics performance across different educational contexts and levels.

The findings can also be interpreted through the lens of Social Cognitive Theory, which emphasizes the interaction between personal factors, behavior, and environmental influences. The theory proposes that students with strong self-efficacy beliefs are more likely to persevere in the face of academic difficulties. Likewise, supportive environments encourage the development of resilience, which ultimately improves academic outcomes. Therefore, the positive relationship observed between academic resilience and mathematics performance supports the theoretical assumption that both individual characteristics and environmental factors contribute to students' academic success.

Overall, the findings demonstrate that academic resilience and its dimensions, particularly perseverance and self-efficacy, play an important role in enhancing mathematics performance among n enhancing mathematics performance among secondary school students. The results suggest that educational interventions should focus on strengthening students' resilience by promoting persistence, developing confidence, improving emotional regulation skills, and creating supportive learning environments. Such interventions may contribute to improved mathematics achievement among secondary school students in Kirinyaga West Sub-County and similar educational settings.

LIMITATIONS, IMPLICATIONS AND CONCLUSIONS

Limitations and future directions

The study is restricted to selected schools in Kirinyaga West Sub-County, which limits the generalizability of the findings. Furthermore, correlational design does not establish causation. The study focused mainly on academic resilience and mathematics performance. Other important factors such as teaching methods, mathematics anxiety, socioeconomic background and parental involvement could also influence mathematics performance. Despite these limitations academic resilience is a significant predictor of mathematics performance. Additionally, Comparative studies across different regions should be conducted to identify contextual differences in the relationship between academic resilience and mathematics performance

Implications and Conclusions

Despite these constraints, the results of this study offer valuable insights for both educational practice and policy development. Teachers should adopt instructional practices that foster resilience and positive study habits among learners such as providing regular feedback, encourage goal setting and using supportive classroom environments that motivate students to persist in learning mathematics.

The study concluded a positive and statistically significant relationship between academic resilience and mathematics performance, indicating that students who demonstrate higher levels of resilience such as perseverance, high self-efficacy and ability to recover from academic difficulties perform better in mathematics than less resilient students. Students should be assisted to develop resilience domains.

Ethical Approval

Ethical approval was obtained from relevant institution ethics review committee before commencement of the study. Permission to conduct the study was obtained from the relevant educational authority and participating secondary schools. Informed consent was obtained from the participant. Participation was voluntary and participant were informed of their right to withdraw from their study at any time. Confidentiality and anonymity of the participant were maintained throughout the study

Conflict Of Interest

The author declared no conflict of interest regarding the conduct, analysis, interpretation or publication of this study

REFERENCES

1. Akhtar, M. S., Ekbal, A., & Cambria, E. (2020). How intense are you? Predicting intensities of emotions and sentiments using stacked ensemble [application notes]. *IEEE Computational Intelligence Magazine*, 15(1), 64-75. DOI: 10.1109/MCI.2019.2954667
2. Alcover, M. J. A. Mathematics anxiety: Effects on grade 9 mathematics performance. <http://dx.doi.org/10.13140/RG.2.2.19882.80325>
3. Almulla, M. O. (2024). Academic resilience and its relationships with academic achievement among students of King Faisal University in Saudi Arabia. *Revista de Gestão Social e Ambiental*, 18(9), e07391-e07391

4. Apeh, H. A., & Nteh, K. O. (2020). Impact of social support on students' academic achievement in senior secondary schools in the federal capital territory, Abuja Nigeria. *Ilorin Journal of Education*, 40(2), 60-70. Retrieved from <https://ije.unilorinedu.sch.ng/index.php/ije/article/view/33>
5. Bandura, A. (1986). *Social foundations of thought and action*. Englewood Cliffs, NJ, 1986(23-28),
6. Cassidy, S. (2016). The academic resilience scale (ARS-30): A new multidimensional construct measure. *Frontiers in psychology*, 7, 1787. <https://doi.org/10.3389/fpsyg.2016.01787>
7. Chusna, D. S. A., & Kismiantini, K. (2023, March). The role of student's perseverance, mathematics work ethic, and modern school qualification towards mathematics achievement in PISA 2018 Indonesia. In *AIP Conference Proceedings* 2556(1). AIP Publishing. <https://doi.org/10.1063/5.0110302>
8. DiNapoli, J., & Miller, E. K. (2022). Recognizing, supporting, and improving student perseverance in mathematical problem-solving: The role of conceptual thinking scaffolds. *The Journal of Mathematical Behavior*, 66(1) 100965. <http://dx.doi.org/10.1016/j.jmathb.2022.100965>
9. García Crespo, F. J., Suárez Álvarez, J., Fernández Alonso, R., & Muñiz, J. (2022). Academic resilience in mathematics and science: Europe TIMSS-2019 data. *Psicothema*. DOI:10.7334/psicothema2021.486
10. Indimuli, M. W. (2022). Parental support, communication, and supervision of home work as predictors of academic achievement among standard seven pupils in Nairobi city county, Kenya (Doctoral dissertation, Doctoral dissertation, Kenyatta University).
11. Mabena, N., Namayammu, M., & Ramapela, S., S. (2021). Factors contributing to poor learner performance in mathematics: A case selected schools in Mpulanga province, South Africa. *Creative Common Attribution*, 79(3), 451. <https://doi.org/10.33225/pec/21.79.451>
12. Mazana, M. Y., Montero, C. S., & Casmir, R. O. (2020). Assessing students' performance in mathematics in Tanzania: the teacher's perspective. *International Electronic Journal of Mathematics Education*, 15(3), em0589. <https://doi.org/10.29333/iejme/7994>
13. Nkepah, B. D., & Cheny, N. J. (2024). Analysing the influence of students' resilience on their mathematics academic performance in Mezam division, Cameroon. *Psychology*, 7(4), 1-16. DOI: 10.52589/BJELDP-OLWICPZT.
14. Nsengimana, T., Mugabo, L. R., Hiroaki, O., & Nkundabakura, P. (2020). Reflection on science competence-based curriculum implementation in Sub-Saharan African countries. *International Journal of Science Education*, 47(8), 1071-1084. <https://doi.org/10.1080/09500693.2024.2356971>
15. Ojeleye, C. I., Adegbile, O. N., & Apanpa, T. (2023). Academic resilience and self-esteem as determinant of students' academic performance In Zamfara State. *Milestone: Journal of Strategic Management*, 3(2), 68-78. DOI: 10.19166/ms.v3i2.7206
16. Okaka, B. M. (2024). Achievement motivation and metacognition as predictors of mathematics achievement among form three students in Busia County, Kenya (Doctoral dissertation, Kenyatta University). [Ir-library.ku.ac.ke](http://ir-library.ku.ac.ke)
17. Oribhabor, C. B. (2020). Evaluating the effect of activity based method of teaching mathematics on Nigerian secondary school students' achievement in mathematics. *arXiv preprint arXiv:2011.10785*. DOI: 10.48550/arXiv.2011.10785.
18. Sheehan, J., & Hadfield, K. (2024). Overcoming socioeconomic adversity: Academic resilience in mathematics achievement among children and adolescents in Ireland. *British Journal of Developmental Psychology*, 42(4), 524-545. <https://doi.org/10.1111/bjdp.12512>
19. Vergara, C. R. (2021). Mathematics resilience and achievement goals: Exploring the role of non-cognitive factors to mathematics performance of university students amidst of pandemic. *Open Access Library Journal*, 8(12), 1-10. <https://doi.org/10.4236/oalib.1108166>
20. Wakhata, R., Balimuttajjo, S., & Mutarutinya, V. (2024). Relationship between students' attitude towards, and performance in mathematics word problems. *Plos one*, 19(2), e0278593. County, Kenya. <https://doi.org/10.1371/journal.pone.0278593>
21. Williams, K. L. (2020). Contextualizing math-related strengths and math achievement: Positive math orientations, social supports and the moderating effects of prior math knowledge. *Journal for STEM Education Research*, 3(3), 317-342. <https://doi.org/10.1007/s41979-021-00051-5>
22. Wilson Fadiji, A., & Reddy, V. (2023). Well-being and mathematics achievement: What is the role of gender, instructional clarity, and parental involvement? *Frontiers in Psychology*, 13, 1044261. <https://doi.org/10.3389/fpsyg.2022.1044261>



-
23. Yang, Y., Maeda, Y. & Gentry, M. (2024) .The relationship between mathematics self-efficacy and mathematics achievement: multilevel analysis with NAEP 2019. Large-scale Assess Educ 12, 16. <https://doi.org/10.1186/s40536-024-00204-z>