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Beyond Anxiety: Cultural Pathways of Resilience and Coping in Mathematically Gifted Saudi Youth

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ABSTRACT

This study examined how emotional resilience and coping strategies predict mathematics achievement among gifted Saudi high school students (N = 180). Recognizing that achievement is shaped by psychological and cultural as well as cognitive factors—and that evidence from collectivist contexts is limited—we employed a concurrent mixed-methods design. Quantitative data came from validated scales of resilience and coping (problem-focused, cognitive reappraisal, self-regulation) and indices of mathematics performance; relationships were tested using multiple regression. Qualitative data were drawn from semi-structured interviews with a subsample (n = 30) exploring coping mechanisms and cultural influences and analyzed thematically. Regression results indicated that problem-focused coping and emotional resilience were the strongest predictors of mathematics achievement (R^2 = .47), whereas self-regulation and cognitive reappraisal contributed smaller but significant effects. Thematic findings converged on persistence and structured problem solving as dominant mechanisms. A cultural composite reflecting faith, family support, and honor explained a modest yet significant increment in variance (ΔR^2 = .03), underscoring the role of collectivist values in resilience. Overall, the study integrates universal cognitive strategies with culturally embedded supports and recommends a "Math Resilience Curriculum" combining structured problem-solving training, emotional-regulation practices, and family engagement to enhance achievement among gifted students in Saudi Arabia.

Keywords: Gifted Students; Mathematics Achievement; Emotional Resilience; Coping strategies; Cultural Values; Family Influence

INTRODUCTION

Mathematics is often described as the gateway to innovation and a cornerstone of knowledge-based economies. Gifted students who pursue advanced mathematics frequently find themselves navigating a paradox. They combine exceptional intellectual ability with challenges that are as emotional as they are academic. Success in higher-level mathematics demands not only precision and persistence but also emotional resilience to manage setbacks and tasks that provoke anxiety (Neihart, 1999). Coping strategies such as cognitive reappraisal, problem-focused approaches, and self-regulation have been shown to sustain achievement (Martin & Marsh, 2008). Despite this, most existing knowledge comes from Western, individualistic contexts, leaving limited understanding of how these strategies function in collectivist, non-Western settings.

Studies consistently emphasize perseverance as a defining element of resilience that fuels success in demanding subjects (Duckworth & Quinn, 2009). They also show that adaptive coping reduces mathematics anxiety and improves performance (Beilock & Maloney, 2015). However, these findings tend to assume autonomy-based coping and rarely consider the cultural and social dimensions that shape resilience.

In Saudi Arabia, the picture looks different. Gifted education unfolds in a context where religious faith, family support, and collective responsibility strongly influence students' experiences (Alabdulkarem et al., 2021). These dynamics may encourage coping strategies rooted in spirituality and community rather than individual self-determination, pointing to a distinctive pathway through which resilience contributes to mathematical success.

LITERATURE REVIEW

High school gifted students who study mathematics often navigate a tension between intellectual rigor and emotional challenges. Emotional resilience—defined as the ability to recover from stress and maintain psychological well-being (Ashcraft & Krause, 2007)—is consistently associated with persistence and adaptability, two traits crucial for success in advanced mathematics (Duckworth & Quinn, 2009). This link becomes even more important for gifted students exposed to accelerated curricula and high performance standards, conditions that frequently generate stress and pressure (Neihart, 1999). Despite its importance, the relationship between resilience and mathematics achievement among mathematically gifted students remains insufficiently explored, particularly outside Western contexts.

Coping strategies represent the mechanisms through which resilience translates into academic success. Cognitive reappraisal, for instance, helps students reframe stressors as manageable challenges, thereby reducing their emotional weight and improving coping effectiveness (Subotnik et al., 2011). Similarly, problem-focused coping—directly addressing mathematical problems—has been shown to lower math anxiety and enhance performance (Beilock & Maloney, 2015). Emotional self-regulation, or the ability to manage emotional expression, also sustains persistence in demanding tasks (Martin & Marsh, 2008). Taken together, these strategies illustrate a paradox of giftedness: while advanced cognitive abilities may facilitate achievement, they can simultaneously heighten vulnerability to stress (Alfaiz, 2025).

Recent studies in Saudi Arabia have shed new light on this dynamic. Gifted students in the Kingdom often face considerable psychological distress and challenges in regulating emotions, which underscores the protective role of resilience (Alsultan et al., 2024). Tailored educational practices have been found to strengthen self-efficacy among gifted learners, a construct closely tied to coping effectiveness (Al-Shammari & Al-Arfaj, 2022). At the same time, underachieving gifted students were observed to rely moderately on social coping strategies, with notable gender-based differences (Knopik & Oszwa, 2023). These findings highlight how psychological and cultural pressures intersect in shaping resilience and coping among gifted Saudi learners.

International evidence reinforces these observations. Mathematical resilience has been positively linked to motivation and persistence among mathematically gifted students, underscoring the role of self-determination in achievement (Cheung et al., 2024). A machine-learning model based on PISA 2022 data further identified coping as a central mechanism for sustaining mathematics achievement during global disruptions such as the COVID-19 pandemic (Szczygieł, 2025). Both domain-specific factors (e.g., mathematics self-beliefs) and domain-general factors (e.g., executive function, emotional regulation) have been shown to predict performance, pointing to the multidimensional nature of resilience (Kalaura et al., 2025). Notably, resilience-focused interventions in Zambia reduced math anxiety and enhanced performance among secondary students (Ungar, 2004). Collectively, these studies affirm that analyzing resilience and coping in gifted mathematics learners requires attention to both universal strategies and local contexts.

The cultural context is especially crucial. Western studies, rooted in individualistic traditions, often emphasize autonomy and personal agency (Duckworth & Quinn, 2009). By contrast, Saudi Arabia's collectivist environment highlights family support, religious faith, and honor (Alabdulkarem et al., 2021). Faith-based coping, for example, has been found to support well-being among Saudi youth—an element largely absent in Western models (Alabdulkarem et al., 2021). These contrasts suggest that gifted Saudi students may draw as much on communal and spiritual resources as on individual strategies when navigating mathematics-related challenges.

Nevertheless, conceptual and methodological limitations in prior research complicate the picture. Some studies aggregate across academic domains, masking findings specific to mathematics (Kenney-Benson et al., 2006). Others focus narrowly on anxiety while overlooking proactive coping strategies (Beilock & Maloney, 2015). Moreover, the dominance of Western samples limits the generalizability of existing models. Resilience, after all, is not only a psychological construct but also a cultural one, shaped by social and contextual influences (Ungar, 2004).

This study therefore addresses these gaps by investigating the interplay between emotional resilience, coping strategies, and mathematical achievement among Saudi gifted high school students. By integrating recent Saudi evidence with international findings, it situates resilience and coping within both universal and culturally embedded frameworks. The conceptual framework (Figure 1) reflects this dual perspective, showing how resilience and coping—reinforced by cultural supports such as faith and family—contribute to mathematical success.

Theoretical Framework

This study is anchored in a framework that posits a reciprocal relationship between resilience and coping strategies in predicting mathematics achievement. Emotional resilience—defined as the capacity to rebound from stress (Masten et al., 2024)—serves as the foundation for persistence in advanced mathematics. Coping mechanisms such as cognitive reappraisal, problem-focused coping, and self-regulation are conceptualized as processes that not only depend on resilience but also reinforce it (Martin & Marsh, 2008). In other words, resilience and coping are mutually sustaining forces.

This bidirectional relationship is evident across national and international research. For instance, resilience has been shown to foster intrinsic motivation in mathematically gifted learners, while coping strategies strengthen resilience by enabling persistence in demanding tasks (Knopik & Oszwa, 2023). Large-scale empirical evidence further demonstrates that resilience and coping predict mathematics achievement under global disruptions, notably during the COVID-19 crisis, thereby reinforcing the reciprocal model (Cheung et al., 2024). At the same time, research in Saudi Arabia highlights that emotional and social coping mechanisms are deeply tied to resilience, but they are also shaped by cultural dimensions such as family expectations and religious practices (Alfaiz, 2025; Al-Shammari & Al-Arfaj, 2022).

Within this framework, cultural moderators play a decisive role. Collectivist values, religious faith, and family support amplify the positive effects of resilience and coping (Alabdulkarem et al., 2021). The influence of family support in sustaining resilience and long-term perseverance among highly able learners is well established (Hébert, 2000). Similarly, religious reframing has been identified as a powerful resource that strengthens emotional regulation under stress (Folkman & Moskowitz, 2004). Taken together, these findings suggest that while resilience and coping operate as universal psychological processes, their expression and impact are significantly shaped by cultural contexts.

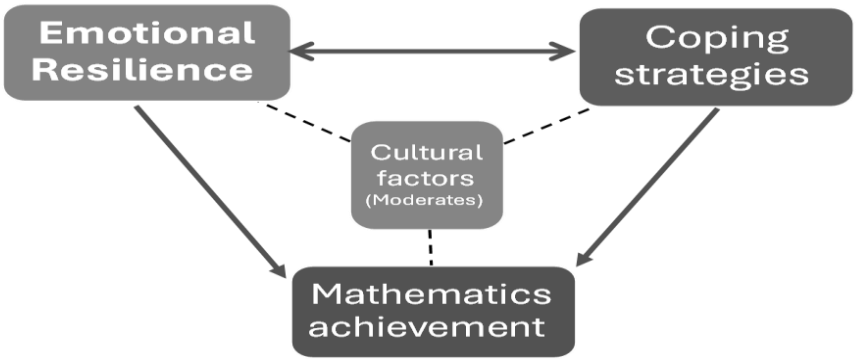

Figure 1. The relationship between resilience and coping strategies in predicting mathematics achievement

This conceptual model, illustrated in Figure 1, provides the foundation for the study's guiding questions. It positions resilience and coping strategies as interdependent processes that jointly predict mathematics achievement, while also allowing space for cultural factors to moderate this relationship.

Accordingly, the study addresses three research questions:

RQ1: How do individual coping strategies contribute to resilience?

RQ2: To what extent does resilience mediate coping strategies in predicting mathematics achievement?

RQ3: How do culturally embedded coping strategies shape this relationship?

By testing this model through a mixed-methods design, the study seeks not only to extend resilience theory into a culturally grounded, mathematics-specific context but also to offer fresh insights into the lived experiences of gifted Saudi high school students.

METHOD

Research Design

This study adopted a mixed-methods sequential explanatory design to explore the relationships among emotional resilience, coping, and mathematical achievement in gifted Saudi high school students. The design unfolded in two phases: (a) a quantitative phase to estimate effects and test predictive relationships among variables, and (b) a qualitative phase to interpret and contextualize the statistical findings. Prioritizing the quantitative phase allowed the identification of key trends and effect sizes, while the qualitative phase added depth by capturing students' cultural and experiential perspectives. Taken together, this design aligned with the dual aims

of the study—testing theoretical relationships and examining culturally specific coping processes (Creswell & Plano Clark, 2018).

Participants

The participants were drawn from academically advanced high school students enrolled in specialized gifted programs in Riyadh, Saudi Arabia, during 2024. A purposive sample of 180 students was selected from 10 schools, spanning Grades 10 through 12, for the quantitative phase. The sample size was calculated to detect medium effects (Cohen's $f^2 = .15$) with 80% statistical power at $\alpha = .05$, which is appropriate for multiple regression analyses with up to four predictors (Hébert, 2000). Eligibility required enrollment in a gifted and talented (G-T) program and the successful completion of at least one advanced mathematics course.

It is important to note that only male students were included. This reflects the organizational structure of the Saudi education system, where male and female schools operate separately. Due to institutional restrictions, the research team had access solely to male schools, which limited the sampling frame. This constraint is acknowledged as both a cultural and logistical boundary condition of the study.

From this pool, a purposive subsample of 30 students was drawn for the qualitative phase. These students were selected to represent different levels of resilience and coping profiles (high, moderate, and low), ensuring a diversity of perspectives. Data collection continued until thematic saturation was reached, defined as the point at which no new themes emerged across consecutive interviews. Pilot testing confirmed that a range of 25–30 participants was sufficient to achieve saturation in this context.

Table 1. Sample Characteristics

Phase	N	Grades	Gender	Context
Quantitative	180	10–12	Male	Gifted programs in 10 Riyadh schools
Qualitative	30	10–12	Male	Subsample by resilience/coping levels

Data Collection

Quantitative

Validated instruments were employed and carefully adapted to the Saudi context with attention to both cultural sensitivity and linguistic clarity. Emotional resilience was assessed using the 6-item Brief Resilience Scale (BRS; Smith et al., 2008) (e.g., "I tend to bounce back quickly after hard times"), with responses rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In the current study, Cronbach's α was .84, indicating strong internal consistency. Prior research has also confirmed the validity of this scale in adolescent and non-Western populations (Smith et al., 2013).

Coping strategies were measured using the Brief COPE Inventory (Carver, 1997), adapted into three subscales: cognitive reappraisal, problem-focused coping, and self-regulation. Items were rated on a 4-point scale from 1 (not at all) to 4 (a lot). Subscale reliabilities in this study ranged from $\alpha = .70$ to .88, reflecting acceptable to strong internal consistency. Mathematics achievement was assessed using students' most recent mathematics grades (scored on a 0–100 scale) along with standardized Qiyas mathematics test scores when available.

Both instruments underwent forward translation into Arabic by a bilingual expert, followed by back-translation to ensure equivalence. The translations were then reviewed by two faculty members specializing in psychology and gifted education, thereby ensuring both cultural and linguistic appropriateness.

Qualitative

For the qualitative phase, a purposive subsample of 30 students participated in semi-structured interviews that explored the coping strategies they employed to strengthen resilience and achieve success in mathematics. Guiding prompts included:

- "What do you do when you feel stressed or stuck on a math problem?"
- "How do you keep going in mathematics to be successful?"
- "In what ways do your family, culture, or school influence how you handle math challenges?"

An additional probe—"How does your faith or family influence the way you solve math problems?"—was included to capture deeper insights into culturally embedded coping.

Interviews lasted between 30 and 45 minutes, were conducted in Arabic, and audio-recorded with participant consent. A pilot with two students was conducted to refine and validate the interview guide. Data collection continued until thematic saturation was reached, defined as the point at which no new themes or insights emerged. This ensured that the qualitative data offered comprehensive coverage of coping patterns across diverse resilience levels.

Data Analysis

Quantitative

The quantitative data were first summarized using descriptive statistics (means, standard deviations, and ranges) for resilience, coping subscales, and mathematics achievement. Pearson's correlations were then employed to examine associations among the constructs.

Research Questions 1 and 2 were tested using multiple regression analyses, while moderation effects for Research Question 3 were assessed through hierarchical regression. Grade level was entered as a control variable. To minimize multicollinearity, all predictors were mean-centered before computing interaction terms. Standard regression diagnostics confirmed the assumptions of linearity, normally distributed residuals, and homoscedasticity. In addition, Variance Inflation Factors (all < 5) indicated the absence of collinearity problems.

Qualitative

Interview transcripts were analyzed thematically following Braun and Clarke's (2006) six-step procedure: familiarization, initial coding, theme generation, theme review, theme definition, and reporting. Coding proceeded inductively, allowing culturally embedded themes (e.g., faith-based persistence, family support) to emerge naturally from the data.

To enhance the trustworthiness of the analysis, two strategies were employed. First, peer debriefing was conducted by a second researcher, who reviewed 20% of transcripts and codes to check for consistency. Second, member checking was carried out with five participants, who reviewed interview summaries to confirm the accuracy of interpretation. Themes were refined iteratively until conceptual clarity was reached, and findings were subsequently triangulated with quantitative results to reinforce interpretation.

Integration of Findings

Quantitative and qualitative results were integrated using a convergence coding matrix, which enabled the identification of areas of agreement, partial overlap, or divergence. This integrative procedure followed established recommendations (Creswell & Clark, 2018) and ensured that each research question was addressed through complementary forms of evidence. By doing so, the integration strengthened both internal validity (through cross-validation of findings) and external validity (by situating results in the broader cultural context).

Ethical Considerations

The study received ethical approval from the Scientific Research Committee at King Faisal University. Participation was voluntary, with informed parental consent and student assent obtained before data collection. Confidentiality was ensured through anonymized coding, and digital files were securely stored on password-protected devices. Students were informed of their right to withdraw at any time without penalty.

All instruments were carefully adapted through expert review and back-translation, ensuring sensitivity to religious and social norms. The research process fully adhered to international ethical standards for educational studies

RESULTS AND DISCUSSION

This study investigated how coping strategies and resilience contribute to mathematics achievement among 180 gifted Saudi high school students. Results are presented by research question (RQ), with quantitative analyses and qualitative themes integrated to provide a comprehensive interpretation.

Contribution of Coping Strategies to Emotional Resilience

Quantitative Findings.

Table 2 presents the descriptive statistics and correlations among resilience and the three coping strategies. Overall, resilience levels were relatively high ($M = 3.85$, $SD = 0.62$), whereas coping strategies fell within the moderate range. Among them, problem-focused coping showed the highest mean ($M = 3.10$, $SD = 0.68$), followed closely by self-regulation ($M = 3.05$, $SD = 0.71$) and cognitive reappraisal ($M = 2.90$, $SD = 0.75$).

Correlation analysis revealed that resilience was most strongly associated with problem-focused coping ($r = .58$, $p < .01$), while moderate correlations were observed with self-regulation ($r = .45$, $p < .01$) and cognitive reappraisal ($r = .38$, $p < .01$). Intercorrelations among the coping strategies themselves ($r = .40$–$.52$, all $p < .01$) suggest that students frequently relied on a combination of approaches rather than a single strategy.

The regression analysis further confirmed these relationships, yielding a significant overall model, $F(3, 176) = 42.67$, $p < .001$, $R^2 = .42$, indicating that coping strategies together explained 42% of the variance in resilience.

Within this model, problem-focused coping emerged as the strongest predictor (β = .39, p < .001, 95% CI [.24, .54]). Self-regulation made a moderate but significant contribution (β = .28, p = .004, 95% CI [.09, .47]), and cognitive reappraisal had a smaller yet still significant effect (β = .22, p = .021, 95% CI [.03, .41]).

Taken together, these results highlight that resilience among mathematically gifted students is not a static trait but rather a capacity actively reinforced by coping strategies—particularly structured problem-solving—while self-regulation and reappraisal provide additional support.

Table 2. Descriptive Statistics and Correlations for Resilience and Coping Strategies (N = 180)

Variable	M	SD	1	2	3	4
1. Resilience (BRS)	3.85	0.62	—			
2. Cognitive Reappraisal	2.90	0.75	.382**	—		
3. Problem-Focused Coping	3.10	0.68	.581**	.452**	—	
4. Self-Regulation	3.05	0.71	.445**	.401**	.523**	—

Note. $^{**}p < .01$.

Qualitative Findings

The interviews with 30 students offered rich insights that reinforced and contextualized the statistical results. Three themes stood out, each aligning closely with one of the coping strategies measured in the quantitative phase.

Mindset shift through cognitive reappraisal. Many students described how they reframed struggle as part of the learning process. One participant explained, "It's okay to struggle—it's how I learn." Such statements illustrate how cognitive reappraisal reduced the emotional weight of failure and transformed difficulties into opportunities for growth.

Structured problem-solving as a coping tool. A second theme centered on the deliberate, step-by-step approach to handling mathematics problems. As one student remarked, "I solve one part at a time." These accounts vividly mirror the statistical finding that problem-focused coping was the strongest predictor of resilience, emphasizing the centrality of systematic problem-solving in sustaining persistence.

Emotional stability through self-regulation. A third theme highlighted students' reliance on emotional regulation strategies to maintain focus under pressure. One interviewee noted, "I take deep breaths to stay calm." This simple yet powerful practice reflects the protective role of self-regulation in reducing anxiety and supporting steady engagement with complex tasks.

Together, these voices show that resilience was not merely abstract or trait-like, but actively constructed through everyday practices of reframing, problem-solving, and emotional regulation.

Integration

The convergence between the quantitative and qualitative strands strengthens the interpretation of the findings. The strong statistical effect of problem-focused coping (β = .39, r = .58) was echoed in students' narratives of breaking problems into smaller steps, demonstrating how advanced cognitive ability amplified the benefits of this strategy. Self-regulation and cognitive reappraisal, while less dominant in the regression model (β = .28 and β = .22, respectively), were clearly visible in students' accounts of calming themselves or adopting a growth-oriented mindset.

Taken together, these results suggest that resilience in mathematically gifted students is driven less by avoiding anxiety—as some studies have proposed (Passolunghi et al., 2020)—and more by proactive coping mechanisms that combine persistence, structured problem-solving, and emotional regulation. This interpretation aligns with broader evidence that mathematically gifted students benefit from self-determined resilience strategies that enhance motivation and perseverance (Knopik & Oszwa, 2023).

Prediction of Mathematical Achievement by Resilience and Coping

Quantitative Findings

Table 3 presents descriptive statistics and correlations for mathematics achievement and its predictors. On average, students achieved relatively high mathematics scores (M = 87.50, SD = 7.85), consistent with their enrollment in advanced gifted programs. Resilience was again elevated (M = 3.85, SD = 0.62), while coping strategies remained in the moderate range (M = 2.90–3.10).

Correlation analysis showed that mathematics achievement was most strongly associated with problem-focused coping (r = .55, p < .01) and resilience (r = .52, p < .01). Significant, though smaller, correlations were also observed with self-regulation (r = .42, p < .01) and cognitive reappraisal (r = .35, p < .01). These associations

suggest that both general resilience and specific coping strategies contribute meaningfully to performance in mathematics.

The multiple regression model was statistically significant, $F(4, 175) = 38.92$, $p < .001$, $R^2 = .47$, indicating that resilience and coping strategies together explained 47% of the variance in mathematics achievement—a substantial effect. Within this model, resilience ($\beta = .34$, $p < .001$) and problem-focused coping ($\beta = .28$, $p = .002$) emerged as the strongest predictors, reinforcing the centrality of persistence and structured problem-solving for gifted learners. In contrast, self-regulation ($\beta = .20$, $p = .019$) and cognitive reappraisal ($\beta = .15$, $p = .041$) contributed smaller but still significant effects, suggesting that while emotional stability and positive reframing play supportive roles, they are less influential than resilience and active problem-solving.

Taken together, these findings underscore that mathematical success among gifted students is not determined by intellectual ability alone. Instead, resilience and proactive coping strategies appear to be crucial drivers, explaining nearly half of the variance in achievement outcomes.

Table 3. Descriptive Statistics and Correlations for Mathematics Achievement and Predictors

Variable	M	SD	1	2	3	4	5
1. Math Achievement	87.50	7.85	—				
2. Resilience	3.85	0.62	.522**	—			
3. Cognitive Reappraisal	2.90	0.75	.352**	.382**	—		
4. Problem-Focused Coping	3.10	0.68	.548**	.581**	.452**	—	
5. Self-Regulation	3.05	0.71	.421**	.445**	.401**	.523**	—

Note. $^{**}p < .01$.

Qualitative Findings

The interviews highlighted two dominant themes that shed light on how resilience and coping translated into mathematics achievement.

Persistence as resilience. Many students described resilience not as an abstract quality but as the determination to keep moving forward despite setbacks. One student explained, "I kept going even when I failed." Such accounts reveal how resilience manifested as perseverance—an ability to endure frustration and transform failure into motivation for continued effort.

Structured problem-solving as a performance booster. A second theme emphasized the role of problem-focused coping. Students consistently described breaking down complex problems into manageable parts. As one remarked, "Breaking problems up into steps was the way I got my answer." These voices directly echo the quantitative finding that problem-focused coping was one of the strongest predictors of achievement, highlighting how structured approaches enabled students to harness their advanced cognitive skills effectively.

Together, these narratives demonstrate that achievement among gifted students was driven less by the absence of anxiety and more by active perseverance and systematic engagement with mathematical tasks.

Integration

The convergence of quantitative and qualitative findings provides a coherent picture of how resilience and coping predict mathematics achievement. Statistically, resilience and problem-focused coping together accounted for a large portion of the variance ($R^2 = .47$, Cohen's $f^2 = .89$), with resilience ($\beta = .34$, $r = .52$) and problem-focused coping ($\beta = .28$, $r = .55$) emerging as the strongest predictors. These effects were vividly illustrated in students' own narratives of persistence and stepwise problem-solving.

Self-regulation ($\beta = .20$) and cognitive reappraisal ($\beta = .15$) also contributed significantly, though to a lesser extent. Students spoke about strategies such as calming themselves or reframing difficulties, reinforcing the quantitative evidence that adaptive mindsets and attention control support achievement. This finding resonates with prior research linking working memory, math performance, and reduced anxiety (Ashcraft & Krause, 2007), and with more recent evidence that domain-specific resilience enhances mathematics achievement (Szczygieł, 2025).

Taken together, the integrated results suggest that gifted students achieve not merely by avoiding stress but by actively transforming challenges into opportunities—through perseverance, structured coping, and the regulation of emotions.

Moderating Role of Culturally Based Coping

Quantitative Findings.

Table 4 presents descriptive statistics and correlations for mathematics achievement, resilience, and the cultural coping composite. On average, students reported a moderate reliance on culturally grounded coping ($M = 3.15$, $SD = 0.65$). Correlation analyses revealed that cultural coping was positively associated with both resilience ($r = .48$, $p < .01$) and mathematics achievement ($r = .45$, $p < .01$), suggesting that culturally embedded strategies are intertwined with both emotional and academic functioning.

Hierarchical regression analysis further clarified this role. In Step 1, resilience alone predicted mathematics achievement, explaining 27% of the variance ($R^2 = .27$, $p < .001$). In Step 2, adding cultural coping significantly increased the explained variance to 38% ($\Delta R^2 = .11$, $p < .001$), underscoring the independent contribution of cultural resources. In Step 3, the interaction term between resilience and cultural coping accounted for an additional 3% of the variance ($R^2 = .41$, $\Delta R^2 = .03$, $p = .015$). Although modest, this effect indicates that cultural coping strengthened the positive impact of resilience on achievement.

Taken together, these results demonstrate that cultural coping is not only directly linked to mathematics success but also acts as a moderator that amplifies the benefits of resilience.

Table 4. Descriptive Statistics and Correlations for Math Achievement, Resilience, and Cultural Coping

Variable	M	SD	1	2	3
1. Math Achievement	87.50	7.85	—		
2. Resilience	3.85	0.62	.522**	—	
3. Cultural Coping Composite	3.15	0.65	.452**	.482**	—

*Note. **p < .01.*

Qualitative Findings.

Interviews revealed three cultural themes that moderated the relationship between resilience and mathematics achievement.

Faith-based reframing. Several students described how religious practices helped them transform stress into strength. As one participant noted, "Praying gave me strength for math." Faith was not just a private resource but a means of reframing academic challenges as opportunities for spiritual growth, thereby reinforcing persistence.

Family-supported coping. Many participants emphasized the encouragement and guidance of parents as a key factor in sustaining motivation. One student recalled, "My parents said don't give up." Such accounts highlight how family support created a buffer against discouragement and maintained commitment to mathematics success.

Honor-driven self-regulation. A third theme centered on the cultural value of family honor. As one student expressed, "Good grades honor my family." This sense of responsibility anchored self-regulation, making academic effort a matter of collective pride rather than individual ambition.

Together, these narratives illustrate how collectivist values—faith, family, and honor—shaped coping in ways that extended beyond individual strategies, embedding resilience within broader social and cultural frameworks.

Integration

The quantitative analysis demonstrated a modest but significant moderation effect ($\Delta R^2 = .03$, Cohen's $f^2 = .05$), indicating that cultural coping strengthened the link between resilience and mathematics achievement. Correlations in the moderate range ($r = .45$–$.48$) further confirmed that cultural factors added meaningful explanatory power.

The qualitative accounts brought these statistical patterns to life. Faith-based reframing, family-supported coping, and honor-driven self-regulation exemplify how cultural resources amplified persistence and discipline—dimensions often overlooked in Western models. Statements such as "Praying gave me strength" and "Good grades honor my family" underscore the deeply relational nature of resilience in a collectivist context.

These findings align with prior evidence that faith supports well-being among Saudi youth (Alabdulkarem et al., 2021) and contrast with Western literature that privileges autonomy and individual coping (Folkman & Moskowitz, 2004; Rutter, 2012). They also reinforce the view that resilience is not only psychological but also culturally situated (Ungar, 2004). While problem-focused coping remained the strongest mechanism overall, the present results refine the reciprocal model by embedding it within a collectivist framework where cultural values enhance, rather than replace, universal coping strategies (Martin & Marsh, 2008).

Practical Implications

The findings suggest that interventions in gifted education should incorporate a Math Resilience Curriculum that combines multiple components. These might include:

1. Workshops on structured problem-solving, helping students break down equations into manageable steps.
2. Mindfulness-based activities to strengthen self-regulation and reduce mathematics-related anxiety.
3. Family workshops to facilitate parent–student goal-setting and shared responsibility for achievement.

4. Short faith-based practices that reinforce persistence and align with students' cultural values.

At the same time, potential implementation challenges must be acknowledged. For instance, parental involvement may be difficult in busy households, and teachers could experience workload pressures when integrating resilience training into advanced curricula. Additionally, some schools may lack the resources needed to coordinate family-based sessions. Addressing these barriers will be crucial to ensure that such interventions are both feasible and sustainable.

LIMITATIONS

This study is not without limitations. First, it relied on self-report instruments, which may be subject to social desirability biases. Second, the sample was restricted to male students in Riyadh, reflecting access constraints within Saudi Arabia's gender-segregated school system. This limitation highlights the importance of including female students in future research to capture a fuller picture. Third, the cross-sectional design prevents causal inferences about the relationships observed. Finally, while the qualitative interviews provided valuable insights, they were limited in scope and depth.

FUTURE DIRECTIONS

Future research should build on these findings in several ways:

1. Incorporate teacher and parent reports alongside student self-reports to provide multi-informant perspectives.
2. Develop or adapt culturally grounded measures of coping and resilience that better reflect collectivist values.
3. Conduct longitudinal studies to track how resilience and coping evolve across academic years.
4. Expand samples to include both genders, diverse regions (urban and rural), and even cross-cultural comparisons (e.g., Saudi vs. Western gifted students).
5. Evaluate the practical feasibility and cost-effectiveness of resilience-based interventions in real school settings.

CONCLUSION

As anticipated in the introduction, this study confirmed that emotional resilience and coping strategies play a decisive role in sustaining mathematics achievement among gifted Saudi high school students. Quantitative analyses demonstrated that resilience and problem-focused coping were the strongest predictors of achievement, while qualitative findings revealed how persistence, structured problem-solving, and emotional regulation shaped students' daily academic experiences. In addition, cultural resources—faith, family, and honor—added modest but significant effects, reinforcing the link between resilience and achievement in ways not fully captured by Western models.

Taken together, these findings highlight the dual importance of universal cognitive strategies and culturally embedded supports. They extend resilience theory by situating it in a collectivist, faith-based context, and they point to practical applications in the form of a Math Resilience Curriculum that integrates structured problem-solving, emotional regulation, and family engagement.

Looking ahead, future research should broaden the scope by including female students, expanding to diverse regions, and conducting cross-cultural comparisons. Such studies would refine our understanding of how resilience operates across contexts and further inform the design of interventions that help gifted learners thrive—not only in mathematics, but also in their broader educational and personal development.

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Conflict Of Interest Statement

Authors state no conflict of interest.

Informed Consent

We have obtained informed consent from all individuals included in this study.

Ethical Approval

Ethical approval was obtained from the Committee for Scientific Research Ethics at King Faisal University [KFU-2025-ETHICS1423]. All datasets were collected and stored in compliance with institutional research ethics and privacy guidelines.

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