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Academic Resilience in Mathematics Among Senior High School Students in Mindanao State University-Sulu

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Abstract. This study investigated the extent of academic resilience in mathematics among senior high school students at Mindanao State University-Sulu (MSU-Sulu). Descriptive-correlational research design was used to gather data from 120 respondents. The findings revealed the student-respondents are mostly females aged between 17-18 years old. There is an equal representation of grade levels, and most students' parents have a monthly income between P20,001.00 and P30,000.00. Additionally, the majority of parents are college graduates; 2) The student-respondents displayed a high positive attitude towards mathematics in most categories. However, they showed some ambiguity in the category of 'Struggle;' 3) The study revealed no significant differences based on gender, age, parents' monthly income, or educational attainment. However, grade level was found to be a notable factor, with grade 11 and grade 12 students exhibiting varying degrees of resilience. This suggests that students' perceptions of academic resilience in mathematics may develop as they progress through senior high school; 4) The findings also revealed that only the correlation between 'Value' and 'Growth' is statistically significant, although it is weak. The correlations between 'Value' and 'Struggle', and 'Struggle' and 'Growth' are not statistically significant. Consequently, the hypothesis stating that there is no significant correlation among the subcategories of academic resilience in mathematics is largely supported, except for the weak but significant correlation between 'Value' and 'Growth'. Based on these findings, the study recommends the following: 1) The University administrator should incorporate goals and strategies related to promoting academic resilience in mathematics into MSU's strategic planning initiatives and policies; 2) Faculty members of MSU-Sulu should adopt flexible instructional approaches that accommodate diverse learning styles and levels of mathematical proficiency among students; 3) They may also consider adopting student-centered pedagogical approaches that prioritize active learning, problem-solving, and collaboration in the classroom; and 4) Furthermore, future researchers in the field of mathematics education are encouraged to conduct similar studies to contribute to ongoing research on improving mathematical skills and academic resilience among the students. This will provide a foundation for continued advancements in the field.

Keywords: Academic resilience; Mathematics education; Mindanao State University-Sulu; Philippines.

1.0 Introduction

Education is essential to the growth of individuals and society as a whole, and mathematics is a cornerstone of the academic domain. One important topic associated to this field of discipline is students' resiliency to mathematics. According to Wilder and Lee (2010), mathematics resilience refers to a student's attitude towards math that allows them to persist in their learning even when faced with setbacks and challenges. Kooken et al. (2015) further explained that researchers are now paying more attention to how students respond to difficult or challenging situations in their math studies.

This phenomenon is the same at Mindanao State University-Sulu where the students view achieving mathematical competency as both an academic challenge and a vital ability that supports cognitive growth and problem-solving

skills. Situated in the culturally diverse region of Mindanao, Mindanao State University-Sulu has unique opportunities and problems when it comes to helping its senior high school students develop mathematical resilience. The requirement to comprehend and improve academic resilience in mathematics becomes critical as educational environments change.

Mathematical resilience refers to the ability of learners to navigate and overcome negative emotions that may arise when they encounter difficulty in learning mathematics. Resilient learners understand that while mastering mathematics can be challenging, they can find the necessary support and experience positive emotions when they succeed. Teaching for mathematical resilience equips learners with the skills to effectively use mathematics and acquire new knowledge, empowering them in their daily lives and careers. It is possible for learners of all ages to develop the resilience needed to approach mathematics with confidence, without developing negative attitudes (Lee & Wilder, 2017). In a similar vein, Hernandez-Martinez and Williams (2013) as cited by Ishak et al. (2020) emphasized that resilience in mathematics involves students' adaptability in making decisions when faced with unfamiliar situations.

This study provided insight into the extent of academic resilience in mathematics among the students in the special environment of Mindanao State University-Sulu. Through an analysis of resilience-promoting variables like growth, struggle, and value, this research offered insights that can guide educational practices and policies. In addition, this research deepened the understanding of academic resilience in mathematics and offer useful recommendations for educators, administrators, and policymakers to foster a resilient and proficient generation of math learners by situating the discussion within the framework of the said high school.

2.0 Methodology

2.1 Research Design

A descriptive-correlational methodology was used in this study, which aimed to investigate the various facets of academic resilience. The research explored three characteristics: growth, struggle, and value. These factors work together to support students' perseverance and success in the difficult field of mathematics. According to McCurney and White (2009), as cited by IvyPanda (2023), descriptive correlational design is used in research studies to determine the relationship between different variables and provide static depictions of settings.

2.2 Research Respondents

A group of 120 students from the Mindanao State University-Sulu Senior High School population of 1,955 participated as respondents in this study. These students were officially enrolled during the academic year 2023-2024. The respondents were selected using non-proportionate stratified random sampling. Stratified random sampling involves selecting a group of items from the population based on classification and random selection. Table 1 displays the breakdown of respondents based on their grade level and section.

Table 1. Distribution of the respondents according to grade and section

Grade and Section	Number of Respondents	Population Size	Percentage
STEM 11	30	500	6.0%
GAS 11	30	577	5.20%
STEM 12	30	356	8.43%
GAS 12	30	522	5.75%
Total	**120**	**1955**	**6.14%**

2.3 Research Instrument

A standardized questionnaire titled "Academic Resilience in Mathematics among Senior High School Students in Mindanao State University-Sulu" was used to gather the desired information from the respondents. This questionnaire was adopted and modified from a study by Kooken et al. (2015) titled "Development and Validation of the Mathematical Resilience Scale." The questionnaire is divided into two parts: Part 1 contains the personal data of the respondents, while Part 2 consists of three subcategories of academic resilience in mathematics: value, growth, and struggle. Respondents answered the questionnaire using a 5-point Likert scale with response options such as Strongly Agree (SA), Agree (A), Undecided (U), Disagree (D), and Strongly Disagree (SD). To validate the research instrument, the researcher sent the questionnaire to prospective validators. However, since the

questionnaire was adapted, the researcher did not conduct a separate reliability test. The Cronbach alpha value of .90 confirms the questionnaire's reliability.

2.4 Data Gathering Procedure

The questionnaire was personally administered by the researcher during the first week of February 2024, with retrieval of the questionnaires also taking place during the same week.

2.5 Data Analysis

The responses from the questionnaires were analyzed using descriptive statistics such as frequency, percentage, weighted arithmetic mean, and standard deviation. Inferential statistics such as t-test for independent samples, one-way analysis of variance (ANOVA), and Pearson Product Moment Correlation were also used.

- The demographic profile of the respondents, including gender, age, grade level, parents' monthly income, and parents' educational attainment, was analyzed using frequency and percentage.
- The extent of academic resilience in Mathematics among senior high school students at MSU-Sulu was analyzed using weighted arithmetic mean and standard deviation, focusing on aspects such as value, struggle, and growth.
- To determine if there were significant differences in the extent of academic resilience in Mathematics among senior high school students at MSU-Sulu based on their demographic profile, including gender, age, grade level, parents' monthly income, and parents' educational attainment, t-test for independent samples and one-way analysis of variance were utilized.
- The significant correlation among the subcategories of academic resilience in Mathematics, specifically value, struggle, and growth, was analyzed using Pearson Product Moment Correlation.

3.0 Results and Discussion

3.1 Demographic Profile of the Respondents

Table 1 displays the demographic profile of the student-respondents at Mindanao State University-Sulu Senior High School, specifically in terms of gender. The table shows that out of the 120 student-respondents, 43 (35.8%) are males, while 77 (64.2%) are females. This data indicates that most of the student-respondents, more than half of them, are females. Therefore, it can be concluded that the student-respondents are predominantly female.

Table 1. Student-respondents' demographic profile in terms of gender

Gender	Number of Respondents	Percent
Male	43	35.8%
Female	77	64.2%
Total	**120**	**100%**

Table 2 displays the demographic profile of the student-respondents at Mindanao State University-Sulu Senior High School, specifically their age distribution. From the table, it is evident that out of the 120 student-respondents, 29 (24.2%) are aged 16 and below, 58 (48.3%) are aged 17-18, 21 (17.5%) are aged 19-20, and 12 (10.0%) are aged 21 and above. The findings of this study highlight that almost half of the student-respondents fall within the 17-18 age range. Consequently, it can be inferred that most participants in this study belong to the middle age group category.

Table 2. Student-respondents' demographic profile in terms of age

Age	Number of Respondents	Percent
16 years old and below	29	24.2%
17-18 years old	58	48.3%
19-20 years old	21	17.5%
21 years old and above	12	10.0%
Total	**120**	**100%**

Table 3 displays the demographic profile of the student-respondents at Mindanao State University-Sulu Senior High School based on their grade level. The table shows that out of the total 120 student-respondents, 60 (50.0%) are in grade 11, while the other 60 (50.0%) are in grade 12. Therefore, this study indicates an equal distribution of student-respondents across both grade levels.

Table 3. Student-respondents' demographic profile in terms of grade level

Grade Level	Number of Respondents	Percent
Grade 11	60	50.0%
Grade 12	60	50.0%
Total	**120**	**100%**

Table 4 displays the demographic profile of student-respondents at Mindanao State University-Sulu Senior High School, focusing on their parents' monthly income. The table reveals that out of 120 student-respondents, 12 (10.0%) have parents with a monthly income below 5,000 pesos, 24 (20.0%) have parents with a monthly income between 5,001 and 10,000 pesos, 29 (24.2%) have parents with a monthly income between 10,001 and 20,000 pesos, 44 (36.7%) have parents with a monthly income between 20,001 and 30,000 pesos, and 11 (9.2%) have parents with a monthly income above 30,001 pesos. This data demonstrates that more than one-third of the student-respondents have parents whose average monthly income falls within the 20,001 to 30,000 pesos range. Therefore, the majority of the student-respondents can be classified as belonging to the middle-income bracket, as defined in this study.

Table 4. Student-respondents' demographic profile in terms of parents' monthly income

Section	Number of Respondents	Percent
P5,000.00 and below	12	10.0%
P5,001.00-P10000.00	24	20.0%
P10,001.00-P20,000.00	29	24.2%
P20,001.00-P30,000.00	44	36.7%
P30,001.00 and above	11	9.2%
Total	**120**	**100%**

Table 5 displays the demographic profile of student-respondents at Mindanao State University-Sulu Senior High School in terms of their parents' educational attainment. The table indicates that out of the 120 student-respondents, 13 (10.8%) have parents who completed elementary school, 22 (18.3%) have parents who finished secondary school, 68 (56.7%) have parents who are college graduates, and 17 (14.2%) have parents who are post-college graduates. This study reveals that more than half of the student-respondents' parents are college graduates. This suggests that a significant proportion of the parents have achieved a higher level of education, with the majority being college graduates.

Table 5. Student-respondents' demographic profile in terms of parents' educational attainment

Section	Number of Respondents	Percent
Elementary Graduate	13	10.8%
Secondary Graduate	22	18.3%
College Graduate	68	56.7%
Post-College Graduate	17	14.2%
Total	**120**	**100%**

3.2 Level of Academic Resilience in Mathematics

Table 6. Extent of academic resilience in Mathematics among the students in terms of value

Statements	Mean	SD	Rating
1. Math is essential for my future.	4.71	.454	Strongly Agree
2. Math will be useful to me in my life's work.	4.69	.464	Strongly Agree
3. Math courses are very helpful no matter what I decide to study.	4.67	.473	Strongly Agree
4. Knowing math contributes greatly to achieving my goals.	4.68	.470	Strongly Agree
5. Having a solid knowledge of math helps me understand more complex topics in my field of study.	4.61	.490	Strongly Agree
6. People who are good at math have more opportunities than those who are not good at math.	4.40	.834	Agree
7. Thinking mathematically can help me with things that matter to me.	4.62	.486	Strongly Agree
8. It would be easy to succeed in life with math.	4.61	.490	Strongly Agree
9. Math develops good thinking skills that are necessary to succeed in any career.	4.69	.464	Strongly Agree
10. Math can become my asset.	4.71	.456	Strongly Agree
Total	**4.64**	**.5081**	**Strongly Agree**

Note: 4.50-5.00 = Strongly Agree (SA), 3.50-4.49 = Agree (A), 2.50-3.49 = Undecided (U), 1.50-2.49 = Disagree (D), 1.00-1.49 = Strongly Disagree (SD)

Table 6 presents the level of academic resilience in Mathematics among senior high school students in MSU-Sulu SHS, as measured by their perceived value. The category obtained a total weighted mean score of 4.64, with a standard deviation of .5081, indicating a "Strongly Agree" rating from the student respondents. These findings

suggest that senior high school students at MSU-Sulu SHS perceive themselves as having a high level of academic resilience in mathematics in terms of value.

Specifically, the student respondents strongly agreed with statements such as "Math is essential for my future", "Math will be useful to me in my life's work", "Knowing math contributes greatly to achieving my goals", "Having a solid knowledge of math helps me understand more complex topics in my field of study", "Math develops good thinking skills that are necessary to succeed in any career", and "Math can become my asset".

These results align with the study conducted by Lim and Lopez (2023), which emphasized that resilient students in the context of Mathematics view mistakes and difficulties as opportunities for growth. These students also demonstrate a strong work ethic, maintain a positive attitude towards the subject, and believe in their ability to succeed. Lim and Lopez (2023) further noted that such a mindset fosters self-efficacy, which is essential for overcoming challenges and persevering in the face of frustration.

Table 7. Extent of academic resilience in Mathematics among the students in terms of struggle

Statements	Mean	SD	Rating
1. Everyone does not struggle with math at some point.	1.83	.857	Disagree
2. Good mathematicians experience difficulties when solving problems.	2.51	1.290	Undecided
3. Successful people who work in math-related fields struggle when working on hard math problems.	3.38	1.310	Undecided
4. Everyone doesn't make mistakes at times when doing math.	2.03	1.177	Disagree
5. Struggle is normal part of working on math.	4.23	.855	Agree
6. People in my peer group don't struggle sometimes with math.	1.78	1.006	Disagree
7. People who are good at math may pass a hard math test.	4.38	.662	Agree
8. Math teachers don't have difficulties when answering a math question.	4.35	.763	Agree
9. Math questions don't confuse me.	1.99	1.017	Disagree
10. I sometimes get encouraged by difficulties in mathematics	4.33	.702	Agree
Total	**3.08**	**.9639**	**Undecided**

Table 7 presents the findings on the level of academic resilience in mathematics among senior high school students at MSU-Sulu, specifically focusing on their perception of struggle. The category of struggle obtained an average weighted mean score of 3.08, with a standard deviation of .9639, which is rated as "Undecided" by the student-respondents. This rating suggests that the students in this study perceive struggle as not significantly influencing their academic resilience in mathematics.

It is worth noting that the student-respondents rated certain items as "Undecided," such as "Good mathematicians experience difficulties when solving problems" and "Successful people who work in math-related fields struggle when working on hard math problems." These findings contradict the conclusions reached by Ashcraft and Moore (2009), who stated that the fear of failure and the perception of mathematics as a challenging and intimidating subject can lead students to avoid it and hesitate to seek assistance. This negative cycle can result in underperformance, further reinforcing their anxieties and undermining their resilience.

Table 8. Extent of academic resilience in Mathematics among the students in terms of growth

Statements	Mean	SD	Rating
1. Everyone can get better at math if they try.	4.67	.473	Strongly Agree
2. Math can be learned by anyone.	4.64	.499	Strongly Agree
3. If someone is not a math person, they will still be able to learn math.	4.65	.479	Strongly Agree
4. If someone is not good at math, there is something that can be done to change that.	4.58	.544	Strongly Agree
5. People are either good at math or they aren't.	4.50	.820	Strongly Agree
6. I believe a person's math ability is determined at birth.	2.18	1.058	Disagree
7. Some people can always learn math.	4.63	.609	Strongly Agree
8. People who are good in math may really grow personally.	4.48	.799	Agree
9. A person can become good in math through constant practice.	4.66	.494	Strongly Agree
10. Someone will develop in math if he or she can be tutored well.	4.63	.623	Strongly Agree
Total	**4.36**	**.6398**	**Agree**

Table 8 displays the level of academic resilience in mathematics among senior high school students at MSU-Sulu in terms of growth. This category has an overall weighted mean score of 4.36, with a standard deviation of 0.6398.

According to the student respondents, this rating falls under the category of "Agree." These findings suggest that most students participating in this study feel confident in their ability to adapt, learn, and enhance their mathematical skills over time.

It is worth noting that the student respondents rated the statement "People who are good in math may really grow personally" as "Agree," among other statements. Additionally, resilient students are more inclined to develop a growth mindset, which entails the belief that intelligence and abilities can be developed through effort and perseverance (Dweck, 2006).

3.3 Difference in the Extent of Academic Resilience

Table 9. Difference in the extent of academic resilience in mathematics the students in terms of gender

Variables	Grouping	Mean	SD	Mean Difference	*t*	Sig.	Description
Value	Male	.31514	.04806	-.02813	-.499	.619	Not Significant
	Female	.25819	.02942				
Struggle	Male	.36274	.05532	-.23703*	-3.44	.001	Significant
	Female	.36229	.04129				
Growth	Male	.30769	.04692	.07683	1.296	.198	Not Significant
	Female	.31349	.03573				

Note: *Significant at alpha 0.05

Table 9 shows the differences in academic resilience in mathematics among senior high school students at MSU-Sulu, based on gender. The table reveals that the t-values and probability values for the value and growth aspects are not significant at a significance level of .05. This means that there is no difference in the perceptions of male and female senior high school students from MSU-Sulu regarding the subcategories of academic resilience. Therefore, it can be concluded that both male and female students perceive the extent of academic resilience in mathematics similarly, without one gender being better at it than the other. However, there is a significant difference in the extent of struggle aspect, indicating that female students perceive struggle differently compared to male students, as supported by the significant statistical difference.

Hence, it can be concluded that, in general, gender does not significantly influence how senior high school students at MSU-Sulu perceive the extent of academic resilience in mathematics. Therefore, the hypothesis stating, "There is no significant difference in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu when classified by their demographic profile in terms of gender,'' is accepted.

In a meta-analysis conducted by Watt and Credé (2015) on academic resilience, it was determined that gender does not have a significant overall effect on resilience scores. This finding is consistent with the observation that there is no significant difference between genders in terms of value and growth aspects.

Table 10. Difference in the extent of academic resilience in mathematics the students in terms of age

Sources of Variation		Sum of Squares	df	Mean Square	F	Sig.	Description
Value	Between Groups	.514	3	.171	2.271	.084	Not Significant
	Within Groups	8.746	116	.075			
	Total	9.259	119				
Struggle	Between Groups	1.039	3	.346	2.508	.062	Not Significant
	Within Groups	16.013	116	.138			
	Total	17.052	119				
Growth	Between Groups	1.655	3	.552	6.428	.000	Significant
	Within Groups	9.953	116	.086			
	Total	11.608	119				

Table 10 displays the differences in academic resilience in mathematics among senior high school students at MSU-Sulu, categorized by age. The table reveals that the F-values and probability values for the value and struggle aspects are not significant at alpha .05. This indicates that, despite variations in age, students generally have similar perceptions towards the subcategories of academic resilience in mathematics. Therefore, it can be concluded that students aged 16 and below, 17-18 years old, 19-20 years old, and 21 years and above perceive academic resilience in mathematics to the same extent, with no age group being more perceptive than the others. However, when it

comes to the growth aspect, a significant difference is observed. This suggests that students aged 16 and below perceives growth differently compared to those aged 19-20 and 21 years and below, as supported by the significant statistical difference.

Hence, it can be concluded that, in general, age does not significantly influence how senior high school students at MSU-Sulu perceive the extent of academic resilience in mathematics. Therefore, the hypothesis stating, "There is no significant difference in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu when classified by their demographic profile in terms of age," is accepted. These results support the findings of Lee and Wilder (2017), who concluded that learners of any age can develop the resilience they need to approach mathematics safely. All learners can learn mathematics in ways that do not cause them to develop negative traits.

Table 11. Difference in the extent of academic resilience in mathematics the students in terms of grade level

Variables	Grouping	Mean	SD	Mean Difference	*t*	Sig.	Description
Value	Grade 11	4.5700	.30214	-.13796*	-2.785	.006	Significant
	Grade 12	4.7080	.23658				
Struggle	Grade 11	3.0067	.40037	-.14667*	-2.154	.033	Significant
	Grade 12	3.1533	.34320				
Growth	Grade 11	4.2483	.33623	-.22333*	-4.179	.000	Significant
	Grade 12	4.4717	.24153				

Table 11 displays the differences in academic resilience in mathematics among senior high school students at MSU-Sulu, categorized by grade level. The table reveals that the t-values and probability values for all aspects are significant at an alpha level of .05. This suggests that there is a difference in the perceptions of grade 11 and grade 12 senior high school students from MSU-Sulu regarding the subcategories of academic resilience. As a result, it can be inferred that grade 11 students perceive academic resilience in mathematics differently compared to grade 12 students, as supported by the significant statistical difference.

Hence, it can be concluded that, grade level significantly influences how senior high school students at MSU-Sulu perceive the extent of academic resilience in mathematics. Therefore, the hypothesis stating, "There is no significant difference in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu when classified by their demographic profile in terms of grade level," is rejected. This finding is based on a study conducted by Xu et al. (2020) that investigated the development of math anxiety in high school students over time. Although the study did not specifically concentrate on resilience, it implies that students' attitudes towards math may shift during high school, potentially affecting their perception of resilience.

Table 12. Difference in the extent of academic resilience in mathematics the students in terms of parents' monthly income

Sources of Variation		Sum of Squares	df	Mean Square	F	Sig.	Description
Value	Between Groups	.015	4	.004	.046	.996	Not Significant
	Within Groups	9.244	115	.080			
	Total	9.259	119				
Struggle	Between Groups	.192	4	.048	.327	.859	Not Significant
	Within Groups	16.860	115	.147			
	Total	17.052	119				
Growth	Between Groups	.755	4	.189	2.000	.099	Not Significant
	Within Groups	10.853	115	.094			
	Total	11.608	119				

Table 12 presents the differences in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu, classified according to parents' monthly income. As shown in this table, all the F-values and probability values of subcategories subsumed are not significant at alpha .05. This means that though student-respondents vary in their parents' monthly income, generally they do not differ in perception towards the subcategories subsumed under the extent of academic resilience in mathematics. Consequently, this suggests that student-respondents with parents earning 5,000 pesos and below, 5,001-10,000 pesos, 10,001-20,000 pesos, 20,001-30,000 pesos, and 30,001 pesos and above perceive the extent of academic resilience in mathematics similarly, with no parental monthly income group being a 'better perceiver' than another.

Hence, it can be concluded that parents' monthly income does not significantly influence how senior high school students at MSU-Sulu perceive the extent of academic resilience in mathematics. Therefore, the hypothesis stating, "There is no significant difference in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu when classified by their demographic profile in terms of parents' monthly income," is accepted.

This finding contradicts the study conducted by Condliffe and Davies (2007), which concluded that while there may be a link between socioeconomic status and academic achievement, it does not necessarily lead to perceptions of resilience. In fact, students from lower-income families may in fact develop strong resilience through overcoming various challenges.

Table 13. Difference in the extent of academic resilience in mathematics the students in terms of parents' educational attainment

Sources of Variation		Sum of Squares	df	Mean Square	*F*	Sig.	Description
Value	Between Groups	.090	3	.030	.379	.768	Not Significant
	Within Groups	9.169	116	.079			
	Total	9.259	119				
Struggle	Between Groups	.023	3	.008	.053	.984	Not Significant
	Within Groups	17.029	116	.147			
	Total	17.052	119				
Growth	Between Groups	.597	3	.199	2.098	.104	Not Significant
	Within Groups	11.011	116	.095			
	Total	11.608	119				

Table 13 presents the differences in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu, classified according to parents' educational attainment. As shown in this table, all the F-values and probability values of subcategories subsumed are not significant at alpha .05. This means that though student-respondents vary in their parents' educational attainment, generally they do not differ in perception towards the subcategories subsumed under the extent of academic resilience in mathematics. Consequently, this indicates that student-respondents, regardless of whether their parents are elementary graduates, secondary graduates, college graduates, or post-college graduates, perceive the extent of academic resilience in mathematics in a similar manner, with no parental educational attainment group being a 'better perceiver' than another.

Hence, it can be concluded that parents' educational attainment does not significantly influence how senior high school students at MSU-Sulu perceive the extent of academic resilience in mathematics. Therefore, the hypothesis stating, "There is no significant difference in the extent of academic resilience in mathematics among senior high school students at MSU-Sulu when classified by their demographic profile in terms of parents' educational attainment," is accepted. Parents with higher levels of education often have higher academic expectations for their children. As a result, this can influence the motivation and resilience of the students (Van der Velden & Van de Werfhorst, 2013).

3.4 Correlation among the Subcategories Subsume Under the Academic Resilience in Mathematics

Table 14. Correlation among the subcategories subsume under the academic resilience in mathematics

Variables		Pearson r	Sig.	N	Description
Dependent	Independent				
Value	Struggle	.091	.324	120	Nearly Perfect
	Growth	.206*	.024	120	Low
Struggle	Growth	-.022	.808	120	Low

Note: *Correlation coefficient is significant at alpha .05

Table 14. shows the correlation among the subcategories subsume under the academic resilience in mathematics. As shown in the table, the computed Pearson correlation Coefficients (Pearson *r*) between these variables, except between value and growth, are not significant at alpha .05. Furthermore, the correlational degree among the categories under the academic resilience in mathematics is as follows:

a) Value and Struggle: The Pearson correlation coefficient of .091 indicates a very weak positive relationship between these variables. However, the significance (Sig.) value of .324 is greater than the alpha level of .05,

suggesting that this correlation is not statistically significant. In relation to this finding, Casinillo et al. (2020) found a positive correlation, suggesting that students who are resilient can maintain motivation even when faced with challenges. This emphasizes the significance of building resilience to decrease anxiety and promote perseverance in mathematics.

b) Value and Growth: The Pearson correlation coefficient of .206 indicates a weak positive relationship, and the Sig. value of .024 is less than the alpha level of .05, indicating that this correlation is statistically significant. The description 'Low' might suggest that the strength of the relationship is considered low despite being significant. Duckworth and Yeager (2015) conducted a study on the concept of a growth mindset, which highlights the belief that abilities can be improved through effort. While they did not provide an exact correlation coefficient, their research suggests a positive connection between valuing learning and maintaining growth-oriented beliefs in relation to academic achievement.

c) Struggle and Growth: The Pearson correlation coefficient of -.022 indicates a very weak negative relationship between these variables. The Sig. value of .808 is much greater than the alpha level of .05, which means this correlation is not statistically significant. This result supports the research conducted by Dowker and Sarkar (2016) on the relationship between self-efficacy beliefs (confidence in one's abilities) and mathematics achievement. While their main focus was not on "struggle," it indicates that facing challenges in math may not directly impact a student's growth mindset, potentially leading to a lack of significant correlation.

4.0 Conclusion

This study concludes that:

a. The reliability and validity of the research findings may be impacted by the skewed distributions of the ages, genders, parents' monthly incomes, and parents' educational attainments of the student respondents.

b. In general, the student respondents demonstrate a positive attitude toward academic resilience in mathematics. This indicates that they have a strong belief in their ability to overcome challenges and persist in their mathematical studies. However, their attitude toward struggle is uncertain, suggesting that there may be areas where students feel less confident or encounter more significant challenges in their mathematical learning.

c. The genders, ages, parents' monthly incomes, and educational attainments of the student respondents do not have a significant influence on academic resilience. However, grade level plays a crucial role. This implies that students' resilience in mathematics may develop as they progress from grade 11 to grade 12, emphasizing the importance of interventions tailored to specific grade levels.

d. There is a weak, yet significant, correlation between the subcategories of academic resilience known as 'Value' and 'Growth.' This is in contrast to the non-significant correlations observed elsewhere. This suggests that while students may not strongly perceive the connection between their struggles and growth, or value the struggle itself, they do recognize the importance of growth and its value in their academic journey in mathematics.

e. This study examined the concept of academic resilience in mathematics among senior high school students at MSU-Sulu. It was observed that students generally possess a positive attitude. Moreover, it is found that resilience tends to develop during high school years, and socioeconomic factors may not play as significant a role as previously believed. Notably, there was a weak connection between valuing mathematics and being willing to embrace challenges, indicating a necessity for interventions that assist students in perceiving difficulties as chances for personal growth.

This study recommends the following:

a. The University administrator should incorporate objectives and strategies to enhance academic resilience in mathematics into Michigan State University's strategic planning initiatives and policies. This will ensure that efforts to foster resilience are in line with the university's vision and mission and receive institutional support and recognition.

b. Faculty members at MSU-Sulu should actively promote the adoption of adaptable instructional approaches that cater to the diverse learning styles and levels of mathematical proficiency among students. Offering various learning paths, such as flipped classrooms, active learning strategies, and differentiated instruction, can help students develop resilience by allowing them to engage with course materials in ways that suit their individual needs.

c. Faculty members of MSU-Sulu should consider implementing student-centered pedagogical approaches that prioritize active learning, problem-solving, and collaboration in the mathematics classroom. They should encourage faculty members to develop courses and assignments that stimulate critical thinking, application of mathematical concepts in real-world scenarios, and perseverance in the face of challenges.
d. Moreover, it is highly recommended that future researchers in the field of mathematics education undertake studies comparable to this one. This will contribute to the continuous research on enhancing mathematical skills and academic resilience among college students in Sulu, and establish a basis for further progress in the field.

5.0 Contributions of Authors

All contributions to each part of this work were made by the sole author himself. He reviewed and approved the final version of this work.

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7.0 Conflict of Interests

The authors declare no conflicts of interest about the publication of this paper.

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9.0 References

Ashcraft, M., and Moore, J. (2009). Mathematics anxiety and its cognitive consequences: A review. Learning and Individual Differences, 19(4), 355-375.

Baluyos, G., Cabaluna, P., and Paragat, J. (2023). Students' Preference in Online Learning Environment and Academic Resilience in Relation to Their Academic Performance in Mathematics. EduLine: Journal of Education and Learning Innovation, 3(3), 460-470. https://doi.org/10.35877/454RI.eduline2038

Boaler, J. (2016). Mathematical mindsets: Unleashing the power of beliefs, brains, and learning. John Wiley & Sons.

Casinillo, J. P. C., and Villena, M. C. R. (2020). Revisiting mathematical resilience and anxiety among senior high students. International Journal of Indonesian Education and Teaching, 5(2), 343-352.

Casinillo, L. F., Casinillo, E. L., Lagumbay, C. T., Abad, H. R. F., and Dagongdong, M. L. (2022). Revisiting mathematical resilience and anxiety among senior high students. International Journal of Indonesian Education and Teaching, 6(2), 193-203. https://doi.org/10.24071/ijiet.v6i2.4661

Casinillo, L., Abapo, A. L., Abela, J. J., and Martinez, S. J. (2023). Characterizing the challenges as correlates of senior high students' profile in the new normal setting. Asian Journal of Assessment in Teaching and Learning, 13(1), 24-33. https://doi.org/10.37134/ajatel.vol13.1.3.2023

Cherry, K. (2022). What Is Self-Determination Theory? https://www.verywellmind.com/what-is-self-determination-theory-2795387

Condliffe, R., and Davies, J. (2007). Resilience and educational achievement: A review of the literature. Children and Society, 21(4), 321–330.

Dowker, A., and Sarkar, A. (2016). Mathematics anxiety and mathematics achievement: The role of self-efficacy beliefs. Journal of Educational Psychology, 108(2), 181-195.

Duckworth, A. L., and Yeager, D. (2015). Mindsets and student success: Grit, growth mindset, and the three Cs. Educational Psychologist, 50(1), 31-48. https://files.eric.ed.gov/fulltext/EJ1051129.pdf

Dweck, C. S. (2006). Mindset: The new psychology of success. Random House Publishing Group.

Frost, J. (n.d.). Stratified Sampling: Definition, Advantages & Examples. statisticsbyjim.com

Hayes, A. (2023). How Stratified Random Sampling Works, With Examples. Investopedia. https://www.investopedia.com/terms/stratified_random_sampling.asp#:~:text=Proportional%20stratified%20random%20sampling%20involves,their%20occurrence%20in%20the%20population

Iliyasu, R., and Etikan, I. (2021). Comparison of quota sampling and stratified random sampling. Biom. Biostat. Int. J. Rev, 10(1), 24-27. https://doi.org/10.15406/bbij.2021.10.00326

IvyPanda. (n.d.). Descriptive statistics and correlational design. https://ivypanda.com/essays/data-presentation-descriptive-and-correlational-designs/

Johnston-Wilder, S., and Lee, C. (2010). Developing mathematical resilience.

Kooken, J., Welsh, M. E., McCoach, D. B., Johnston-Wilder, S., and Lee, C. (2016). Development and validation of the mathematical resilience scale. Measurement and Evaluation in Counseling and Development, 49(3), 217-242. https://doi.org/10.1177/0748175615596782

Krzensk, A. (2020). Influencing academic resilience and self-regulation in students: An intervention in mathematics.

Ledesma, J. G., and Linaugo, J. D. (2023). Mathematics anxiety, resiliency, and chemistry performance of grade 9 students. Technium Soc. Sci. J., 42, 49. https://doi.org/10.47577/tssj.v42i1.8712

Lee, C., and Johnston-Wilder, S. (2017). The construct of mathematical resilience. In Understanding emotions in mathematical thinking and learning (pp. 269-291). Academic Press. https://doi.org/10.1016/b978-0-12-802218-4.00010-8
Lim, C. C., and Lopez, M. S. C. (2023). Self-efficacy and academic resilience among grade 12 students in a private school: A correlational study. Philippine Journal of Psychology, 26(1), 1-12. https://doi.org/10.5281/zenodo.8185748
Mallick, S., and Kaur, N. (2016). Academic resilience among senior secondary school students: Influence of learning environment. International Journal of Educational Development Using Information and Communication Technology, 11(2), 181-192. https://doi.org/10.21659/rupkatha.v8n2.03
Neshila, K. F. (2018). Academic resilience in Mathematics amongst at-risk Grade 10 learners in Namibia: A phenomenology study (Doctoral dissertation, University of Namibia)
Pintrich, P. R. (2000). The role of metacognitive knowledge in learning, teaching, and assessment. American Psychologist, 55(9), 1119-1129. https://doi.org/10.1207/s15430421tip4104_3
Radhamani, K., and Kalaivani, D. (2021). Academic resilience among students: A review of literature. *International Journal of Research and Review*, *8*(6), 360-369. https://doi.org/10.52403/ijrr.20210646
Richardson, G. E. (2002). The metatheory of resilience and resiliency. Journal of clinical psychology, 58(3), 307-321. https://doi.org/10.1002/jclp.10020
Secadron Jr, A. C., and Tan, D. A. (2023). Enhancing Students' Mathematical Resilience and Critical Thinking Skills Using e-Modules via Process-Oriented-Guided-Inquiry-Learning Approach. American Journal of Educational Research, 11(5), 287-296. https://doi.org/10.12691/education-11-5-6
Siegel, D. (2013). Brainstorm: The power and purpose of the teenage brain. Penguin Books.
Van der Velden, W., and Van de Werfhorst, H. (2013). Parental educational expectations and offspring's educational attainment: A review of the evidence. Educational Research Review, 8(1-2), 1–23. https://doi.org/10.1016/j.edurev.2012.12.002
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
Watt, H. M. G., and Credé, M. (2015). Gender differences in academic resilience of secondary school students: A meta-analysis. Journal of Educational Psychology, 107(2), 428–441. https://www.apa.org/workforce/publications/women.pdf
Xu, Y., Han, X., and Huang, J. (2020). Development of mathematics anxiety in high school: A latent growth curve analysis. Journal of Educational Psychology, 112(7), 1692-1704. https://doi.org/10.1037/edu0000402
Zanthy, L. S., Kusuma, Y. S., and Soemarmo, U. (2019). Mathematical resilience analysis of senior high school students. Journal of Physics: Conference Series, 1315, 012015. https://doi.org/10.1088/1742-6596/1315/1/012074