Mediating Effect of Study Habits on the Correlation Between Social Influence and Mathematical Resilience on Student Engagement

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Abstract

Student disengagement remains a pressing educational concern. The mediating effect of study habits on the relationship between social influence and mathematical resilience on student engagement was examined. Using a predictive research design, the data from 302 respondents selected through stratified sampling were analyzed via mediation analysis. Findings showed that study habits significantly mediate the correlation between the predictor and criterion variables. With a stronger effect observed in the link between mathematical resilience and engagement, partly supporting the Theory of Planned Behavior. Future research may explore additional mediating variables and qualitative insights, while educational leaders may implement programs that strengthen study habits to enhance the effect of predictor of student engagement.

Keywords: Mediating effect; study habits; social influence; mathematical resilience; student engagement

1. Introduction

Student disengagement in mathematics is a global concern (Cevikbas & Kaiser, 2022). A significant proportion of students around the world exhibit low levels of engagement in mathematics classes. (Bringula et al., 2021). Joshi et al. (2022) highlight that student disengagement in mathematics remains a persistent challenge worldwide.

In Australia, students have been found to show low engagement in mathematics (Naiker et al., 2022). In Asia, specifically in Taiwan, students have been reported to display relatively low engagement in mathematics compared to learners in other countries (Yeh et al., 2019). Moreover, in Malaysia, student engagement is often neglected in mathematics education (Maamin et al., 2022).

In the Philippines, students often demonstrated low engagement in mathematics (Verdeflor et al., 2024). Additionally, studies in Davao City and Davao de Oro have reported low student engagement in mathematics classes (Alipio, 2020; Dooma et al., 2024).

Low engagement in mathematics can hinder problem-solving and conceptual understanding (Saqib et al., 2024). Persistent disengagement may also worsen educational inequalities and reduce competitiveness in mathematics (Dooma et al., 2024). Despite its pressing effects, students' engagement in mathematics remains underexplored, particularly in in the local context, highlighting the need for further studies to address the gap and find solutions of this issue. This underscores the urgency of conducting this study.

This study is significant as it provides valuable insights into promoting quality and inclusive education, as emphasized in the United Nations Sustainable Development Goal 4 (Quality Education). It

contributes to the educational community by deepening the understanding of how social influence, mathematical resilience, and study habits affect students' engagement in mathematics. The findings may guide the Department of Education (DepEd) in improving curriculum development, teacher training, and educational policies that enhance students' engagement, strengthen social support, and promote resilience and effective study practices. Moreover, the study benefits students, teachers, parents, and school administrators of Holy Cross of Davao College by highlighting the importance of supportive environments and positive learning strategies that enhance students' engagement and academic success.

1.1 Statement of the Problem

The study aims to investigate the significance of the mediating effect of study habits on the relationship between social influence and mathematical resilience on student engagement. Specifically, it seeks to answers to the following:

1. to described the levels of social influence in terms of parent norm influence, peer norm influence, and teacher norm influence; the mathematical resilience in terms of value, struggle, and growth; and the study habits in terms of homework assignment, time allocation, reading and note taking, and teacher consultation; and the student engagement in terms of social engagement, cognitive engagement, and emotional engagement.
2. to determine the significance of the correlation between social influence, mathematical resilience, and the study habits with students' engagement.
3. to determine the significance of the direct effect of social influence on student engagement, controlling for study habits; indirect effect of social influence on student engagement through study habits; and total effect of social influence on student engagement.
4. to determine the significance of the direct effect of mathematical resilience on student engagement, controlling for study habits; indirect effect of mathematical resilience on student engagement through study habits; and total effect of mathematical resilience on student engagement.

1.2 Hypotheses

The following hypotheses were tested at a 0.05 level of significance.

Ho1: Social influence, mathematical resilience, and study habits do not have a significant correlation with student engagement.

Ho2: The direct effect of social influence on student engagement, controlling for study habits; indirect effect of social influence on student engagement through study habits; and total effect of social influence on student engagement, are not significant.

Ho3: The direct effect of mathematical resilience on student engagement, controlling for study habits; indirect effect of mathematical resilience on student engagement through study habits; and total effect of mathematical resilience on student engagement, are not significant.

2. Methodology

2.1 Research Design

This study employed predictive research design. It is a quantitative approach that aims to predict future outcomes or events by identifying patterns and relationships among variables using statistical or modeling techniques, rather than establishing causality. It is applied when researchers seek to forecast results or estimate the likelihood of outcomes based on existing data and theoretical variables, especially in studies focused on influence or prediction rather than explanation (Witteloostuijn et al., 2022). Its advantages include the ability to support decision-making, identify significant predictors, improve planning through forecasting, and provide objective, data-driven insights across various fields such as education, health, and business

(Dolatsara, 2023).

2.2 Locale of the Study

The study was conducted in a selected private schools located in Toril, Davao City. Toril, Davao City, provides a suitable setting for studying student engagement because its schools host learners with diverse backgrounds, allowing researchers to explore how students actively participate, interact, and involve themselves in learning activities.

2.3 Sample and Sampling Technique

The respondents of this study consisted of Senior High School students from a selected private school in Toril, Davao City, during the Academic Year 2025–2026. The total population comprised 1, 405 students. The sample consisted of 302 senior high school students from selected schools, with 173 students from one school and 129 students from another.

This study employed stratified random sampling. Stratified random sampling is a probability sampling technique in which a population is divided into homogeneous subgroups (strata), and participants are randomly selected from each stratum, often proportionally, to ensure representativeness and reduce sampling bias (Ahmed, 2024). This sampling method is applied when the population has distinct subgroups that could affect the variables being studied, allowing each subgroup to be properly represented in the sample (Giri, 2024). Its advantages include reducing sampling error, increasing the precision of estimates, and enhancing the generalizability and validity of the study's findings by capturing the diversity of the population (Adeoye, 2023).

2.4 Data Gathering Technique

This study employed survey technique in gathering data. This method is efficient and cost effective, allows researchers to reach a broad and diverse sample, ensures standardization and comparability of data, and supports anonymity that encourages honest responses, all of which enhance the reliability and generalizability of the findings (Kuphanga, 2024).

In this study, four adapted and modified survey questionnaires were employed, all of which used a four-point Likert scale. The social influence questionnaire was adapted from Walker and Walker (2022) and comprised 15 items assessing students perceived support from parents, peers, and teachers, with a Cronbach's alpha of 0.826. The mathematical resilience scale was adapted from Kooken et al. (2017) and included 23 items designed to evaluate students' ability to cope with challenges in mathematics, demonstrating a reliability of 0.866. The study habits questionnaire was adapted from Atsuwe and Moses (2017) and consisted of 23 items measuring students' study behaviors and routines, with a Cronbach's alpha of 0.905. Lastly, the student engagement was adapted from Kong (2003) and comprised of 21 items measured students' level of engagement in learning mathematics with a pilot-test reliability of 0.841.

2.5 Data Analysis Technique

Descriptive statistics summarize and organize data to provide an overview of patterns, central tendencies, and variability. In this study, this was done using mean and standard deviation (Bhandari, 2023). Correlation analysis examines the strength and direction of the linear relationship between two continuous variables, which was conducted using the Pearson Product Moment Correlation (r) (Turney, 2024). Mediation analysis investigates whether the effect of a predictor on an outcome is transmitted through a third variable (mediator), which estimates both direct and indirect effects without assuming normality of the sampling distribution (He et al., 2023). The Beta estimate statistical tool for the direct, indirect, and total effect of the

determinant was utilized.

2.5 Ethical Consideration

The study adhered to strict ethical standards in conducting research. Permission to conduct the study was obtained from the school principal, and parental consent forms along with informed assent were distributed for minor students, while informed consent was obtained directly from students of legal age to ensure voluntary participation and confidentiality of responses. The research instruments underwent validation and reliability testing, including the computation of Cronbach's alpha to ensure consistency. Additionally, the research proposal was reviewed and approved by the Society of Moral Integrity and Legal Ethics (SMILE) to ensure compliance with ethical and legal research principles.

3. Results and Discussions

3.1 Descriptive Analysis

Table 1. Descriptive Table

Shown in Table 1 are the descriptive statistical results of the study. Included in the table are the variables involved namely social influence, mathematical resilience, study habits, and students' engagement with their respective indicators. Also presented are the number of respondents, standard deviation, mean, and the descriptive level.

Variables	N	Standard Deviation	Mean	Descriptive Level
Social Influence	**302**	**.40**	**3.15**	**High**
Parent Norm Influence Factor		*.53*	*3.05*	High
Peer Norm Influence Factor		*.52*	*3.05*	High
Teacher Norm Influence Factor		*.51*	*3.35*	Very High
Mathematical Resilience	**302**	**.37**	**3.34**	**High**
Value		*.52*	*3.17*	High
Struggle		*.41*	*3.47*	Very High
Growth		*.38*	*3.39*	Very High
Study Habits	**302**	***.43***	***3.07***	**High**
Homework and Assignment		*.48*	*3.16*	High
Time Allocation		*.55*	*2.93*	High
Reading and Note Taking		*.55*	*3.05*	High
Teacher Consultation		*.51*	*3.13*	High
Students Engagement	**302**	***.39***	***3.16***	**High**
Cognitive Engagement		*.44*	*3.17*	High
Behavioral Engagement		*.48*	*3.23*	High
Affective Engagement		*.41*	*3.10*	High

Specifically, the social influence variable obtained a mean of 3.15, which is described as high. This indicates that social influence among students is strong. The standard deviation is 0.40, described as very low, indicating highly consistent responses. One of its indicators is described as very high, the rest are high. Moreover, the mathematical resilience variable obtained a mean of 3.34**,** which is described as high**,** suggesting that students' mathematical resilience is strong. The corresponding standard deviation of 0.37,

described as very low, indicates highly consistent responses. Two of its indicators are described as very high, while remaining one is high. Furthermore, the study habits variable obtained a mean of 3.07, which is described as high, suggesting that students' study habits are good. The corresponding standard deviation is 0.43, described as very low, indicating high consistent responses. All its indicators are described high. Finally, the students' engagement obtained a mean of 3.16, which is described as high. This signifies that students' engagement is good. The corresponding standard deviation of 0.39, described as very low, indicates highly consistent responses. All its indicators are described high.

All variables, the social influence, mathematical resilience, study habits, and students' engagement, are described as high, indicating generally strong levels. However, mathematical resilience and social influence show relatively stronger levels with some indicators rated very high, while study habits and students' engagement remain consistently high across all indicators.

3.2 Correlation Analysis

Table 2: Correlation Table

Table 2 is the correlational table. It shows the relationship between the predictive and criterion variables. Likewise, it contains the r-value, p-value, decision on null hypothesis, and its interpretation.
**. *Correlation is significant at the 0.05*

The table specifically showed that the correlation between social influence and student engagement

Variables	Student Engagement			
	r-value	p-value	Decision on *Ho*	Interpretation
Social Influence	.834	.000	Reject *Ho*	High positive significant correlation
Mathematical Resilience	.590	.000	Reject *Ho*	Moderate high positive significant correlation
Study Habits	.908	.000	Reject *Ho*	High positive significant correlation

obtained a p-value of 0.000, which is less than the 0.05 level of significance. Hence, the null hypothesis was rejected. It denotes that the correlation of these variables is significant. The corresponding r-value of 0.834 indicates that the correlation is positive high. This implies that as social influence increases, student engagement tends to increase. Meanwhile, the correlation between mathematical resilience and student engagement obtained a p-value of 0.000, which is less than the 0.05 level of significance. Thus, the null hypothesis was rejected. It denotes that the correlation is significant. The corresponding r-value 0.590, described the correlation as moderately high. This implies that as mathematical resilience increases, student engagement tends to increase as well. Furthermore, the correlation between study habits and student engagement obtained a p-value of 0.000, which is less 0.05 level of significance. Thus, the null hypothesis was rejected. It indicates that the correlation between variables is significant. With a corresponding r-value of 0.908, high positive correlation was suggested. This implies that as study habits increases, student engagement tends to increase.

All variables show significant positive relationships with students' engagement, indicating that increases in these factors are associated with higher engagement. In comparison, study habits demonstrate the strongest relationship with engagement, followed by social influence, while mathematical resilience shows a

comparatively weaker but still meaningful association.

3.3 Mediation Analysis (N=302)

Table 3. Mediation Table (N=302)

Table 3 presents the mediation analysis. Likewise, it contains Beta estimate, standard error, Z-value, p-value, decision on null hypothesis, and its interpretation.

Label	Path / Effect	Estimate (β)	SE	Z-value	p-value	Decision on H_0	Interpretation
a	Social Influence → Study Habits	0.73	0.05	14.5	0.000	Reject H_0	Significant
b	Study Habits → Student Engagement	0.58	0.02	24.5	0.000	Reject H_0	Significant
c'	Social Influence → Student Engagement	0.40	0.03	15.6	0.000	Reject H_0	Significant
a × b	Indirect Effect (Mediation)	0.42	0.04	11.6	0.000	Reject H_0	Significant
(a x b)+c	Total Effect	0.82	0.04	22.1	0.000	Reject H_0	Significant

Level of Significance: 0.05
Decision Rule: Reject H_0 if $p < 0.05$
Mediated Proportion: 0.51

Specifically, the table shows that the direct effect of social influence on student engagement obtained an estimated Beta of 0.40. Its corresponding p-value of 0.000 is less than the 0.05 level of significance. Hence, the null hypothesis was rejected. This indicates that the direct effect of social influence on student engagement, controlling for study habits, is moderate and significant. Moreover, the indirect effect of social influence on student engagement through study habits obtained an estimate Beta of 0.42. Its corresponding p-value of 0.000 is less than 0.05 level of significant. Thus, the null hypothesis was rejected. It means that the indirect of social influence on the criterion through the mediator is moderate and significant. Moreover, the total effect obtained an estimated Beta of 0.82. Its corresponding p-value of 0.000 is less than the 0.05 level of significance. Thus, the null hypothesis was rejected, indicating that the total effect is strong and significant. The mediated proportion obtained which is 0.51 indicates that the strength of the mediation is strong.

Both the direct and indirect effects of social influence on student engagement are significant, indicating that social influence influences engagement both independently and through study habits. It indicates that though the strength of the mediation is strong, its effect is partial.

3.4 Mediation Analysis (N=302)

Table 4. Mediation Table (N=302)

Table 4 presents the mediation analysis examining the role of study habits in the relationship between mathematical resilience and student engagement. Likewise, it contains Beta estimate, standard error, Z-value, p-value, decision on null hypothesis, and its interpretation.

Label	Path / Effect	Estimate (β)	SE	Z-value	p-value	Decision on H_0	Interpretation
a	Mathematical Resilience → Study Habits	0.59	0.06	10.18	0.000	Reject H_0	Significant
b	Study Habits → Student Engagement	0.75	0.03	25.98	0.000	Reject H_0	Significant
c'	Mathematical Resilience → Student Engagement	0.17	0.03	5.01	0.000	Reject H_0	Significant
a × b	Indirect Effect (Mediation)	0.45	0.05	9.76	0.000	Reject H_0	Significant
(a x b)+c	Total Effect	0.62	0.05	11.67	0.000	Reject H_0	Significant

Level of Significance: 0.05
Decision Rule: Reject H_0 if $p < 0.05$
Mediated Proportion: 0.73

The direct effect of mathematical resilience on student engagement obtained an estimated Beta of 0.17. Its corresponding p-value of 0.000 is less than the 0.05 level of significance. Hence, the null hypothesis was rejected. This indicates that the direct effect of mathematical resilience on student engagement, controlling for study habits, is weak but significant. Moreover, the indirect effect of higher mathematical resilience on student engagement through study habits obtained an estimated Beta of 0.45. Its corresponding p-value of 0.000 is less than the 0.05 level of significance. Thus, the null hypothesis was rejected. This means that the indirect effect of mathematical resilience on student engagement through the mediator is moderate and significant. Moreover, the total effect obtained an estimated Beta of 0.62. Its corresponding p-value of 0.00 is less than the 0.05 level of significance. Thus, the null hypothesis was rejected, indicating that the total effect is strong and significant. The mediated proportion obtained which is 0.73 indicates that the strength of the mediation is strong.

Both the direct and indirect effects of mathematical resilience on student engagement are significant, although the direct effect is weaker compared to the indirect pathway. It indicates that though the strength of the mediation is strong, its effect is partial.

3.5 Social Influence and Student Engagement Correlation

The finding that social influence has a significantly positive correlation with student engagement affirms Guzman (2023), who found a highly significant positive correlation between social influence and students' engagement, highlighting the importance of teacher, peer, and parental support. Likewise, the current finding is consistent with Xia et al. (2025), who emphasized that social support significantly promotes learning engagement through positive interactions.

On the contrary, the current finding contradicts Zhang & Kim (2025), who reported that although social influence is positively related to engagement, its overall effect tends to be weak, suggesting that other factors also shape student engagement.

3.6 Mathematical Resilience and Student Engagement Correlation

The current finding that mathematical resilience has a significantly moderately high correlation with student engagement is in line with previous study of Digamo and Abuzo (2024) as well as Liu (2024), which demonstrate that mathematical resilience is moderately positively associated with students' engagement, highlighting its role in fostering confidence, persistence, and effective learning strategies. However, the current finding contradicts the study conducted by Xenofontos and Mouroutsou (2022), which indicated that evidence on mathematical resilience remains inconsistent, suggesting that its influence on students' engagement may vary depending on contextual and other contributing factors.

3.7 Study Habits and Student Engagement Correlation

The current finding shows that study habits have a significantly high positive correlation with students' engagement, suggesting that consistent and effective study strategies enhance students' active participation in learning. This current finding affirms the study of Grande and Edig (2024), who found that students who practice organized study routines tend to exhibit higher levels of engagement and academic involvement. Moreover, the current finding supports the study of Thiel and Hanssen (2025), which found a significant relationship between study habits and students' engagement, showing that students who use consistent and effective study strategies are more likely to participate actively in learning. However, this current finding contradicts Paynandos and Doronio (2025), who reported an insignificant relationship between study habits and student engagement.

3.8 Social Influence and Student Engagement as Mediated by Study Habits

The finding indicates that the effect of social influence on students' engagement through study habits is significant, highlighting the importance of developing effective study habits to enhance engagement and academic achievement. The current finding supports the study of Ali and Das (2025), who show that social factors, such as support from teachers, peers, and parents, influence students' engagement indirectly by shaping their study behaviors. Moreover, the current finding affirms the study of Rautanen et al. (2022), which emphasizes that students' study habits can strengthen this relationship, as consistent and effective study practices enable learners to fully utilize available social support, thereby maximizing their engagement and motivation in academic tasks. In contrast, the current finding contradicts Zheng et al. (2023), who reported that study habits did not significantly mediate the relationship between social support and student engagement, indicating that social influence alone was insufficient to directly translate into engagement through study behaviors.

3.9 Mathematical Resilience and Student Engagement as Mediated by Study Habits

The finding indicates that mathematical resilience enhances students' engagement indirectly through study habits. The current finding supports study of Fatimah et al. (2025), who show that learners with higher mathematical resilience are more likely to adopt structured and strategic study behaviors, which translate resilience into active participation and improved academic outcomes. Furthermore, the current finding also affirms the study of Maarif and Fitriani (2023), who emphasizes that study habits act as a mechanism through which mathematical resilience supports students' motivation and engagement in mathematics learning. In contrast, the current finding contradicts Namalata (2024), who found that study skills did not significantly mediate the relationship between behavioral characteristics such as resilience and student engagement, indicating that in some contexts, resilience alone does not translate into higher engagement through study behaviors.

4. Conclusion

Based on the findings, study habits partially but significantly mediate the correlation between social influence and mathematical resilience, and the student engagement respectively. The mediating effect is stronger on the correlation between mathematical resilience and student engagement. These results affirmed the Theory of Planned Behavior, which holds that behavior is guided by intentions shaped by attitudes, subjective norms, and perceived behavioral control.

5. Recommendations

1. Further research may explore similar studies investigating other variables as mediators and including all the factors of the Theory of Planned Behavior.
2. Qualitative research designs may also be undertaken to uncover other factors or subthemes that may influence student engagement, which could serve as additional variables for future quantitative studies.
3. Educational Leaders may implement educational programs or workshops to emphasize the importance of developing effective study habits, which may enhance the link between social influence and mathematical resilience with student engagement.

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