



Emotional Intelligence as a Predictor of Improving Mathematics Performance Through Anxiety and Motivation Management

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ABSTRACT

Objective: This study aims to analyze the influence of emotional intelligence on students' mathematics performance, focusing on the mediating roles of anxiety management and learning motivation. **Method:** A quantitative survey method was employed with 172 purposively selected vocational high school students. Research instruments were validated and tested for reliability, and data were analyzed using path analysis with SPSS 22. **Results:** The findings reveal that emotional intelligence does not significantly affect mathematics performance directly but has a significant indirect effect through anxiety management and learning motivation. Learning motivation emerged as the most dominant mediator, and the path model explained 74.3% of the variance in mathematics performance. **Novelty:** This study advances Indonesian vocational school literature by introducing a path model that explains emotional intelligence as an indirect predictor of mathematics performance through anxiety management and learning motivation. Unlike previous SMK studies that focused on direct effects using simple regression, this research provides a process-oriented explanation by simultaneously modeling multiple mediators, offering a clearer understanding of how emotional and motivational factors shape mathematics achievement.

INTRODUCTION

Mathematics performance is an important indicator of students' academic quality because it reflects logical thinking, analytical ability, and problem-solving skills, which are essential in the era of globalization and digitalization. However, empirical evidence shows that many students in Indonesia still struggle to achieve optimal mathematics learning outcomes. This condition is not only related to cognitive abilities but is also strongly influenced by students' affective and psychological conditions, which play a significant role in shaping learning processes and academic performance.

One of the main obstacles frequently encountered in mathematics learning is math anxiety, a psychological condition characterized by feelings of fear, tension, or discomfort when individuals engage with mathematical tasks. Math anxiety can reduce concentration, disrupt cognitive processes, and ultimately impair academic performance. Ashcraft (2002) and Ramirez and Beilock (2011) explain that math anxiety can trigger negative emotional responses that interfere with students' ability to process mathematical information effectively. Earlier research by Hembree (1990) also identified math anxiety as one of the major contributors to low achievement in mathematics.

In addition to anxiety, learning motivation plays a crucial role in determining students' academic success. Motivation functions as an internal drive that directs the intensity, persistence, and direction of students' learning behavior. Students with strong motivation tend to demonstrate greater persistence in solving problems and are more willing to engage in challenging learning tasks. Pintrich and De Groot (1990) emphasize that motivational and self-regulatory components are fundamental determinants of students' success in achieving academic goals.

These affective challenges become even more pronounced in vocational high schools (Sekolah Menengah Kejuruan/SMK) in Indonesia, where students face dual academic and vocational demands. In addition to mastering theoretical subjects such as mathematics, SMK students must also develop practical competencies aligned with specific industries such as engineering, accounting, hospitality, or information technology. In this context, mathematics is often perceived as abstract and less directly related to vocational practice, which may increase anxiety and reduce learning motivation. The combination of academic pressure, time constraints, and vocational performance expectations makes SMK students particularly vulnerable to affective barriers in mathematics learning, highlighting the importance of psychological approaches that support emotional regulation and motivation.

Within this framework, emotional intelligence (EI) has gained increasing attention as an important psychological resource that supports students' academic adaptation and achievement. Goleman (1995) defines emotional intelligence as the ability to recognize, understand, and effectively manage one's own emotions and those of others. Students with higher emotional intelligence are better able to regulate stress, cope with academic challenges, and maintain consistent motivation in learning activities. Mayer and Salovey (1997) and Zeidner et al. (2008) further emphasize that emotional intelligence provides an essential foundation for adaptability and resilience in demanding learning environments.

Empirical studies have consistently demonstrated the relevance of emotional intelligence for academic outcomes. A meta-analysis conducted by MacCann et al. (2020) found that emotional intelligence positively contributes to overall academic performance, particularly when measured using ability-based assessments. In the Indonesian context, Aljura et al. (2022) reported that emotional intelligence has a moderate influence on students' mathematics learning outcomes, while Malasari and Awofala (2021) found a strong relationship between emotional intelligence and mathematical problem-solving ability. These findings suggest that emotional regulation plays an important role in supporting effective mathematical reasoning and performance.

Despite the growing body of evidence, previous studies have generally examined the relationship between emotional intelligence and mathematics achievement using direct and linear models. Limited attention has been given to the psychological mechanisms through which emotional intelligence influences academic performance, particularly the mediating roles of math anxiety and learning motivation. Consequently, the processes through which emotional intelligence contributes to improved mathematics performance remain insufficiently understood, especially in vocational education contexts where emotional and motivational demands are more complex. Although Živković et al. (2023) highlighted the importance of emotional and motivational variables in mathematics learning, emotional intelligence has rarely been positioned as a central predictor within a comprehensive mediation model.

Building on previous findings, this study extends the work of MacCann et al. (2020), Suren and Kandemir (2020), Lichtenfeld et al. (2023), and Maghfiroh et al. (2024) by simultaneously modeling math anxiety and learning motivation as mediating variables using path analysis. This approach enables a deeper and more process-oriented understanding of how emotional intelligence influences mathematics performance. Such a comprehensive model has rarely been applied in the Indonesian educational context,

particularly at the vocational secondary education level, which remains relatively underrepresented in empirical research.

Based on this background, a clear research gap exists in understanding how emotional intelligence influences students' mathematics performance through indirect psychological pathways. To address this gap, the present study proposes an integrative model that positions emotional intelligence as a predictor of mathematics performance through two key mediating mechanisms: the reduction of math anxiety and the enhancement of learning motivation.

This research contributes theoretically by providing a mechanism-based explanation of mathematics achievement, and practically by offering insights for educational interventions aimed at strengthening students' emotional intelligence to regulate anxiety and sustain motivation. Such interventions are particularly relevant for vocational students who must cope with both academic and industry-oriented performance demands.

Accordingly, this study addresses the following research questions:

1. How does emotional intelligence influence students' mathematics performance through the mediating roles of math anxiety and learning motivation?
2. How can a structural model describing the relationships among emotional intelligence, anxiety, learning motivation, and mathematics performance be constructed to improve understanding of mathematics achievement in vocational education?

In line with these questions, the objectives of this study are to analyze the influence of emotional intelligence on mathematics performance by considering the mediating effects of anxiety and learning motivation and to construct and validate a comprehensive model explaining the psychological mechanisms that shape mathematics achievement among vocational high school students in Indonesia.

Through this approach, the study is expected to provide deeper insights into the interaction between psychological and academic factors as part of broader efforts to improve the quality of mathematics learning.

RESEARCH METHOD

Research Design

This study employed a quantitative approach using an explanatory survey design to examine the direct and indirect effects of emotional intelligence on students' mathematics performance, mediated by mathematics anxiety and learning motivation. This design was selected because it allows the identification of causal relationships among variables through path analysis using SPSS version 22.

Subjects, Population, Sample, and Research Location

The research subjects were students of Vocational High School at SMK Pasundan 1 Cianjur, Cianjur Regency, Class XII, Academic Year 2024–2025, who had completed core mathematics topics, including arithmetic, algebra, and geometry.

The population consisted of approximately 300 students. Sampling was conducted using a purposive sampling technique based on the following criteria: (1). Enrolled as Class XII students; (2). Actively participating in mathematics learning during the past academic year; and (3). Willing to participate as research respondents. The sample size

was determined using the Slovin formula at a 95% confidence level and a 5% margin of error (Santoso, 2023), as follows:

Formula:

$$n = \frac{N}{1+N(e)^2}$$

with:

$N = 300$,

$e = 0,05$

Thus, the calculated sample size was:

$$n = \frac{300}{1+300(0,05)^2} = \frac{300}{1+0,75} = \frac{300}{1,75} = 172$$

A total of 172 students were invited and completed the survey and test. This number has been consistently used in the methodology, analysis, and results sections, and the abstract has been revised accordingly to reflect the correct sample size.

Research Instruments

The research instruments used in this study were as follows:

1. Emotional Intelligence Questionnaire (X)
Consisted of 15 Likert-scale items (1-5) adapted from the Mayer-Salovey (1997) ability-based emotional intelligence model, covering emotional perception, understanding, and regulation.
2. Mathematics Anxiety Questionnaire (Y1)
Included 15 items adapted from Ashcraft and Krause (2007), measuring emotional, cognitive, and physiological anxiety responses during mathematics learning and testing.
3. Learning Motivation Questionnaire (Y2)
Comprised 15 items adapted from Pintrich and De Groot (1990), measuring intrinsic motivation, task value, self-efficacy, and learning persistence.
4. Mathematics Performance Test (Z)
The mathematics performance instrument consisted of 25 essay questions designed to measure students' conceptual understanding and problem-solving ability based on the Grade XII vocational high school curriculum. The questions covered three main content domains: (a) arithmetic operations and applied problem-solving, (b) algebraic manipulation and equation modeling, and (c) geometric reasoning and spatial problem-solving. Each essay item required students to show step-by-step reasoning and was scored using a standardized rubric to ensure consistency and objectivity in evaluation.

Instrument validity was assessed through expert judgment and Confirmatory Factor Analysis (CFA). Reliability was tested using Cronbach's Alpha ($\alpha \geq 0.70$) in SPSS 22, indicating acceptable internal consistency for all instruments.

Data collection technique

Data were collected using two complementary methods:

1. Online questionnaires were administered through Google Forms to efficiently collect responses and facilitate data tabulation.
2. Offline mathematics tests were conducted in the classroom under the supervision of the researchers and mathematics teachers to ensure the integrity and consistency of the testing process.

Prior to statistical analysis, the collected data were screened to identify and address potential issues, including missing values and outliers, in order to ensure the accuracy and reliability of the dataset.

Data Analysis Techniques

Data were analyzed using SPSS version 22 with a path analysis approach to examine both direct and indirect relationships among variables. Path analysis, as an extension of multiple linear regression, was used to test the theoretically formulated causal model involving independent variables, mediators, and dependent variables.

The analysis proceeded in several stages. First, descriptive statistics (mean, standard deviation, minimum, and maximum values) were calculated. Second, classical assumption tests were conducted, including normality (Kolmogorov–Smirnov test), multicollinearity (Tolerance > 0.10; VIF < 10), and heteroscedasticity (Glejser test), following Hair, Babin, and Anderson (2019).

Subsequently, path analysis was conducted through a series of regression tests: (1) emotional intelligence (X) → mathematics anxiety (Y1) and learning motivation (Y2); (2) mathematics anxiety (Y1) and learning motivation (Y2) → mathematics performance (Z); and (3) emotional intelligence (X) → mathematics performance (Z).

Indirect effects were calculated as the product of the path coefficients ($a \times b$), while total effects were obtained by summing direct and indirect effects. This approach allowed for a clear separation between direct and mediated influences.

The results of this analysis were used to test the proposed structural hypotheses and to evaluate the mediating roles of anxiety and motivation in the relationship between emotional intelligence and students' mathematics performance.

RESULTS AND DISCUSSION

Descriptive Statistical Analysis

Table 1. Descriptive Statistics of Research Variables (N = ...)

	Range	Min	Max	Sum	Mean		Std. Deviation	Variance
					Statistic	Std. Error		
Emotional Intelligence	58.00	16.00	74.00	8510.00	49.4767	1.09110	14.30963	204.766
Anxiety Management	58.00	15.00	73.00	8435.00	49.0407	1.09486	14.35896	206.180
Motivation	60.00	15.00	75.00	8854.00	51.4767	1.18198	15.50154	240.298
Mathematics Performance	60.00	15.00	75.00	8441.00	49.0756	1.01505	13.31227	177.216
Valid N (listwise)								

*Source: Output of SPSS 22 (2025)

Interpretation of Descriptive Statistics

Interpretation of Descriptive Statistics The descriptive analysis indicates that emotional intelligence, anxiety management, learning motivation, and mathematics performance among vocational high school students are generally at moderate levels, with relatively wide score distributions across variables. This pattern suggests considerable variability in students' emotional and motivational profiles, supporting the need for further structural analysis."

Emotional Intelligence (X)

The mean score of emotional intelligence was 49.48 (SD = 14.31), indicating a moderate level of emotional competence among students. The large standard deviation reflects considerable differences in students' abilities to perceive, understand, and regulate emotions. This variability suggests that emotional regulation skills are not uniformly developed among vocational students, which may influence how they respond to academic pressures, particularly in mathematics learning contexts.

Anxiety Management (Y1)

Anxiety management also showed a moderate mean score (M = 49.04, SD = 14.36), with a wide range of values. This indicates that while some students are able to manage mathematics-related anxiety effectively, others experience significant difficulties in regulating emotional responses during learning and testing situations. Such variation supports the role of anxiety management as a potential mediating mechanism between emotional intelligence and academic performance.

Learning Motivation (Y2)

Learning motivation recorded the highest mean score (M = 51.48, SD = 15.50), indicating that most students possess moderate to high motivation toward learning mathematics. However, the relatively large variance suggests unequal motivational strength among students, which may explain differences in persistence, engagement, and effort in solving mathematical problems.

Mathematics Performance (Z)

Mathematics performance had a mean score of 49.08 (SD = 13.31), reflecting moderate achievement levels with notable variation across students. This distribution suggests that affective and motivational differences may contribute to performance disparities beyond cognitive ability alone.

Link to Path Analysis Findings

The observed variability across emotional intelligence, anxiety management, and learning motivation provides empirical justification for the use of path analysis in this study. The results of the structural analysis confirm this descriptive pattern: although emotional intelligence does not have a statistically significant direct effect on mathematics performance ($p = 0.312$), its indirect effect through anxiety management and learning motivation is substantial. This indicates that emotional intelligence influences performance primarily by improving students' emotional regulation and motivation, rather than acting as a direct predictor of achievement. These findings strengthen the argument that emotional intelligence functions as a regulatory resource, shaping mathematics performance through psychological pathways rather than direct cognitive mechanisms. Consequently, interventions aimed at improving mathematics achievement among vocational high school students should focus on strengthening emotional regulation and learning motivation alongside cognitive instruction.

Analysis of Research Instrument Tests

Variable X

Table 2. Results of the Validity Test of the Emotional Intelligence Variable (X)

Statement	R count	R table	Status	Information
X1	0,715	0,149	>	Valid

Statement	R count	R table	Status	Information
X2	0,670	0,149	>	Valid
X3	0,772	0,149	>	Valid
X4	0,617	0,149	>	Valid
X5	0,666	0,149	>	Valid
X6	0,772	0,149	>	Valid
X7	0,796	0,149	>	Valid
X8	0,740	0,149	>	Valid
X9	0,791	0,149	>	Valid
X10	0,811	0,149	>	Valid
X11	0,814	0,149	>	Valid
X12	0,681	0,149	>	Valid
X13	0,829	0,149	>	Valid
X14	0,771	0,149	>	Valid
X15	0,821	0,149	>	Valid

Source: processed by researchers (2025)

Variable Y1

Table 3. Results of the Validity Test of the Anxiety Management Variable (Y1)

Statement	R count	R table	Status	Information
Y11	0,808	0,149	>	Valid
Y12	0,832	0,149	>	Valid
Y13	0,755	0,149	>	Valid
Y14	0,734	0,149	>	Valid
Y15	0,656	0,149	>	Valid
Y16	0,568	0,149	>	Valid
Y17	0,851	0,149	>	Valid
Y18	0,830	0,149	>	Valid
Y19	0,837	0,149	>	Valid
Y110	0,822	0,149	>	Valid
Y111	0,824	0,149	>	Valid
Y112	0,823	0,149	>	Valid
Y113	0,822	0,149	>	Valid
Y114	0769	0,149	>	Valid
Y115	0,721	0,149	>	Valid

Source: processed by researchers (2025)

Variable Y2

Table 4. Results of the Validity Test of the Motivation Variable (Y2)

Statement	R count	R table	Status	Information
Y21	0,832	0,149	>	Valid
Y22	0,856	0,149	>	Valid
Y23	0,745	0,149	>	Valid
Y24	0,741	0,149	>	Valid
Y25	0,849	0,149	>	Valid
Y26	0,812	0,149	>	Valid
Y27	0,843	0,149	>	Valid
Y28	0,786	0,149	>	Valid
Y29	0,616	0,149	>	Valid
Y210	0,788	0,149	>	Valid
Y211	0,826	0,149	>	Valid
Y212	0,736	0,149	>	Valid
Y213	0,654	0,149	>	Valid
Y214	0,785	0,149	>	Valid
Y215	0,839	0,149	>	Valid

Source: processed by researchers (2025)

Variable Z

Table 5. Results of the Validity Test of the Mathematics Performance Variable (Z)

Statement	R count	R table	Status	Information
Z1	0,771	0,149	>	Valid
Z2	0,776	0,149	>	Valid
Z3	0,788	0,149	>	Valid
Z4	0,726	0,149	>	Valid
Z5	0,761	0,149	>	Valid
Z6	0,759	0,149	>	Valid
Z7	0,747	0,149	>	Valid
Z8	0,747	0,149	>	Valid
Z9	0,721	0,149	>	Valid
Z10	0,766	0,149	>	Valid
Z11	0,767	0,149	>	Valid
Z12	0,772	0,149	>	Valid
Z13	0,656	0,149	>	Valid
Z14	0,810	0,149	>	Valid
Z15	0,752	0,149	>	Valid

Source: processed by researchers (2025)

Validity and reliability tests were conducted to ensure that the instruments used in this study were able to measure the constructs accurately and consistently. Based on the results of the validity test for each variable, all statement items in the Emotional Intelligence (X), Anxiety Management (Y1), Motivation (Y2), and Mathematics Performance (Z) variables showed a calculated r value greater than the table r (0.149). For the Emotional Intelligence variable, the calculated r value ranged from 0.617 to 0.829. For the Anxiety Management variable, the calculated r value was between 0.568 to 0.851. The Motivation variable had a calculated r value between 0.616 to 0.856, while the Mathematics Performance variable showed a calculated r value from 0.656 to 0.810. All of these values far exceeded the established threshold, so it can be concluded that all instrument items were declared valid and suitable for use in research.

Furthermore, the reliability test results showed that all four variables had Cronbach's Alpha values above 0.90. The Emotional Intelligence variable obtained a value of 0.944, Anxiety Management 0.952, Motivation 0.955, and Mathematics Performance 0.946. Based on the interpretation, the reliability of these values indicates a very high level of reliability. This indicates that each instrument has strong internal consistency, making it reliable for repeatedly measuring the variables studied in similar contexts.

Thus, it can be concluded that the research instrument used has met the requirements of good validity and reliability. High validity indicates that each item accurately measures the intended construct dimension, while high reliability indicates that the instrument is capable of producing consistent results. Therefore, the data obtained from this instrument can be used for further analysis in research, such as regression testing or path analysis, to empirically test the causal relationships between variables.

Classical Assumption Test Analysis

Normality

X against Y1:

Table 6. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		172
Normal Parameters ^{a,b}	Mean	.0000000
	Std.	5.38944971
	Deviation	
Most Extreme Differences	Absolute	.139
	Positive	.139
	Negative	-.049
Test Statistic		.139
Asymp. Sig. (2-tailed)		.000 ^c

Source: Output of SPSS 22 (2025)

X against Y2:

Table 7. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		172
Normal Parameters ^{a,b}	Mean	.0000000
	Std.	5.07691596
	Deviation	
Most Extreme Differences	Absolute	.107
	Positive	.107
	Negative	-.054
Test Statistic		.107
Asymp. Sig. (2-tailed)		.000 ^c

Source: Output of SPSS 22 (2025)

X against Z:

Table 8. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		172
Normal Parameters ^{a,b}	Mean	.0000000
	Std.	6.40301138
	Deviation	
Most Extreme Differences	Absolute	.076
	Positive	.076
	Negative	-.039
Test Statistic		.076
Asymp. Sig. (2-tailed)		.017 ^c

Source: Output of SPSS 22 (2025)

X, Y1, Y2 against Z:

Table 9. One-Sample Kolmogorov-Smirnov Test

		Unstandardized Residual
N		172
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	5.34419509
Most Extreme Differences	Absolute	.087
	Positive	.087
	Negative	-.049
Test Statistic		.087
Asymp. Sig. (2-tailed)		.003 ^c

Source: Output of SPSS 22 (2025)

Normality tests were performed using the Kolmogorov-Smirnov method (K-S Test) on unstandardized residuals.

Model	Asymp. Sig. (2-tailed)
X → Y1	0,000
X → Y2	0,000
X → Z	0,017
X, Y1, Y2 → Z	0,003

Because all significance values are below 0.05, statistically, the residuals are not normally distributed. However, in a study with a large sample size (N=172), deviations from normality are tolerable.

Multicollinearity

X against Y1:

Table 10. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	2.660	1.621		1.642	.103		
Emotional Intelligence	.932	.040	.870	23.040	.000	1.000	1.000

Source: Output of SPSS 22 (2025)

X against Y2:

Table 11. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	3.030	1.527		1.985	.049		
Emotional Intelligence	.917	.038	.879	24.065	.000	1.000	1.000

Source: Output of SPSS 22 (2025)

X against Z:

Table 12. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	9.021	1.925		4.685	.000		
Emotional Intelligence	.820	.048	.795	17.068	.000	1.000	1.000

Source: Output of SPSS 22 (2025)

X, Y1, Y2 against Z:

Table 13. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		Collinearity Statistics		
	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1 (Constant)	6.710	1.640		4.091	.000		
Emotional Intelligence	.100	.098	.096	1.015	.312	.169	5.904
Anxiety Management	.169	.081	.175	2.085	.039	.216	4.633
Motivation	.614	.086	.621	7.133	.000	.202	4.952

Source: Output of SPSS 22 (2025)

Multicollinearity is analyzed through the Tolerance and Variance Inflation Factor (VIF) values:

Predictor	Tolerance	VIF
Emotional Intelligence	≥ 0,169	≤5,904
Anxiety Management	0,216	4,633
Motivation	0,202	4,952

All Tolerance values are > 0.1 and VIF < 10, indicating no multicollinearity between the independent variables. This indicates that each independent variable does not influence each other in an extreme linear manner, so the regression results can be interpreted independently.

Heteroscedasticity

X, Y1, Y2 against Z:

Table 14. Coefficients^a

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1 (Constant)	6.710	1.640			4.091	.000
Emotional Intelligence	.100	.098	.096		1.015	.312
Anxiety Management	.169	.081	.175		2.085	.098
Motivation	.614	.086	.621		7.133	.077

Source: Output of SPSS 22 (2025)

This test is carried out by looking at the significance value (Sig.) of the regression results of the independent variable against the residual, with the model:

X → Y1: Sig. = 0,071

X → Y2: Sig. = 0,066

X → Z: Sig. = 0,075

X, Y1, Y2 → Z:

X: Sig. = 0,312

Y1: Sig. = 0,098

Y2: Sig. = 0,077

Because the significance value is > 0.05, then in all regression models, there are no symptoms of heteroscedasticity.

1. Correlation Analysis, Linear Regression, and Path Analysis

Correlation analysis

Table 15. Correlations

		Kecerdasan Emosional	Pengelolaan Kecemasan	Motivasi	Kinerja Matematika
Emotional Intelligence	Pearson Correlation	1	.870**	.879**	.795**
	Sig. (2-tailed)		.000	.000	.000
	N	172	172	172	172
Anxiety Management	Pearson Correlation	.870**	1	.843**	.782**
	Sig. (2-tailed)	.000		.000	.000
	N	172	172	172	172
Motivation	Pearson Correlation	.879**	.843**	1	.853**
	Sig. (2-tailed)	.000	.000		.000
	N	172	172	172	172

		Kecerdasan Emosional	Pengelolaan Kecemasan	Motivasi	Kinerja Matematika
Mathematics Performance	Pearson Correlation	.795**	.782**	.853**	1
	Sig. (2-tailed)	.000	.000	.000	
	N	172	172	172	172

Source: Output of SPSS 22 (2025)

X, Y1, Y2 against Z:

Table 16. Model Summary

Model	R	Adjusted R	Std. Error of the Estimate
1	.862 ^a	.743	5.39170

Source: Output of SPSS 22 (2025)

Table 17. ANOVA^a

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	14141.099	3	4713.700	162.148	.000 ^b
Residual	4883.832	168	29.070		
Total	19024.931	171			

Source: Output of SPSS 22 (2025)

The results of the correlation test indicate that there is a very strong and significant relationship between the variables in this study. Emotional intelligence has a very strong positive correlation with anxiety management ($r = 0.870$), motivation ($r = 0.879$), and mathematics performance ($r = 0.795$), all of which are significant at the 1% level ($p < 0.01$). Similarly, anxiety management is significantly correlated with motivation ($r = 0.843$) and mathematics performance ($r = 0.782$), while motivation also shows a very strong correlation with mathematics performance ($r = 0.853$). These results confirm that the higher the emotional intelligence, the better the students' anxiety management and motivation, which ultimately has a positive impact on improving mathematics performance.

A simple linear regression analysis confirmed the correlation findings. The relationship between emotional intelligence and anxiety management yielded a coefficient of determination (R^2) of 0.757, with a regression coefficient of 0.932 ($p = 0.000$), indicating that 75.7% of the variation in anxiety management can be explained by emotional intelligence.

Meanwhile, the regression between emotional intelligence and motivation produced an R^2 of 0.773, with a regression coefficient of 0.917 ($p = 0.000$), meaning that emotional intelligence explains 77.3% of the variation in student motivation. The relationship between emotional intelligence and mathematics performance showed an R^2 of 0.631 and a regression coefficient of 0.820 ($p = 0.000$), indicating a strong direct influence of emotional intelligence on mathematics performance.

Furthermore, the results of the path analysis involving three predictors, emotional intelligence, anxiety management, and motivation, on mathematics performance showed an R^2 of 0.743. This means that 74.3% of the variation in mathematics performance can be explained simultaneously by these three variables. However, in this multiple regression model, the direct effect of emotional intelligence on mathematics performance was insignificant ($\beta = 0.100$; $p = 0.312$). In contrast, anxiety management and motivation still showed significant effects with $\beta = 0.169$ ($p = 0.039$) and $\beta = 0.614$ ($p = 0.000$), respectively.

This condition indicates that the effect of emotional intelligence on mathematics performance occurs indirectly, through the mediation of anxiety management and motivation.

Thus, it can be concluded that emotional intelligence is a crucial factor that not only directly influences math performance but also plays a significant role by improving students' ability to manage anxiety and maintain learning motivation. These findings have important implications for education, particularly in designing programs to strengthen emotional and motivational soft skills to support improved student academic achievement.

Discussion

The discussion highlights learning motivation as the dominant mediator, which represents an important implication for instructional design in vocational high schools (SMK). The findings of this study indicate that emotional intelligence, anxiety management, learning motivation, and mathematics performance among vocational students are generally at moderate levels, with considerable variability across individuals. This variation reflects meaningful differences in students' emotional and affective capacities, which play an important role in shaping their learning experiences in mathematics. The wide distribution of scores suggests that students differ substantially in their ability to regulate emotions, manage anxiety, and sustain motivation, emphasizing the importance of examining affective mechanisms rather than relying solely on cognitive explanations of academic performance.

The results of the path analysis show that emotional intelligence does not directly predict mathematics performance when mediating variables are included in the model. Instead, its influence occurs indirectly through anxiety management and, more prominently, learning motivation. This finding suggests that emotional intelligence functions primarily as a regulatory resource that enhances students' emotional readiness and motivational persistence, which ultimately influence their academic outcomes. The dominance of learning motivation as a mediator indicates that students with higher emotional intelligence are more capable of maintaining engagement, sustaining effort, and persisting in solving mathematical problems, even when facing difficulties.

These findings are particularly meaningful in the context of vocational high schools (SMK). Unlike students in general academic tracks, SMK students must balance academic learning with vocational competencies that are closely linked to practical and industry-oriented skills. In this context, mathematics is often perceived as abstract and less directly related to vocational practice, which may increase anxiety and reduce intrinsic engagement. Consequently, vocational students tend to rely more heavily on emotional regulation and motivational resilience to succeed in mathematics learning. This explains why anxiety management and learning motivation function as critical pathways linking emotional intelligence to academic performance in this educational setting.

When compared with previous studies, the findings of this research offer important distinctions. Earlier studies in Indonesia often reported direct relationships between emotional intelligence, motivation, and academic performance using simple regression models. In contrast, the present study demonstrates that the influence of emotional intelligence on mathematics achievement operates primarily through indirect psychological mechanisms. This finding aligns with international studies emphasizing process-oriented explanations of learning but extends the literature by providing



empirical evidence from the vocational education context, which remains relatively underrepresented in educational research. By modeling multiple mediators simultaneously, this study offers a more comprehensive explanation of how emotional and motivational factors interact to influence mathematics performance.

The findings also highlight the importance of strengthening emotional and motivational development within vocational education. Educational interventions that enhance students' emotional regulation, reduce anxiety, and foster sustained learning motivation may be more effective than approaches that focus solely on cognitive skill development. Programs aimed at developing emotional intelligence, implementing anxiety-management strategies, and designing motivation-enhancing instructional practices may help vocational students navigate the dual academic and vocational demands they face while improving their mathematics achievement.

Overall, this study contributes to the growing body of evidence demonstrating that mathematics performance is not determined solely by cognitive ability but is strongly influenced by emotional and motivational processes. By showing that emotional intelligence affects mathematics performance indirectly through anxiety management and learning motivation, this research provides a clearer understanding of the psychological mechanisms underlying mathematics achievement and highlights the importance of holistic instructional approaches in vocational high school education.

CONCLUSION

Fundamental Finding : This study concludes that emotional intelligence does not have a significant direct effect on students' mathematics performance. Instead, its influence operates indirectly through anxiety management and learning motivation. Among these mediating variables, learning motivation emerges as the most dominant factor. The proposed structural model explains 74.3% of the variance in mathematics performance, indicating that affective and motivational factors play a critical role in shaping students' academic achievement. The fundamental findings clearly demonstrate the absence of a direct relationship between emotional intelligence and mathematics performance, while highlighting the importance of indirect psychological pathways. These results provide stronger evidence that emotional intelligence contributes to academic success primarily by enhancing students' ability to regulate anxiety and maintain learning motivation.

Implication : The findings imply that interventions aimed at improving mathematics performance should not solely emphasize cognitive skills but also incorporate programs to enhance students' emotional intelligence, develop effective anxiety management strategies, and strengthen learning motivation. Such holistic approaches can support students' psychological readiness and foster sustained academic success.

Limitation : This research was limited to a sample of 150 vocational high school students within a specific context, which may restrict the generalizability of the findings. The use of a cross-sectional survey design also limits the ability to capture changes over time or establish causal relationships fully. **Future Research:** Future studies are recommended to apply longitudinal or experimental designs to better explore causal mechanisms and long-term effects. Expanding the research to different educational levels, cultural contexts, or incorporating additional psychological variables such as self-regulation and resilience may provide a more comprehensive understanding of the dynamics influencing mathematics performance.



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