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The Role of Emotional Intelligence in Academic Motivation Regulation and Academic Performance among Secondary School Students: Modeling the Mediating Effects of Metacognitive Strategies

Zohreh. Jalali Ghazaani[1], Masoumeh Sadat. Abtahi[1*], Sadegh. Yazdanpanah[1]

[1] Department of Psychology and Educational Sciences, SR.C., Islamic Azad University, Tehran, Iran

*** Corresponding author email address**: m.abtahi2030@iau.ac.ir

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A B S T R A C T

Purpose: The present study aimed to investigate the role of emotional intelligence in academic motivation regulation and academic performance among secondary school students, with particular emphasis on the mediating role of metacognitive strategies.
Methods and Materials: This applied study employed a descriptive-correlational design using structural equation modeling (SEM). The statistical population consisted of secondary school students in Tehran during the 2024–2025 academic year, from whom 300 participants were selected through multistage cluster sampling. Data were collected using the Schutte Emotional Intelligence Scale, the Metacognitive Awareness Inventory developed by Schraw and Dennison, and an academic motivation regulation scale based on Wolters' framework. Academic performance was measured using students' semester grade point averages in core subjects. The validity of the instruments was examined through expert review and confirmatory factor analysis, while reliability was assessed using Cronbach's alpha and composite reliability coefficients. Data were analyzed using SPSS Version 26 and AMOS Version 24. Pearson correlation analysis, confirmatory factor analysis, structural equation modeling, and bootstrap procedures with 5,000 resamples were employed to test direct and indirect relationships among the study variables.
Findings: The results revealed significant positive relationships among emotional intelligence, metacognitive strategies, academic motivation regulation, and academic performance. Emotional intelligence exerted a direct positive effect on metacognitive strategies ($\beta = .48$, $p < .001$) and academic motivation regulation ($\beta = .28$, $p < .001$). Metacognitive strategies positively predicted academic performance ($\beta = .35$, $p < .001$), while academic motivation regulation significantly influenced academic performance ($\beta = .44$, $p < .001$). The structural model demonstrated satisfactory fit indices ($\chi^2/df = 2.14$, CFI = .96, TLI = .95, RMSEA = .048, SRMR = .042). Bootstrap analyses further indicated that emotional intelligence had significant indirect effects on academic performance through metacognitive strategies ($\beta = .17$, $p < .001$) and academic motivation regulation ($\beta = .12$, $p = .005$), confirming the mediating roles of these variables.

Conclusion: The findings demonstrate that emotional intelligence contributes significantly to students' academic performance both directly and indirectly through enhanced metacognitive strategy use and more effective academic motivation regulation. These results highlight the interconnected roles of emotional, cognitive, and motivational processes in academic achievement and suggest that educational programs designed to strengthen emotional intelligence and metacognitive competencies may improve students' motivation, self-regulated learning, and overall academic success.

Keywords: *Emotional intelligence, metacognitive strategies, academic motivation regulation, academic performance, structural equation modeling, secondary school students.*

1. Introduction

Emotional intelligence has emerged as one of the most influential psychological constructs in contemporary educational research because it shapes how students perceive, understand, regulate, and utilize emotions in academic and social contexts. Beyond traditional cognitive abilities, emotional intelligence contributes to students' adaptation to school demands, interpersonal relationships, psychological well-being, and academic success. Educational systems increasingly recognize that academic achievement is not solely determined by intellectual capacity but is also influenced by emotional competencies that enable students to cope with challenges, sustain motivation, and engage effectively in learning activities. Recent studies have demonstrated that emotionally intelligent students tend to display greater academic engagement, stronger social adjustment, and more favorable educational outcomes than their peers with lower emotional competencies (Gkintoni et al., 2023; Sánchez & Jiménez-Vázquez, 2023; Yim, 2025).

Adolescence represents a critical developmental period characterized by substantial cognitive, emotional, and social transformations. During this stage, students encounter increasing academic demands, heightened performance expectations, and complex interpersonal experiences that require sophisticated emotional and cognitive regulation. The ability to recognize and manage emotions effectively becomes particularly important for maintaining adaptive functioning and academic persistence. Research has shown that emotional intelligence serves as a protective factor that supports psychological adjustment and facilitates successful navigation of developmental challenges during adolescence (D'Amico & Geraci, 2021; Drigas & Sideraki, 2021; Supervía et al., 2023). Furthermore, emotional intelligence has been associated with improved executive functioning, prosocial behavior, and adaptive educational outcomes among secondary school students (Espino-Díaz et al., 2021; Wang et al., 2023; Wu et al., 2023).

Academic performance is one of the most important indicators of educational success and future opportunities. It reflects not only students' mastery of academic content but also their capacity to apply cognitive, motivational, and self-regulatory resources in learning environments. Contemporary educational theories increasingly emphasize the multidimensional nature of academic achievement, highlighting the contribution of emotional, motivational, and metacognitive processes to successful learning outcomes. Studies have consistently demonstrated that students who possess stronger emotional competencies are better able to cope with academic stress, maintain persistence in challenging tasks, and achieve higher levels of academic performance (Gkintoni et al., 2023; Lyu & Hu, 2025; Sánchez & Jiménez-Vázquez, 2023). Similarly, parental support, emotional engagement, and self-regulatory capacities have been identified as significant predictors of academic achievement during adolescence (Lyu & Hu, 2025; Martínez-López et al., 2023; Wang et al., 2023).

Although emotional intelligence has been widely linked to academic outcomes, the mechanisms through which it influences achievement remain an important area of investigation. Researchers have argued that emotional intelligence may exert its effects indirectly through cognitive and motivational processes that facilitate learning and academic adaptation. In particular, metacognitive strategies and academic motivation regulation have attracted considerable attention as potential mediators linking emotional competencies to educational success. Understanding these pathways can provide a more comprehensive explanation of how emotional intelligence contributes to students' academic functioning and may inform the development of more effective educational interventions (Katsantonis, 2024; Moustakas & Gonida, 2023; Yim, 2025).

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Metacognition refers to individuals' awareness, monitoring, and regulation of their own cognitive processes. It encompasses planning, self-monitoring, evaluation, and strategic control of learning activities. Metacognitive strategies enable students to become active participants in their learning by helping them select appropriate strategies, monitor their understanding, and adjust their behavior when difficulties arise. A substantial body of research has demonstrated that metacognitive skills play a central role in academic achievement across different educational levels and subject domains (Allix et al., 2024; Nwosu et al., 2021; Tibken et al., 2022). Students who effectively employ metacognitive strategies tend to demonstrate higher academic performance, greater learning efficiency, and stronger self-regulated learning abilities than those who lack such skills (Shaheema et al., 2023; L. C. Wang et al., 2021; Yim, 2025).

Recent empirical findings further underscore the importance of metacognition in educational contexts. Metacognitive self-regulation has been shown to increase with age and is strongly influenced by motivational factors among secondary school students (Katsantonis, 2024). Longitudinal evidence suggests that metacognition contributes not only to academic learning but also to social adaptation and the development of meaningful peer relationships (Loon & Laninga-Wijnen, 2025). Educational interventions specifically designed to enhance metacognitive competencies have demonstrated positive effects on students' academic success and learning outcomes (Allix et al., 2024). Furthermore, metacognition has been identified as a significant mediator of adaptive functioning in various developmental and educational contexts, highlighting its central role in promoting successful outcomes (Chien et al., 2023; Munsell et al., 2021).

The relationship between emotional intelligence and metacognition has become an increasingly important topic within educational psychology. Emotional intelligence may facilitate metacognitive functioning by enabling students to manage emotional distractions, maintain cognitive flexibility, and engage in reflective thinking during learning activities. Researchers have proposed that emotionally intelligent individuals possess greater awareness of both emotional and cognitive processes, allowing them to regulate their learning more effectively. Studies examining emotional metacognition and meta-emotional intelligence suggest that higher levels of emotional awareness and regulation are associated with enhanced metacognitive functioning and adaptive learning behaviors (Chifari, 2025; D'Amico & Geraci, 2023; Diego et al., 2022). Similarly, positive relationships between emotional intelligence and metacognitive strategies have been reported among adolescent learners across diverse educational settings (Algraini, 2022; Arslan & Demirbağ, 2024; Cécillon et al., 2024).

Another key construct relevant to academic achievement is academic motivation regulation. Motivation regulation refers to the strategies students use to initiate, maintain, and enhance their motivation during learning activities. Effective regulation of motivation allows students to sustain effort, overcome obstacles, and persist in the face of academic challenges. Within self-regulated learning frameworks, motivation regulation is considered a critical determinant of learning success because it influences engagement, persistence, and goal-directed behavior (Martínez-López et al., 2023; Shaheema et al., 2023; Wu et al., 2023). Students who successfully regulate their motivation are more likely to invest effort in learning tasks, utilize effective learning strategies, and achieve higher academic outcomes.

Motivational processes are closely connected to emotional functioning. Emotions influence students' perceptions of competence, expectations of success, and willingness to engage in learning activities. Emotional intelligence may therefore enhance academic achievement by promoting more effective regulation of motivation. Emotionally intelligent students are generally better equipped to cope with frustration, manage anxiety, and maintain positive emotional states that support sustained academic engagement. Research has demonstrated that emotional and cognitive engagement significantly mediate academic outcomes and that emotional competencies contribute to students' ability to remain motivated in educational settings (Lyu & Hu, 2025; Sánchez & Jiménez-Vázquez, 2023; Supervía et al., 2023). Furthermore, achievement emotions have been found to interact with metacognitive processes in shaping students' academic performance and learning experiences (Moustakas & Gonida, 2023).

Theoretical and empirical evidence also suggests strong interconnections among emotional intelligence, metacognition, and motivation regulation. Emotional competencies facilitate adaptive emotion regulation, which in turn supports reflective thinking, strategic learning, and sustained motivation. Metacognitive processes enable students to monitor their motivational states and adjust their learning strategies accordingly, while effective motivation regulation encourages greater engagement in metacognitive

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activities. Research examining emotional regulation, metacognitive beliefs, executive functions, and academic achievement has consistently highlighted the complex interactions among these constructs (Cécillon et al., 2024; Ge & Tolmie, 2025; Zografou & Drigas, 2022). Likewise, studies focusing on anxiety, self-regulation, and executive functioning have emphasized the importance of emotional and metacognitive mechanisms in educational adaptation and performance (Cengiz et al., 2025; Ge & Tolmie, 2025; M. T. Wang et al., 2021).

The growing literature on meta-emotional intelligence provides additional support for the proposed relationships. Meta-emotional intelligence extends traditional emotional intelligence by emphasizing individuals' awareness and understanding of their own emotional competencies. This construct has been associated with well-being, social functioning, behavioral regulation, and adaptive decision-making among adolescents (Chifari, 2025; D'Amico & Geraci, 2021, 2023). Because meta-emotional processes involve reflection on emotional experiences, they may represent an important bridge between emotional intelligence and metacognitive functioning, thereby influencing academic outcomes through enhanced self-regulation and motivation.

Despite substantial evidence linking emotional intelligence, metacognition, motivation, and academic achievement, several gaps remain in the existing literature. Many studies have examined these constructs independently rather than within an integrated structural framework. Furthermore, although emotional intelligence has been associated with academic success, fewer studies have simultaneously investigated the mediating roles of metacognitive strategies and academic motivation regulation in explaining this relationship. Existing findings suggest that learning strategies, self-regulated learning processes, emotional engagement, and metacognitive competencies may operate as important pathways connecting emotional characteristics to academic achievement, yet empirical evidence testing these mechanisms remains limited (Lyu & Hu, 2025; Merlo & Jaforte, 2024; Yim, 2025). Additional research is therefore needed to clarify how these variables interact within a comprehensive conceptual model.

Moreover, contemporary educational environments present new challenges that require students to integrate emotional, cognitive, and motivational resources effectively. The increasing complexity of learning demands highlights the importance of identifying psychological factors that promote academic resilience and achievement. Studies examining educational success among adolescents have emphasized the role of metacognitive competence, self-regulation, emotional functioning, social support, and engagement in facilitating positive educational outcomes (Commodari et al., 2022; Tibken et al., 2022; Varrasi et al., 2022). These findings suggest that interventions targeting emotional intelligence and metacognitive skills may provide valuable opportunities for improving students' academic functioning and long-term educational success.

Considering the theoretical significance of emotional intelligence and the growing evidence supporting the educational importance of metacognitive strategies and motivation regulation, investigating the structural relationships among these variables can contribute meaningfully to educational psychology research. Such an approach may help clarify the psychological mechanisms through which emotional competencies influence academic performance and provide practical implications for educational planning and intervention design. Therefore, the present study aimed to examine the role of emotional intelligence in academic motivation regulation and academic performance among secondary school students, with metacognitive strategies as a mediating variable.

2. Methods and Materials

2.1. Study Design and Participants

The present study was an applied research project that employed a descriptive-correlational design using a structural equation modeling (SEM) approach. This methodology was selected because of the multivariate nature of the research and its capacity to simultaneously examine direct and indirect relationships among the study variables. Specifically, the study sought to investigate the role of emotional intelligence in explaining students' academic performance while also examining the mediating roles of metacognitive strategies and academic motivation regulation within this relationship. Structural equation modeling provided an appropriate analytical framework for testing the proposed conceptual model and evaluating both measurement and structural relationships among latent and observed variables.

The statistical population consisted of all secondary school students enrolled in public high schools in Tehran, Iran, during the 2024–2025 academic year. Considering the importance of adequate sample size in structural equation modeling and its influence on parameter stability and model fit, a sample of 300 students was determined based on

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methodological recommendations for SEM studies. Participants were selected using a multistage cluster sampling procedure. Initially, several educational districts in Tehran were randomly selected. Subsequently, a number of schools were randomly chosen from each district, and several classes were randomly selected from each school. All students in the selected classes were invited to participate in the study. Eligibility criteria included enrollment in secondary education and willingness to participate voluntarily in the research. Questionnaires containing substantial missing responses or exhibiting invalid response patterns were excluded from the final analyses. Prior to data collection, necessary permissions were obtained from educational authorities and school administrators. Participants were informed about the objectives of the study, assured of the confidentiality of their responses, and provided informed consent before participation. All research procedures were conducted in accordance with established ethical principles for educational and psychological research.

2.2. Measures

Emotional intelligence was assessed using the Schutte Self-Report Emotional Intelligence Test (SSEIT) developed by Schutte et al. (1998), which is grounded in the emotional intelligence model proposed by Mayer and Salovey (1997). The instrument consists of 33 items designed to measure individuals' capacity to perceive, understand, regulate, and utilize emotions effectively in everyday situations. Respondents indicate their level of agreement with each statement using a five-point Likert scale ranging from strongly disagree to strongly agree. Higher scores indicate greater emotional intelligence. Previous studies have demonstrated satisfactory psychometric properties for the instrument, including acceptable levels of internal consistency, construct validity, and convergent validity across diverse student populations. In the present study, content validity was evaluated by experts in educational psychology and psychometrics, and construct validity was further examined through confirmatory factor analysis.

Metacognitive strategies were measured using the Metacognitive Awareness Inventory (MAI) developed by Schraw and Dennison (1994). This instrument assesses students' awareness and regulation of their cognitive processes and includes dimensions such as planning, monitoring, information management, debugging strategies, and evaluation. The questionnaire contains items that evaluate both knowledge of cognition and regulation of cognition, providing a comprehensive assessment of metacognitive functioning. Responses are recorded on a Likert-type scale, with higher scores reflecting greater use of metacognitive strategies. The MAI has been widely utilized in educational research and has demonstrated strong reliability and validity indicators in previous investigations. In the current study, the factorial structure of the instrument was verified through confirmatory factor analysis, and reliability indices were examined using Cronbach's alpha and composite reliability coefficients.

Academic motivation regulation was assessed using scales developed within the self-regulated learning framework proposed by Wolters (2003). These measures evaluate students' strategic efforts to initiate, maintain, and enhance motivation during academic activities. The instrument examines several dimensions of motivational regulation, including effort regulation, attention control, self-consequating, and motivational management strategies. Participants respond to items using a Likert-type response format, with higher scores indicating more effective motivational regulation. Previous research has reported satisfactory psychometric characteristics for these scales, including evidence of construct validity and internal consistency. In the present study, both content and construct validity were assessed, and the reliability of the scale was confirmed through Cronbach's alpha and composite reliability analyses.

Academic performance was operationalized using students' semester grade point averages (GPAs) in core academic subjects. Academic records were obtained through official school documentation with the approval of educational authorities and participants. GPA was selected as an objective indicator of academic achievement because it reflects cumulative academic outcomes across multiple subject areas and provides a standardized measure of students' educational performance.

To ensure the validity and reliability of all measurement instruments, content validity was first evaluated by a panel of specialists in educational psychology and psychometrics. Subsequently, confirmatory factor analyses were conducted to assess construct validity and determine the extent to which the observed indicators represented their respective latent constructs. Reliability was examined using Cronbach's alpha coefficients and composite reliability indices. Values exceeding .70 were considered indicative of acceptable reliability and internal consistency.

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2.3. *Data Analysis*

Data analysis was conducted using SPSS Version 26 and AMOS Version 24. Initially, the collected data were screened for accuracy, missing values, outliers, and distributional assumptions. Descriptive statistics, including means, standard deviations, minimum and maximum values, were calculated to summarize the characteristics of the study variables. Pearson correlation coefficients were also computed to examine preliminary relationships among emotional intelligence, metacognitive strategies, academic motivation regulation, and academic performance.

Prior to conducting structural equation modeling, the assumptions underlying multivariate analyses were assessed. Normality was evaluated through skewness and kurtosis statistics, with values within the range of ±2 considered indicative of acceptable normal distributions. Multicollinearity among predictor variables was examined using tolerance values and variance inflation factor (VIF) indices. These preliminary analyses ensured that the data met the assumptions required for subsequent SEM procedures.

Structural equation modeling was implemented in two consecutive stages. First, the measurement model was evaluated using confirmatory factor analysis to determine whether the observed indicators adequately represented the latent constructs of emotional intelligence, metacognitive strategies, and academic motivation regulation. Convergent validity was assessed through standardized factor loadings, Average Variance Extracted (AVE), and Composite Reliability (CR). Standardized factor loadings greater than .50, AVE values exceeding .50, and CR values above .70 were considered indicative of satisfactory measurement quality.

Following confirmation of the measurement model, the structural model was estimated to test the hypothesized relationships among the study variables. Emotional intelligence was specified as the exogenous variable, metacognitive strategies and academic motivation regulation were modeled as mediating variables, and academic performance was designated as the endogenous outcome variable. Direct pathways from emotional intelligence to academic performance, metacognitive strategies, and academic motivation regulation were examined, as were the direct effects of metacognitive strategies and academic motivation regulation on academic performance. Indirect effects were evaluated using a bootstrap procedure with 5,000 resamples and 95% confidence intervals to determine the significance of the mediating pathways.

The overall adequacy of the structural model was assessed using several commonly recommended goodness-of-fit indices, including the chi-square to degrees of freedom ratio (χ^2/df), the Comparative Fit Index (CFI), the Tucker–Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA), and the Standardized Root Mean Square Residual (SRMR). Following the recommendations of Hu and Bentler (1999), χ^2/df values below 3.00, CFI and TLI values above .90, RMSEA values below .08, and SRMR values below .08 were interpreted as indicators of acceptable model fit.

3. Findings and Results

In the present study, the role of emotional intelligence in academic motivation regulation and students' academic performance was examined, with metacognitive strategies considered as a mediating variable. In the first step, descriptive statistical indices of the study variables, including means and standard deviations, were calculated. The results indicated that the mean scores of emotional intelligence, metacognitive strategies, academic motivation regulation, and academic performance were at a relatively desirable level. The results of the descriptive statistics and correlation coefficients among the study variables are presented in Table 1.

Table 1

Descriptive Statistics and Correlation Matrix of the Study Variables

Variable	Mean	SD	Skewness	Kurtosis	1	2	3	4
1. Emotional Intelligence	3.65	0.48	-0.42	0.15	1			
2. Metacognitive Strategies	3.42	0.55	-0.31	-0.22	0.48	1		
3. Academic Motivation Regulation	3.81	0.62	-0.55	0.48	0.39	0.54	1	
4. Academic Performance	17.45	1.85	-0.72	0.65	0.35	0.42	0.51	1

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To examine the preliminary relationships among the study variables, Pearson correlation coefficients were calculated. The results showed a positive and significant relationship between emotional intelligence and metacognitive strategies ($p < .01$). Emotional intelligence was also positively and significantly associated with both academic motivation regulation and academic performance. Furthermore, metacognitive strategies demonstrated positive and significant relationships with academic motivation regulation and academic performance. These correlations indicate that higher levels of emotional intelligence are associated with greater use of metacognitive strategies, enhanced academic motivation regulation, and improved academic performance.

In the next stage, confirmatory factor analysis (CFA) was conducted to assess the construct validity of the measurement instruments. The findings revealed that all factor loadings were within acceptable ranges and statistically significant. In addition, Composite Reliability (CR) values for all constructs exceeded .70, and Average Variance Extracted (AVE) values were greater than .50, indicating adequate convergent validity of the measurement instruments.

To evaluate the reliability and validity of the study constructs, Cronbach's alpha coefficients, Composite Reliability (CR), and Average Variance Extracted (AVE) were calculated. Based on the criteria proposed by Fornell and Larcker (1981), Cronbach's alpha and CR values above .70 and AVE values above .50 indicate satisfactory reliability and convergent validity.

Table 2

Validity and Reliability Indices of the Study Constructs

Construct	Cronbach's Alpha	Composite Reliability (CR)	Average Variance Extracted (AVE)
Emotional Intelligence	0.89	0.91	0.62
Academic Motivation Regulation	0.86	0.88	0.59
Metacognition	0.90	0.92	0.64
Academic Performance	0.84	0.86	0.56

As shown in Table 2, all Cronbach's alpha and Composite Reliability values exceeded .70, while all AVE values were greater than .50. Therefore, the study constructs demonstrated satisfactory reliability and convergent validity.

In the subsequent step, the structural model of the study was tested. The model fit indices indicated that the proposed model exhibited an acceptable fit to the observed data. Specifically, the values of the Comparative Fit Index (CFI) and Tucker–Lewis Index (TLI) were above .90, while the Root Mean Square Error of Approximation (RMSEA) was below .08, indicating an acceptable fit of the conceptual model. The model fit indices are reported in Table 3.

Table 3

Fit Indices of the Structural Model (Conceptual Research Model)

Fit Index	Obtained Value	Recommended Criterion	Fit Evaluation
Chi-Square/Degrees of Freedom (χ^2/df)	2.14	< 3.00	Acceptable
Comparative Fit Index (CFI)	0.96	> 0.90	Acceptable
Tucker–Lewis Index (TLI)	0.95	> 0.90	Acceptable
Root Mean Square Error of Approximation (RMSEA)	0.048	< 0.08	Acceptable
Standardized Root Mean Square Residual (SRMR)	0.042	< 0.08	Acceptable

The path analysis results indicated that emotional intelligence had a direct and significant effect on metacognitive strategies. Emotional intelligence also demonstrated a direct and significant effect on academic motivation regulation. Furthermore, metacognitive strategies exerted positive and significant effects on both academic motivation regulation and academic performance. The findings also revealed that academic motivation regulation had a positive and significant effect on students' academic performance. To examine the mediating effects of the study variables, a bootstrap procedure was employed. The results showed that the indirect effects of emotional

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intelligence on academic performance through metacognitive strategies and academic motivation regulation were statistically significant. These findings suggest that part of the influence of emotional intelligence on academic performance is explained through increased utilization of metacognitive strategies and enhanced regulation of academic motivation. The path coefficients and direct and indirect effects are presented in Table 4.

Table 4

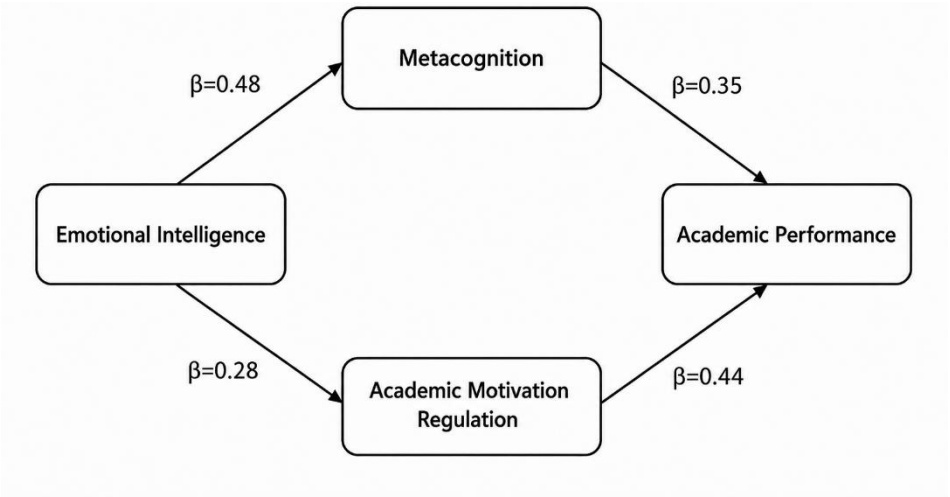
Path Coefficients (Direct, Indirect, and Total Effects) Based on Bootstrap Analysis

Model Paths	Standardized Coefficient (β)	t-value	p-value	LLCI	ULCI
Direct Effects					
Emotional Intelligence → Metacognition	0.48	5.82	.001	0.35	0.61
Emotional Intelligence → Academic Motivation Regulation	0.28	3.45	.001	0.15	0.42
Metacognition → Academic Performance	0.35	4.12	.001	0.21	0.48
Academic Motivation Regulation → Academic Performance	0.44	5.26	.001	0.31	0.58
Indirect Effects (Mediating Effects)					
Emotional Intelligence → Metacognition → Academic Performance	0.17	3.95	.001	0.08	0.29
Emotional Intelligence → Academic Motivation Regulation → Academic Performance	0.12	2.88	.005	0.05	0.21

Following confirmation of the measurement model and assessment of the validity and reliability indices of the constructs, the structural model was estimated to test the research hypotheses. At this stage, direct and indirect relationships among the study variables were examined using structural equation modeling. The figure below presents the final research model along with the standardized path coefficients.

Figure 1

Final Structural Model of the Study with Standardized Path Coefficients



As illustrated in Figure 1, the final structural model includes direct relationships among emotional intelligence, metacognitive strategies, academic motivation regulation, and academic performance. The standardized path coefficients indicate that emotional intelligence can influence students' academic performance through metacognitive strategies and academic motivation regulation. Moreover, the results demonstrate that the hypothesized direct and indirect pathways are statistically meaningful and interpretable, and that the overall model exhibits satisfactory fit to the data.

4. Discussion and Conclusion

The present study aimed to examine the role of emotional intelligence in academic motivation regulation and academic performance among secondary school students, with particular emphasis on the mediating role of metacognitive strategies. The findings demonstrated that emotional

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intelligence was positively and significantly associated with metacognitive strategies, academic motivation regulation, and academic performance. Furthermore, metacognitive strategies exerted significant positive effects on both academic motivation regulation and academic performance. The structural model also revealed that emotional intelligence indirectly influenced academic performance through metacognitive strategies and academic motivation regulation, indicating the presence of significant mediating pathways. Overall, the results support the conceptual proposition that emotional competencies contribute to academic success not only directly but also through cognitive and motivational self-regulatory processes.

One of the most important findings of the present study was the significant positive relationship between emotional intelligence and academic performance. This result suggests that students who possess higher levels of emotional intelligence tend to achieve better academic outcomes. Emotional intelligence enables learners to recognize, understand, and regulate their emotional experiences effectively, thereby reducing the disruptive effects of negative emotions and facilitating sustained engagement with academic tasks. Students with stronger emotional competencies are more capable of coping with academic pressures, maintaining concentration, and persisting when faced with difficulties. These findings are consistent with previous studies that identified emotional intelligence as a significant predictor of academic achievement and school adjustment (Gkintoni et al., 2023; Sánchez & Jiménez-Vázquez, 2023; Yim, 2025). The results also align with evidence indicating that emotional intelligence contributes to adaptive educational outcomes by enhancing students' engagement, social functioning, and psychological well-being (D'Amico & Geraci, 2021; Espino-Díaz et al., 2021; Supervía et al., 2023).

The positive effect of emotional intelligence on academic performance may be explained through several theoretical perspectives. From a self-regulation perspective, emotionally intelligent students are more capable of managing frustration, controlling impulsive reactions, and maintaining emotional stability during challenging learning situations. Such capabilities allow students to allocate greater cognitive resources to learning activities rather than emotional distress. In addition, emotional intelligence promotes adaptive interpersonal relationships with teachers and peers, which can foster supportive learning environments and increase academic engagement. Previous research has similarly shown that emotional intelligence enhances executive functioning and prosocial behavior, both of which are associated with improved academic outcomes (Drigas & Sideraki, 2021; Espino-Díaz et al., 2021; Sánchez & Jiménez-Vázquez, 2023).

Another important finding was the significant positive relationship between emotional intelligence and metacognitive strategies. Students with higher emotional intelligence reported greater use of planning, monitoring, and evaluation strategies during learning activities. This result supports theoretical arguments suggesting that awareness and regulation of emotions facilitate awareness and regulation of cognition. Individuals who can effectively monitor their emotional states may also be more capable of monitoring their thinking processes and adapting learning strategies when necessary. These findings are consistent with previous studies demonstrating positive associations between emotional intelligence, emotional metacognition, and metacognitive functioning (Algraini, 2022; Arslan & Demirbağ, 2024; D'Amico & Geraci, 2023). They also support the proposition that emotional awareness and reflective thinking are interconnected processes that jointly contribute to effective learning and self-regulation (Chifari, 2025; Diego et al., 2022).

The relationship between emotional intelligence and metacognition can be interpreted through the lens of meta-emotional intelligence theory. According to this perspective, individuals who understand and evaluate their emotional experiences accurately are more likely to engage in reflective and strategic cognitive processes. Emotional awareness provides valuable feedback regarding task demands, performance challenges, and motivational states, thereby facilitating the use of metacognitive strategies. Recent research has emphasized that emotional and meta-emotional competencies extend beyond emotional regulation and contribute to broader self-regulatory capacities that support learning and adaptation (Chifari, 2025; D'Amico & Geraci, 2023). Therefore, emotionally intelligent students may be better positioned to employ effective metacognitive strategies because they possess greater awareness of both internal emotional experiences and cognitive processes.

The study also revealed a significant positive relationship between emotional intelligence and academic motivation regulation. This finding indicates that students with stronger emotional competencies are more successful in maintaining effort, sustaining interest, and regulating motivational states during academic activities. Motivation regulation is essential for academic success because it enables students to persist

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despite obstacles, boredom, or temporary setbacks. Emotional intelligence may facilitate motivation regulation by helping students manage negative emotions that often undermine persistence and engagement. These findings correspond with research demonstrating that emotional competencies are closely linked to students' engagement, motivation, and learning persistence (Lyu & Hu, 2025; Martínez-López et al., 2023; Sánchez & Jiménez-Vázquez, 2023). Similarly, studies on self-regulated learning have emphasized the role of emotional processes in maintaining motivational resources during challenging academic tasks (Shaheema et al., 2023; Wu et al., 2023).

The positive association between metacognitive strategies and academic motivation regulation observed in the present study further highlights the interconnected nature of cognitive and motivational processes. Students who effectively monitor and regulate their learning are more likely to maintain motivation because they possess greater confidence in their ability to achieve academic goals. Metacognitive strategies help learners evaluate progress, identify effective approaches, and adjust behaviors when difficulties arise. Such processes enhance perceptions of competence and control, thereby supporting motivation. These findings are consistent with research demonstrating that metacognitive self-regulation and motivational processes are mutually reinforcing components of successful learning (Katsantonis, 2024; Moustakas & Gonida, 2023; Shaheema et al., 2023). Previous studies have similarly shown that students with stronger metacognitive skills exhibit greater academic engagement and more adaptive motivational profiles (L. C. Wang et al., 2021; Wu et al., 2023).

The significant positive effects of metacognitive strategies and academic motivation regulation on academic performance constitute another important contribution of the present study. Students who reported greater use of metacognitive strategies and stronger motivation regulation achieved higher levels of academic performance. This finding reinforces extensive evidence indicating that academic success depends not only on knowledge acquisition but also on students' capacity to regulate their learning and motivational processes effectively. Metacognitive strategies facilitate efficient learning by enabling students to plan, monitor, and evaluate their cognitive activities. Simultaneously, motivation regulation ensures sustained effort and engagement throughout the learning process. These findings are highly consistent with previous investigations highlighting the importance of metacognitive competence for academic achievement (Allix et al., 2024; Nwosu et al., 2021; Tibken et al., 2022). Similar evidence has demonstrated that metacognitive skills contribute significantly to educational success across diverse academic domains and developmental stages (Loon & Laninga-Wijnen, 2025; Merlo & Jaforte, 2024; L. C. Wang et al., 2021).

The mediation analyses provide particularly valuable insights into the mechanisms underlying academic achievement. The findings revealed that emotional intelligence exerted significant indirect effects on academic performance through both metacognitive strategies and academic motivation regulation. This result suggests that emotional intelligence influences academic outcomes not merely through direct pathways but also by fostering cognitive and motivational resources that enhance learning effectiveness. Such findings are consistent with contemporary models of self-regulated learning, which emphasize the dynamic interactions among emotional, cognitive, and motivational systems (Martínez-López et al., 2023; Shaheema et al., 2023; Wu et al., 2023). The results also align with studies indicating that learning strategies, engagement, and self-regulatory processes mediate the relationship between psychological characteristics and academic achievement (Lyu & Hu, 2025; Wang et al., 2023; Yim, 2025).

The observed mediating role of metacognitive strategies is particularly noteworthy because it suggests that emotional intelligence contributes to academic success by enhancing students' capacity to regulate their cognitive activities. Emotionally intelligent students may be more capable of maintaining concentration, monitoring understanding, and selecting effective learning strategies because they can manage emotional distractions more effectively. This interpretation is supported by research demonstrating close associations among emotional regulation, metacognitive beliefs, executive functions, and educational outcomes (Cécillon et al., 2024; Ge & Tolmie, 2025; Zografou & Drigas, 2022). Moreover, studies involving adolescents have emphasized that metacognitive competence serves as a crucial mechanism linking psychological resources to adaptive functioning and achievement (Chien et al., 2023; Munsell et al., 2021).

The mediating role of academic motivation regulation is equally important. Students who possess higher emotional intelligence may be better able to maintain positive attitudes toward learning, cope with academic frustrations, and sustain motivation over time. These motivational advantages

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subsequently contribute to greater academic achievement. Research has consistently shown that emotional experiences influence students' willingness to engage in learning activities and persist in the face of challenges (Lyu & Hu, 2025; Moustakas & Gonida, 2023; Supervía et al., 2023). The current findings suggest that motivation regulation functions as an important mechanism through which emotional intelligence translates into improved academic outcomes.

The overall structural model demonstrated satisfactory fit indices, indicating that the proposed conceptual framework provides an adequate explanation of the relationships among emotional intelligence, metacognitive strategies, academic motivation regulation, and academic performance. The acceptable fit of the model supports theoretical assumptions regarding the integration of emotional, cognitive, and motivational processes within educational settings. These findings contribute to a growing body of literature emphasizing that academic achievement is a multifaceted phenomenon shaped by complex interactions among psychological variables rather than by cognitive ability alone (Katsantonis, 2024; Sánchez & Jiménez-Vázquez, 2023; Tibken et al., 2022).

Taken together, the results underscore the importance of adopting holistic educational approaches that simultaneously address emotional, cognitive, and motivational development. Contemporary educational environments require students to manage emotions, regulate learning processes, and sustain motivation under increasingly demanding conditions. By demonstrating the interconnected roles of emotional intelligence, metacognitive strategies, and academic motivation regulation, the present study provides empirical support for educational interventions aimed at strengthening these competencies. Such interventions may ultimately enhance students' academic performance and contribute to their broader psychological and educational development (Allix et al., 2024; Merlo & Jaforte, 2024; L. C. Wang et al., 2021).

Several limitations should be considered when interpreting the findings of this study. First, the cross-sectional design limits the ability to draw causal conclusions regarding the relationships among emotional intelligence, metacognitive strategies, motivation regulation, and academic performance. Second, the study relied primarily on self-report questionnaires, which may be influenced by social desirability bias and subjective perceptions. Third, the sample was restricted to secondary school students from a single metropolitan area, which may limit the generalizability of the findings to other educational levels, regions, or cultural contexts. Finally, although the proposed model explained a substantial proportion of variance in academic performance, other potentially relevant variables such as family support, classroom climate, personality traits, and socioeconomic status were not included in the analysis.

Future studies should employ longitudinal and experimental designs to examine the causal relationships among emotional intelligence, metacognitive strategies, motivation regulation, and academic achievement over time. Researchers may also investigate whether these relationships differ across gender, academic disciplines, educational levels, or cultural contexts. Incorporating additional mediating and moderating variables, such as self-efficacy, academic resilience, teacher support, and school climate, could provide a more comprehensive understanding of the mechanisms underlying academic success. Furthermore, future research should examine the effectiveness of intervention programs designed to enhance emotional intelligence and metacognitive skills and evaluate their long-term effects on students' motivation and academic outcomes.

Educational practitioners should consider integrating emotional intelligence training into school curricula to help students develop skills related to emotional awareness, emotional regulation, and adaptive coping. Schools should also provide structured opportunities for students to learn and practice metacognitive strategies such as planning, self-monitoring, and self-evaluation during classroom activities. Teachers can promote motivation regulation by encouraging goal setting, fostering autonomy, providing constructive feedback, and creating supportive learning environments. In addition, school counselors and educational psychologists may develop comprehensive programs that simultaneously target emotional, cognitive, and motivational competencies, thereby enhancing students' academic performance and overall educational well-being.

Authors' Contributions

All authors significantly contributed to this study.

Declaration

In order to correct and improve the academic writing of our paper, we have used the language model ChatGPT.

Transparency Statement

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Data are available for research purposes upon reasonable request to the corresponding author.

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Declaration of Interest

The authors report no conflict of interest.

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Ethical Considerations

In this study, to observe ethical considerations, participants were informed about the goals and importance of the research before the start of the interview and participated in the research with informed consent.

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