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Investigating the Structural Relationships Between Self-Regulated Learning and Academic Motivation with the Mediating Role of Self-Esteem Among Upper Secondary School Students in Babolsar

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A B S T R A C T

Objective: The present study aimed to examine the structural relationships between self-regulated learning and academic motivation and to determine the mediating role of self-esteem among upper secondary school students in Babolsar.

Methods and Materials: This applied study employed a correlational design based on structural equation modeling (SEM). The statistical population consisted of all tenth-, eleventh-, and twelfth-grade students in Babolsar during the 2025–2026 academic year. Using multistage cluster random sampling, 300 students were selected and included in the final analysis. Data were collected using the Self-Regulated Learning Questionnaire developed by Bouffard et al. (1995), the Academic Motivation Scale developed by Vallerand (1992), and the Rosenberg Self-Esteem Scale (1965). Descriptive statistics and Pearson correlation coefficients were calculated using SPSS, while the hypothesized structural model was tested using AMOS through maximum likelihood estimation. The adequacy of the model was evaluated using standard fit indices, including χ^2/df, RMSEA, CFI, IFI, GFI, PNFI, and PCFI.

Findings: The results indicated that all correlations among the principal study variables were positive and statistically significant ($p < .001$). Self-regulated learning demonstrated a significant positive direct effect on academic motivation ($\beta = .545$, $p < .001$) and self-esteem ($\beta = .504$, $p < .001$). Self-esteem also had a significant positive direct effect on academic motivation ($\beta = .264$, $p < .001$). Furthermore, the indirect effect of self-regulated learning on academic motivation through self-esteem was significant ($\beta = .133$, $p < .001$), confirming the mediating role of self-esteem. The structural model demonstrated satisfactory fit with the observed data (χ^2/df = 1.47, RMSEA = .040, CFI = .995, IFI = .995, GFI = .986, PNFI = .563, PCFI = .569), supporting the proposed theoretical framework.

Conclusion: The findings suggest that self-regulated learning is a significant predictor of academic motivation both directly and indirectly through self-esteem. Students with stronger self-regulatory skills tend to possess higher self-esteem, which in turn enhances their academic motivation.

Keywords: *Self-Regulated Learning, Academic Motivation, Self-Esteem, Secondary School Students, Educational Psychology.*

1. Introduction

Education systems across the world increasingly emphasize the development of learners who are capable of directing, monitoring, and evaluating their own learning processes. In contemporary educational environments, students are expected not only to acquire academic knowledge but also to develop the cognitive, motivational, and personal resources necessary for lifelong learning. Among the variables that have received considerable attention in educational psychology, self-regulated learning and academic motivation have emerged as two of the most influential predictors of academic success and educational adjustment. Researchers have consistently argued that students who actively regulate their learning processes demonstrate higher levels of engagement, persistence, achievement, and psychological well-being than their peers who rely primarily on external regulation (Henry & Liu, 2024; Jeon, 2025; Toomla et al., 2025).

Self-regulated learning refers to the active process through which learners set goals, monitor their progress, regulate their cognitive and behavioral strategies, and evaluate the outcomes of their learning activities. This construct integrates cognitive, metacognitive, motivational, and behavioral dimensions and enables students to become active participants in their educational experiences rather than passive recipients of information. The growing importance of self-regulated learning has been reinforced by technological advancements, learner-centered instructional approaches, and the increasing demand for independent learning skills in both traditional and digital educational environments (Jeon, 2025; Toomla et al., 2025). Research has demonstrated that self-regulated learners tend to exhibit stronger academic performance, more adaptive learning behaviors, and greater resilience when confronted with academic challenges (Maleki & Hosseini, 2024; Mornar et al., 2022).

Academic motivation represents another fundamental factor influencing students' educational experiences and outcomes. Academic motivation encompasses the internal and external forces that energize, direct, and sustain students' learning behaviors. According to contemporary motivational theories, motivated students are more likely to invest effort, persist in the face of difficulties, utilize effective learning strategies, and achieve favorable educational outcomes. Conversely, students with low levels of motivation often display disengagement, procrastination, poor academic performance, and increased risk of educational failure (Liang & Mao, 2025; Rentzios et al., 2025). Consequently, understanding the determinants and mechanisms underlying academic motivation remains a major concern for researchers, educators, and policymakers.

The relationship between self-regulated learning and academic motivation has received considerable empirical support. Theoretical perspectives suggest that self-regulated learning and motivation are mutually reinforcing processes. Students who possess stronger motivational resources are more likely to engage in self-regulatory activities, whereas effective self-regulation can strengthen learners' motivation by increasing feelings of competence, autonomy, and control over learning outcomes. Recent empirical studies have confirmed the close association between these constructs across diverse educational contexts. For example, research has shown that self-regulated learning contributes significantly to students' academic motivation, engagement, persistence, and achievement (Fatmala, 2025; Henry & Liu, 2024; Nuryana & Wahyuni, 2025). Similarly, self-regulation has been identified as a key mechanism through which learners maintain motivation and effectively respond to academic demands (Altikulaç et al., 2025).

A growing body of literature has highlighted the importance of motivational processes in explaining the effects of self-regulated learning on educational outcomes. Nuryana and Wahyuni demonstrated that learning motivation mediates the influence of self-regulated learning on academic functioning among secondary school students (Nuryana & Wahyuni, 2025). Likewise, Fatmala reported that higher levels of self-regulation are associated with stronger learning motivation and lower academic procrastination among students (Fatmala, 2025). Henry and Liu proposed an integrated model illustrating how self-regulated learning and motivation operate as interconnected systems that jointly influence students' learning experiences and outcomes (Henry & Liu, 2024). These findings collectively indicate that self-regulated learning and academic motivation are closely linked and should be examined simultaneously within comprehensive explanatory models.

Although the direct relationship between self-regulated learning and academic motivation has been extensively documented, researchers increasingly emphasize the need to identify psychological mechanisms that explain how and why this relationship occurs. One variable that appears particularly relevant in this context is self-esteem. Self-esteem refers to an individual's overall evaluation of self-worth and personal value. It reflects the extent to which

JAYPS Adolescent and Youth Psychological Studies
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individuals perceive themselves as competent, capable, and deserving of respect. Self-esteem has long been recognized as an important determinant of psychological adjustment, social functioning, and educational success (Acosta-Gonzaga, 2023; Zoabi, 2012).

Students with high self-esteem tend to exhibit greater confidence in their abilities, stronger persistence in the face of academic difficulties, and more adaptive coping strategies. In contrast, students with low self-esteem often experience self-doubt, anxiety, reduced motivation, and avoidance of challenging tasks. Educational researchers have consistently reported positive associations between self-esteem and various indicators of academic functioning, including engagement, achievement, persistence, and motivation (Fatemi Panah, 2022; Jimoh et al., 2023; Koner & Mazumder, 2024). Therefore, self-esteem may serve as an important psychological resource that influences students' willingness to engage in and sustain academic activities.

The relationship between self-esteem and academic motivation has been supported by substantial empirical evidence. Zoabi found that students with higher self-esteem demonstrated stronger motivation for learning than students with lower self-esteem (Zoabi, 2012). Similarly, Fatemi Panah reported a significant positive relationship between self-esteem and academic motivation among students, suggesting that self-esteem plays a critical role in sustaining educational engagement and effort (Fatemi Panah, 2022). More recent studies have further confirmed that self-esteem contributes significantly to students' academic outcomes by fostering motivation, confidence, and adaptive learning behaviors (Jimoh et al., 2023; Koner & Mazumder, 2024).

Research also suggests that self-esteem may be closely linked to self-regulated learning. Students who possess positive self-evaluations are more likely to believe in their ability to manage learning tasks effectively, apply appropriate learning strategies, and persist when confronted with challenges. Conversely, successful self-regulation may enhance self-esteem by providing students with repeated experiences of competence and accomplishment. Empirical findings support this reciprocal relationship. Babazadeh and colleagues demonstrated that educational interventions aimed at improving students' self-regulation also enhanced self-esteem (Babazadeh et al., 2021). Likewise, Seo and Shim reported that childhood self-esteem significantly predicted self-regulated learning during adolescence, highlighting the importance of self-esteem as a developmental resource for effective learning regulation (Seo & Shim, 2024).

Recent investigations have increasingly examined self-esteem as a mediating mechanism connecting various psychological and educational variables. Acosta-Gonzaga found that self-esteem contributed significantly to academic engagement and performance, suggesting that positive self-evaluations facilitate educational success through motivational and behavioral pathways (Acosta-Gonzaga, 2023). Similarly, Almurumudhe and colleagues reported that self-esteem mediated the relationships among psychological capital, academic engagement, procrastination, and academic performance, demonstrating its importance as an explanatory variable within educational models (Almurumudhe et al., 2024). These findings indicate that self-esteem may operate as a bridge connecting personal resources with academic outcomes.

Additional evidence supports the proposition that self-esteem functions within broader networks of motivational and self-regulatory processes. Namaziandost and colleagues identified significant associations among academic self-esteem, emotional regulation, demotivation, and educational functioning, emphasizing the central role of self-esteem in academic adjustment (Namaziandost et al., 2023). Similarly, Khawwaf and colleagues reported that self-esteem, self-regulation, and learning strategies significantly predicted academic motivation among university students (khawwaf et al., 2024). These findings suggest that self-esteem may represent a critical psychological mechanism through which self-regulatory processes influence motivational outcomes.

Recent theoretical developments further reinforce the importance of integrating self-regulated learning, self-esteem, and academic motivation within a single explanatory framework. Studies examining motivational beliefs, psychological capital, emotional regulation, and learning engagement consistently indicate that self-regulation and self-evaluative processes jointly influence students' motivation and academic functioning (Haseli Songhori & Salamti, 2024; Maleki & Hosseini, 2024; Rentzios et al., 2025). Moreover, contemporary research in educational psychology increasingly advocates the use of structural models that capture the complex interrelationships among cognitive, motivational, and personal variables rather than examining these factors in isolation (Jeon, 2025; Toomla et al., 2025).

Despite the growing body of literature, several gaps remain. First, although many studies have investigated the direct associations between self-regulated learning and academic motivation, relatively fewer studies have examined the mediating role of self-esteem in this

JAYPS Adolescent and Youth Psychological Studies E-ISSN: 2981-2526

relationship. Second, much of the existing evidence has been generated in university settings, whereas fewer studies have focused on students in upper secondary education. Third, cultural and contextual differences may influence the relationships among self-regulated learning, self-esteem, and academic motivation, highlighting the importance of conducting research in diverse educational environments (Liang & Mao, 2025; Rentzios et al., 2025). Investigating these relationships among Iranian secondary school students may therefore contribute valuable insights to both theory and practice.

Given the theoretical significance of self-regulated learning and academic motivation, the established importance of self-esteem for educational functioning, and the limited evidence regarding their integrated structural relationships among secondary school students, the present study aimed to examine the structural relationships between self-regulated learning and academic motivation with the mediating role of self-esteem among upper secondary school students in Babolsar.

2. Methods and Materials

2.1. Study Design and Participants

The present study was applied in terms of purpose and correlational-explanatory in terms of method, using structural equation modeling to examine the structural relationships between self-regulated learning and academic motivation through the mediating role of self-esteem among upper secondary school students in Babolsar. The research design was non-experimental and cross-sectional, and the data were analyzed within a multivariate correlational framework. The statistical population consisted of all students enrolled in the second stage of secondary education, including tenth-, eleventh-, and twelfth-grade students, in Babolsar during the 2025–2026 academic year. According to the report obtained from the Department of Education of Babolsar, the total number of students in this population was 4,242. Considering the use of structural equation modeling and the need for an adequate sample size to ensure stable parameter estimation, appropriate model fit assessment, and sufficient statistical power, the sample size was determined conservatively. Based on methodological recommendations for SEM studies and considering the number of latent and observed variables in the proposed model, the minimum required sample size was estimated to be approximately 240 participants. However, to increase the accuracy of estimation, compensate for incomplete questionnaires, and strengthen the robustness of model fitting, the sample size was increased to approximately 300 to 320 students. After excluding incomplete questionnaires, data from 300 valid questionnaires were entered into the final analysis.

Participants were selected using multistage cluster random sampling. In the first stage, Babolsar was divided into four geographical areas, namely north, south, east, and west. From each area, one school was randomly selected. Then, from each selected school and from each educational grade, one classroom with approximately 25 to 30 students was selected. The questionnaires were distributed among the selected students after obtaining the necessary permissions and coordinating with school administrators. The inclusion criteria were willingness to participate in the study, provision of informed consent, appropriate physical and psychological health, enrollment in the second stage of secondary education, and being within the age range corresponding to the target educational level. The exclusion criteria included unwillingness to continue participation and the presence of serious psychiatric disorders. Ethical considerations were observed throughout the research process. Before data collection, the required approval was obtained from the relevant ethics committee. Participants were informed about the general objectives of the study, their participation was completely voluntary, and they were assured that they could withdraw from the study at any stage. No identifying information, such as names or family names, was collected, and all responses were kept confidential. Any report derived from the study was prepared without including personal information about the participants.

2.2. Measures

Data were collected through a field method using standardized questionnaires. In addition to reviewing library sources and the relevant research literature, the main data required for statistical analysis were obtained directly from participants through self-report instruments. Before administering the questionnaires, the tools were reviewed and approved for use in the study. The students were provided with the necessary explanations regarding the purpose of the study and the method of responding to the items, and they were asked to complete the questionnaires carefully and honestly within the specified time. The instruments used in this study measured self-regulated learning, academic motivation, and self-esteem.

Self-regulated learning was measured using the Self-Regulated Learning Questionnaire developed by Bouffard

JAYPS Adolescent and Youth Psychological Studies E-ISSN: 2981-2526

and colleagues in 1995. This questionnaire consists of 14 items and is designed to assess students' self-regulated learning strategies. The items are scored on a five-point Likert scale ranging from strongly agree to strongly disagree, with scores ranging from 5 to 1. The total score can range from 14 to 70, with higher scores indicating a higher level of self-regulated learning. The questionnaire includes three components: cognitive strategies, motivational strategies, and metacognitive strategies. The cognitive strategies component includes items 3, 7, 9, 10, and 12; the motivational strategies component includes items 6, 8, and 11; and the metacognitive strategies component includes items 1, 2, 4, 5, 13, and 14. Previous studies have reported acceptable reliability and validity for this instrument. Cronbach's alpha coefficients of approximately 0.70 or higher have been reported for the overall scale and its subscales, and confirmatory factor analysis has supported its construct validity. In addition, previous Iranian studies have reported acceptable internal consistency coefficients for the questionnaire, indicating that the instrument is suitable for measuring self-regulated learning among students.

Academic motivation was assessed using the Academic Motivation Scale developed by Vallerand in 1992 based on the self-determination theory of Deci and Ryan. The localized version of this instrument has also been used in more recent studies. This questionnaire includes 28 items and measures three dimensions of academic motivation: intrinsic motivation, extrinsic motivation, and amotivation. The intrinsic motivation dimension includes items 2, 4, 6, 9, 11, 13, 16, 18, 20, 23, 25, and 27; the extrinsic motivation dimension includes items 1, 3, 7, 8, 10, 14, 15, 17, 21, 22, 24, and 28; and the amotivation dimension includes items 5, 12, 19, and 26. The items are scored on a Likert-type scale, with higher scores in each dimension indicating a stronger presence of that motivational orientation. The reliability and validity of the original English version of the scale have been confirmed among high school and Canadian student samples. In the Iranian context, the face validity of the questionnaire has been confirmed by experts in educational sciences, and its reliability has been examined using test–retest and Cronbach's alpha methods. The reported Cronbach's alpha coefficient for the total scale was 0.88, and previous findings have supported the three-factor structure of intrinsic motivation, extrinsic motivation, and amotivation. Earlier studies have also reported acceptable Cronbach's alpha coefficients for the subscales, indicating the instrument's suitability for assessing students' academic motivation.

Self-esteem was measured using the Rosenberg Self-Esteem Scale, developed in 1965. This instrument consists of 10 items and assesses individuals' positive and negative feelings toward themselves. The Rosenberg Self-Esteem Scale is widely used in psychological and educational research because of its favorable psychometric properties. Although the original instrument is generally considered a unidimensional scale, some studies have emphasized its positive and negative self-evaluation dimensions. Different scoring methods have been proposed for this questionnaire, including four-point Likert scoring and two-option agree/disagree scoring. In the Iranian version used in this study, the agree/disagree scoring method was applied. For items 1 to 5, agreement receives a positive score and disagreement receives a negative score, whereas for items 6 to 10, agreement receives a negative score and disagreement receives a positive score. The total score is calculated by summing the item scores, with higher scores indicating higher self-esteem and lower scores indicating lower self-esteem. Previous studies have reported acceptable reliability coefficients for this scale, including Cronbach's alpha and split-half reliability. Test–retest coefficients across one-, two-, and three-week intervals have also indicated acceptable temporal stability. Therefore, the Rosenberg Self-Esteem Scale was considered an appropriate instrument for measuring self-esteem among upper secondary school students.

2.3. Data Analysis

After data collection, incomplete questionnaires were excluded, and the remaining valid questionnaires were coded and entered into statistical software for analysis. Data analysis was conducted using SPSS and AMOS. First, the data were screened to identify incomplete responses, outliers, and possible entry errors. Descriptive statistics, including mean, standard deviation, frequency, and percentage, were used to describe the demographic characteristics of the participants and the main research variables. The reliability of the instruments was examined using Cronbach's alpha coefficients. In addition, the assumptions required for multivariate analysis and structural equation modeling, including normality of distribution, linearity, and the adequacy of correlations among variables, were assessed before testing the structural model.

The main analytical method used in this study was structural equation modeling. This method was selected because it allows the simultaneous examination of direct and

indirect relationships among observed and latent variables within a theory-based model. Structural equation modeling is a comprehensive multivariate analytical technique that enables researchers to test a set of regression equations at the same time and evaluate whether the proposed theoretical model is consistent with the empirical data. In the present study, the structural model was designed to examine the relationship between self-regulated learning and academic motivation and to determine whether self-esteem mediates this relationship. The maximum likelihood estimation method was used to estimate the parameters of the model. Model fit was evaluated using common fit indices, including the chi-square statistic, the chi-square to degrees of freedom ratio, the comparative fit index, the goodness-of-fit index, the adjusted goodness-of-fit index, the Tucker–Lewis index, and the root mean square error of approximation. The significance of direct and indirect paths was examined based on standardized path coefficients and significance levels. The mediating role of self-esteem was evaluated by analyzing the indirect effect of self-regulated learning on academic motivation through self-esteem. A significance level of 0.05 was considered for statistical decisions.

3. Findings and Results

Based on the demographic results, 300 upper secondary school students participated in the study. Of these participants, 152 students were male, representing 50.7% of the sample, and 148 students were female, representing 49.3%. In terms of educational grade, the distribution of students across the tenth, eleventh, and twelfth grades was almost equal. Specifically, 99 students, equal to 33.0%, were in the tenth grade, 100 students, equal to 33.3%, were in the eleventh grade, and 101 students, equal to 33.7%, were in the twelfth grade. Regarding field of study, the highest frequency belonged to experimental sciences, with 118 students, equal to 39.3%, while the lowest frequency belonged to mathematics, with 90 students, equal to 30.0%. In addition, 92 students, equal to 30.7%, were studying humanities.

Table 1

Descriptive Statistics and Correlation Matrix of the Research Variables

Variable	M	SD	Min–Max	Skewness	Kurtosis	1	2	3	4	5	6	7	8	9
1. Cognitive strategies	13.75	3.11	5–25	0.03	0.19	1								
2. Motivational strategies	9.02	2.06	3–15	-0.06	0.35	.70**	1							
3. Metacognitive strategies	16.61	3.71	6–30	-0.03	0.63	.72**	.66**	1						
4. Total self-regulated learning	39.86	8.34	15–69	0.04	0.56	.88**	.84**	.85**	1					
5. Self-esteem	24.82	4.54	10–40	-0.12	0.64	.39**	.41**	.47**	.50**	1				
6. Intrinsic motivation	36.92	10.14	12–72	0.17	0.16	.52**	.42**	.48**	.54**	.46**	1			
7. Extrinsic motivation	35.45	9.34	12–72	0.19	0.27	.50**	.47**	.51**	.56**	.45**	.70**	1		
8. Amotivation	11.92	3.19	4–24	0.05	0.56	.49**	.47**	.48**	.57**	.47**	.73**	.75**	1	
9. Total academic motivation	86.20	22.10	31–168	0.04	0.25	.57**	.50**	.59**	.63**	.53**	.88**	.87**	.87**	1

**p < .01.

As shown in Table 1, the mean score of total self-regulated learning was 39.86 with a standard deviation of 8.34, and the mean score of self-esteem was 24.82 with a standard deviation of 4.54. Among the components of self-regulated learning, metacognitive strategies had the highest mean score, followed by cognitive strategies and motivational strategies. For academic motivation, the mean score of total academic motivation was 86.20 with a standard deviation of 22.10. The results of the Pearson correlation matrix showed that all main research variables were positively and significantly correlated. Total self-regulated learning had a positive and significant relationship with self-esteem and total academic motivation. In addition, self-esteem was positively and significantly associated with intrinsic motivation, extrinsic motivation, amotivation, and total academic motivation. The correlation between total self-regulated learning and total academic motivation was relatively strong, indicating that students with higher levels of self-regulated learning tended to report higher levels of academic motivation. Moreover, the significant correlation between self-regulated learning and self-esteem supported the theoretical assumption that self-esteem could function as

JAYPS
Adolescent and Youth Psychological Studies
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a mediating variable in the relationship between self-regulated learning and academic motivation.

Before testing the structural model, the main assumptions of structural equation modeling were examined. Missing data were reviewed, and appropriate procedures were used to manage incomplete responses before the final analysis. Univariate outliers were assessed through standardized z scores, and the results indicated that no problematic univariate outliers were present. Multivariate outliers were examined using Mahalanobis distance, and no influential multivariate outliers were detected. The assumption of univariate normality was evaluated through skewness and kurtosis indices. As reported in Table 1, the absolute values of skewness and kurtosis for all observed variables were within acceptable ranges, indicating that the distributions of the variables did not violate the assumption of univariate normality. Multivariate normality was also examined using Mardia's coefficient and its critical ratio, and the obtained critical ratio was below the acceptable threshold of 5, indicating that the assumption of multivariate normality was supported. Multicollinearity was assessed using tolerance and variance inflation factor values. The tolerance coefficients were above the critical value of .10, and the VIF values were below 10, showing that multicollinearity was not a serious concern among the observed variables. Therefore, the data were considered suitable for structural equation modeling.

Table 2

Goodness-of-Fit Indices for the Structural Model

Fit index	χ^2	df	p-value	CMIN/df	RMSEA	RMSEA 90% CI	PNFI	CFI	PCFI	IFI	GFI
Proposed model	17.62	12	.128	1.47	.040	.000–.076	.563	.995	.569	.995	.986
Acceptable criterion	—	—	> .05	< 3.00	< .08	—	> .50	> .90	> .50	> .90	

The results presented in Table 2 indicate that the proposed structural model had an acceptable and desirable fit with the observed data. The chi-square value was not statistically significant, suggesting that the difference between the observed covariance matrix and the model-implied covariance matrix was not substantial. The relative chi-square value was 1.47, which was below the commonly accepted threshold of 3. The RMSEA value was .040, with a 90% confidence interval ranging from .000 to .076, indicating a good approximation of model fit. In addition, the values of CFI, IFI, and GFI were all above .90, and the values of PNFI and PCFI were above .50. Taken together, these indices confirmed that the structural model explaining academic motivation through self-regulated learning and self-esteem had satisfactory fit. Therefore, the proposed model of the structural relationship between self-regulated learning and academic motivation with the mediating role of self-esteem among upper secondary school students in Babolsar was supported.

Table 3

Path Analysis of the Structural Model

Path	Unstandardized coefficient	Standard error	Critical ratio	Standardized coefficient	p-value
Self-regulated learning → Self-esteem	.584	.068	8.63	.504	< .001
Self-regulated learning → Academic motivation	.525	.063	8.32	.545	< .001
Self-esteem → Academic motivation	.219	.047	4.66	.264	< .001
Self-regulated learning → Self-esteem → Academic motivation	.128	.030	4.30	.133	< .001

The results of the path analysis in Table 3 showed that all direct and indirect paths in the proposed model were statistically significant. The direct path from self-regulated learning to self-esteem was positive and significant, indicating that students with higher levels of self-regulated learning reported higher levels of self-esteem. The direct path from self-regulated learning to academic motivation was also positive and significant, showing that self-regulated learning directly predicted academic motivation. In addition, the path from self-esteem to academic motivation was positive and significant, meaning that students with higher self-esteem tended to report higher academic motivation.

JAYPS Adolescent and Youth Psychological Studies
E-ISSN: 2981-2526

The indirect effect of self-regulated learning on academic motivation through self-esteem was also significant, confirming the mediating role of self-esteem in the relationship between self-regulated learning and academic motivation. Since the direct path from self-regulated learning to academic motivation remained significant after entering self-esteem into the model, the mediation pattern can be interpreted as partial mediation. Overall, the results showed that self-regulated learning predicted academic motivation both directly and indirectly through self-esteem.

4. Discussion

The present study aimed to investigate the structural relationships between self-regulated learning and academic motivation with the mediating role of self-esteem among upper secondary school students in Babolsar. The findings indicated that the proposed structural model demonstrated satisfactory fit with the observed data, suggesting that the theoretical relationships specified among the study variables were supported empirically. Furthermore, the results revealed significant positive relationships between self-regulated learning, self-esteem, and academic motivation. The direct effect of self-regulated learning on academic motivation was significant, the direct effect of self-regulated learning on self-esteem was significant, and self-esteem significantly predicted academic motivation. Additionally, the indirect effect of self-regulated learning on academic motivation through self-esteem was statistically significant, indicating that self-esteem partially mediated the relationship between self-regulated learning and academic motivation.

One of the most important findings of the present study was the significant positive relationship between self-regulated learning and academic motivation. This finding suggests that students who employ cognitive, motivational, and metacognitive strategies more effectively tend to exhibit higher levels of academic motivation. Such students are more likely to establish learning goals, monitor their progress, regulate their learning behaviors, and persist when facing academic challenges. These characteristics contribute to stronger motivational beliefs and greater commitment to academic activities. The finding is consistent with the theoretical perspective that motivation and self-regulation are interconnected processes that mutually reinforce one another. When students actively regulate their learning experiences, they gain a greater sense of control over educational outcomes, which in turn enhances their willingness to engage in academic tasks and invest effort in learning activities.

This result is consistent with previous empirical research. Henry and Liu demonstrated that self-regulated learning and motivation function as integrated components of successful learning processes and that learners with stronger self-regulatory capacities generally display higher levels of academic motivation (Henry & Liu, 2024). Similarly, Altikulaç and colleagues found that self-regulated learning plays a central role in fostering academic motivation and serves as an important mechanism linking personal beliefs and educational outcomes (Altikulaç et al., 2025). Nuryana and Wahyuni also reported that self-regulated learning positively influences students' motivation and academic adjustment, highlighting its significance in reducing educational burnout and promoting adaptive educational functioning (Nuryana & Wahyuni, 2025). Likewise, Fatmala showed that stronger self-regulation is associated with higher learning motivation and lower procrastination tendencies among students (Fatmala, 2025). Collectively, these findings support the argument that self-regulated learning is a critical determinant of academic motivation across different educational contexts.

The significant association observed between self-regulated learning and academic motivation can also be explained through motivational theories emphasizing autonomy, competence, and self-determination. Students who effectively regulate their learning behaviors are more likely to experience academic success, perceive themselves as competent learners, and develop positive expectations regarding future performance. These experiences strengthen motivational resources and encourage further engagement in learning activities. The reciprocal nature of this relationship may also explain why motivated students often display greater use of self-regulated learning strategies, creating a positive cycle of educational engagement and achievement (Henry & Liu, 2024; Jeon, 2025).

Another important finding of the study was the significant positive relationship between self-regulated learning and self-esteem. Students who reported higher levels of self-regulated learning also demonstrated higher levels of self-esteem. This finding indicates that the ability to manage one's own learning processes contributes not only to educational performance but also to students' perceptions of personal worth and competence. When students successfully plan, monitor, and evaluate their academic activities, they experience repeated opportunities for accomplishment and mastery. These experiences foster confidence in their

JAYPS
Adolescent and Youth Psychological Studies
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abilities and contribute to positive self-evaluations. Consequently, self-regulated learning appears to function as an important source of self-esteem development during adolescence.

The finding is consistent with previous studies emphasizing the close relationship between self-regulation and self-esteem. Babazadeh and colleagues reported that interventions designed to improve self-regulation among students led to significant improvements in self-esteem and self-concept (Babazadeh et al., 2021). Similarly, Seo and Shim found that self-esteem plays a substantial role in the development of self-regulated learning and that students with stronger self-esteem tend to demonstrate more adaptive self-regulatory behaviors (Seo & Shim, 2024). Maleki and Hosseini further highlighted the importance of motivational and psychological resources in predicting self-regulated learning, suggesting that positive self-perceptions facilitate the effective management of learning activities (Maleki & Hosseini, 2024). Therefore, the present findings reinforce the notion that self-regulation and self-esteem are closely interconnected aspects of student development.

The study also revealed a significant positive relationship between self-esteem and academic motivation. Students with higher self-esteem reported stronger academic motivation than students with lower self-esteem. This finding suggests that students who possess positive self-evaluations are more likely to believe in their capabilities, value educational success, and remain engaged in academic activities. High self-esteem may provide students with the confidence necessary to pursue challenging goals, cope with setbacks, and maintain effort despite difficulties. Conversely, low self-esteem may undermine motivation by generating feelings of inadequacy, self-doubt, and fear of failure.

This finding is highly consistent with previous literature. Zoabi reported that students with stronger self-esteem exhibit greater motivation for learning and more positive attitudes toward educational activities (Zoabi, 2012). Similarly, Fatemi Panah found a significant positive association between self-esteem and academic motivation among students, emphasizing the importance of self-worth in sustaining educational engagement (Fatemi Panah, 2022). Jimoh and colleagues also demonstrated that self-esteem contributes significantly to students' academic outcomes by influencing motivation, persistence, and educational performance (Jimoh et al., 2023). Furthermore, Koner and Mazumder highlighted self-esteem as a major psychological factor associated with academic motivation and academic adjustment (Koner & Mazumder, 2024). The consistency between the present findings and previous evidence suggests that self-esteem is a fundamental motivational resource across educational settings.

Perhaps the most significant contribution of the present study lies in its examination of the mediating role of self-esteem in the relationship between self-regulated learning and academic motivation. The results demonstrated that self-esteem partially mediated this relationship, indicating that self-regulated learning influences academic motivation both directly and indirectly through self-esteem. In other words, students who engage in self-regulated learning strategies tend to develop more positive self-perceptions, which subsequently enhance their academic motivation. This finding provides important insight into the psychological mechanisms underlying the influence of self-regulation on motivation.

The mediating effect identified in this study aligns with previous research emphasizing the explanatory role of self-esteem in educational processes. Acosta-Gonzaga found that self-esteem contributes significantly to academic engagement and educational performance by enhancing students' confidence and willingness to participate in academic activities (Acosta-Gonzaga, 2023). Similarly, Almurumudhe and colleagues demonstrated that self-esteem mediates relationships among psychological resources, academic engagement, procrastination, and educational performance, suggesting that self-esteem acts as an important psychological bridge connecting personal strengths with educational outcomes (Almurumudhe et al., 2024). The current findings extend this line of research by demonstrating that self-esteem also serves as a mediating mechanism linking self-regulated learning to academic motivation among secondary school students.

Theoretical explanations for this mediating role can be derived from social-cognitive and self-determination perspectives. Effective self-regulation provides students with experiences of mastery, competence, and successful goal attainment. These experiences strengthen self-esteem by reinforcing positive beliefs about personal capabilities. Enhanced self-esteem then increases academic motivation because students become more confident in their ability to succeed and more willing to invest effort in educational activities. Thus, self-esteem functions as a psychological pathway through which self-regulated learning exerts part of its influence on motivation. The finding is also consistent with studies highlighting the importance of self-esteem in broader educational networks involving motivation,

JAYPS Adolescent and Youth Psychological Studies
E-ISSN: 2981-2526

engagement, emotional regulation, and learning outcomes (khawwaf et al., 2024; Namaziandost et al., 2023).

The overall model fit obtained in the present study further supports the theoretical integration of self-regulated learning, self-esteem, and academic motivation. The satisfactory fit indices indicate that the proposed structural framework adequately explains the relationships among these variables. This finding is consistent with contemporary educational research advocating multidimensional models that simultaneously consider cognitive, motivational, and personal factors in explaining educational functioning (Rentzios et al., 2025; Toomla et al., 2025). Recent studies have increasingly emphasized that students' educational experiences cannot be understood through isolated variables and that comprehensive models provide a more accurate representation of academic functioning (Haseli Songhori & Salamti, 2024; Jeon, 2025).

Another notable aspect of the findings is the relatively strong predictive power of the model for academic motivation. This result suggests that self-regulated learning and self-esteem together account for a substantial proportion of variation in students' academic motivation. Such findings underscore the practical importance of fostering both self-regulatory skills and positive self-perceptions in educational settings. Educational interventions that target only academic knowledge may be insufficient if students lack the motivational and psychological resources necessary to apply that knowledge effectively. The findings therefore support educational approaches that simultaneously develop cognitive skills, self-regulation capacities, and positive self-concepts.

5. Conclusion

Overall, the findings of the present study provide strong evidence that self-regulated learning plays a central role in promoting academic motivation among upper secondary school students. Furthermore, self-esteem emerges as a significant psychological mechanism through which self-regulated learning contributes to motivational development. The results reinforce contemporary theoretical perspectives emphasizing the interplay among cognitive, motivational, and personal variables and highlight the importance of adopting holistic approaches to student development. By demonstrating both direct and indirect pathways linking self-regulated learning and academic motivation, the study contributes to a deeper understanding of the psychological factors that support successful educational functioning during adolescence.

6. Limitations & Suggestions

Despite its contributions, the present study has several limitations. First, the cross-sectional design limits the ability to draw causal conclusions regarding the relationships among self-regulated learning, self-esteem, and academic motivation. Second, all variables were measured using self-report questionnaires, which may be influenced by social desirability bias and subjective perceptions. Third, the sample was restricted to upper secondary school students in Babolsar, which may limit the generalizability of the findings to students from other regions, educational levels, or cultural backgrounds. Finally, although the model explained a substantial proportion of academic motivation, other potentially influential variables were not included in the analysis.

Future studies may employ longitudinal or experimental designs to examine causal relationships among self-regulated learning, self-esteem, and academic motivation over time. Researchers are encouraged to investigate additional mediating and moderating variables, such as academic self-efficacy, parental support, teacher support, emotional intelligence, and psychological well-being. Comparative studies involving different educational levels, regions, and cultural contexts could provide a broader understanding of these relationships. Future investigations may also incorporate qualitative methods to gain deeper insights into students' experiences of self-regulation, self-esteem, and motivation within academic environments.

Educational practitioners should design programs that strengthen students' self-regulated learning skills, including goal setting, planning, self-monitoring, and reflective learning practices. Schools should also implement initiatives aimed at enhancing students' self-esteem through positive feedback, supportive teacher-student relationships, opportunities for achievement, and recognition of individual strengths. Teachers can integrate self-regulation training into classroom instruction and create learning environments that encourage autonomy, competence, and active participation. School counselors and educational psychologists may also develop interventions that simultaneously target self-esteem and self-regulatory skills as a means of promoting stronger academic motivation and improving overall educational outcomes.

JAYPS Adolescent and Youth Psychological Studies
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Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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Authors' Contributions

All authors equally contributed to this article.

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JAYPS Adolescent and Youth Psychological Studies
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