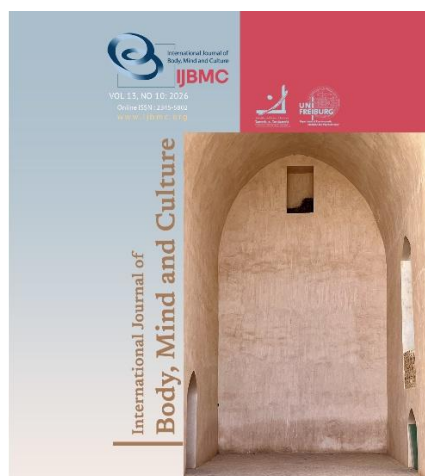


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Structural Model of Academic Engagement Based on Academic Self-Regulation and Academic Buoyancy: The Mediating Role of Emotional Intelligence in Students

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ABSTRACT

Objective: This study aimed to develop and test a structural model of academic engagement based on academic self-regulation and academic buoyancy, with emotional intelligence as a mediator among upper secondary school students.

Methods and Materials: A descriptive-correlational cross-sectional design using structural equation modeling was applied. The statistical population included all male upper secondary school students in Gorgan City, Iran, in 2024. A total of 350 students were selected through multi-stage cluster random sampling. Data were collected using the Academic Engagement Questionnaire, Academic Self-Regulation Questionnaire, Academic Buoyancy Questionnaire, and Schutte Emotional Intelligence Questionnaire. Data were analyzed using Pearson correlation and structural equation modeling in SPSS and AMOS version 24. Model fit was evaluated using CMIN/DF, RMSEA, SRMR, CFI, GFI, NFI, IFI, and TLI.

Findings: The model showed acceptable fit, CMIN/DF = 1.32, RMSEA = .07, SRMR = .03, CFI = .92, GFI = .91, NFI = .98, IFI = .96, and TLI = .96. Academic self-regulation, $\beta = .67$, $p = .001$, academic buoyancy, $\beta = .27$, $p = .001$, and emotional intelligence, $\beta = .19$, $p = .001$, had significant direct effects on academic engagement. Bootstrap analysis confirmed significant indirect effects of academic self-regulation, $\beta = .69$, and academic buoyancy, $\beta = .55$, on academic engagement through emotional intelligence. The model explained 64% of the variance in academic engagement.

Conclusion: Academic self-regulation and academic buoyancy predicted academic engagement directly and indirectly through emotional intelligence.

Keywords: Academic Engagement, Academic Buoyancy, Academic Self-Regulation, Emotional Intelligence, Students.

Introduction

The issue of academic success has always attracted the attention of education specialists and researchers in the educational and academic fields, and over recent decades it has been the focus of numerous studies (Laronze & N'kaoua, 2025). One factor that can play an effective role in academic success and performance and be considered a basis for adaptation to educational environments is academic engagement among learners (Pattnaik et al., 2024). Learners with high academic engagement, unlike those with low engagement, show a greater willingness to devote time and effort to academic activities and, when faced with academic challenges, use appropriate coping strategies (Yazdi & Ghanizadeh, 2024). A lack of interest in study and school can lead to serious consequences such as poor progress at school, a tendency toward deviant behaviors, and the risk of dropping out (Yazdi & Ghanizadeh, 2024).

Regarding factors related to engagement and motivation in academic processes, evidence from recent studies indicates that emotion regulation is associated with success or failure in various domains of life, including academic status and learning. Learners with higher levels of academic self-regulation demonstrate greater motivation and engagement in academic tasks and show more desirable academic performance than their peers (Turner & Husman, 2008). On the other hand, students who are engaged with academic conditions perform academic tasks with greater enjoyment and, when encountering academic challenges, display more adaptive and constructive responses; this, in turn, leads to a higher sense of academic buoyancy among students (Razavi Motlagh et al., 2022).

In examining the concepts and factors related to and influencing academic engagement, researchers—beyond educational constructs—have also explored the roles of psychological, cognitive, and emotional factors in separate and scattered studies. In this regard, McEown et al. (2024), in a study, referred to emotional intelligence as one of the individual–emotional skills and personality characteristics, noting that its use in the teaching–learning process plays an effective role in students' success across different educational

levels. It has also been shown that individuals' beliefs about the nature of knowledge, knowing, and acquiring knowledge—known as epistemological beliefs—are among the factors influencing learning, and are related to many positive academic constructs such as academic self-efficacy, academic engagement and motivation, and desirable academic success and performance (Shirzad et al., 2022). Nevertheless, most studies in recent years have focused on direct and causal relationships among academic constructs. Given the importance of academic engagement and the significant role it can play in improving students' academic performance, the integrated examination of academic, psychological, emotional, and cognitive determinants within coherent structural equation modeling frameworks has been relatively neglected by researchers. Therefore, the present study was designed to develop a structural model of academic engagement based on academic self-regulation and academic buoyancy, with the mediating role of emotional intelligence, among students.

Methods and Materials

Study Design

The present study, in terms of paradigm, was quantitative; in terms of purpose, it was applied; in terms of data collection and analysis, it was correlational and based on structural equation modeling; and in terms of time horizon, it was cross-sectional. The statistical population of this study included all male students studying in the second cycle of secondary education in Gorgan City in 2024. Although there is no general consensus on the required sample size for factor analysis and structural equation modeling, according to many researchers, including Kline (2012), a minimum sample size of 200 is sufficient. Therefore, in the present study, based on Kline's recommendation and to increase the generalizability of the results, a sample size of 350 students was considered and selected using multi-stage cluster sampling.

Instruments

Academic Engagement Questionnaire: This questionnaire was developed by Fredricks et al. (2004). It consists of 15 items and three components: "behavioral engagement in

learning” (items 1, 2, 3, 4), “emotional engagement in learning” (items 5, 6, 7, 8, 9, 10), and “cognitive engagement in learning” (items 11, 12, 13, 14, 15). Responses to each item are scored from 1 to 5, ranging from (Never to Always). Accordingly, Never is scored 1, Rarely 2, Sometimes 3, Often 4, and Always 5. The minimum score a respondent can obtain is 15 and the maximum score is 75. A score between 15 and 25 indicates low academic engagement, a score between 26 and 50 indicates moderate academic engagement, and a score above 50 indicates high academic engagement. The developers reported the overall reliability of the instrument using Cronbach’s alpha as 0.86 and its convergent validity with the Academic Performance Questionnaire as 0.67 (Fredricks et al., 2004). In an Iranian study, the content validity of the questionnaire was reported as 0.89 by Abbasi et al. (2015). In another Iranian study, the overall reliability of the instrument using Cronbach’s alpha was 0.81, and for the subscales, behavioral engagement was 0.79, emotional engagement 0.77, and cognitive engagement 0.78 (Davoodi et al., 2025). In the present study, reliability using Cronbach’s alpha for the total scale was 0.76.

Academic Self-Regulation Questionnaire: This questionnaire was designed by Savari & Arabzadeh (2013) to assess academic self-regulation in students. It includes 30 items and six subscales: memory strategy (items 1 to 5), goal setting (items 6 to 8), self-evaluation (items 9 to 14), help seeking (items 15 to 20), responsibility (items 21 to 24), and organization (items 25 to 30). Respondents answer the items based on a 6-point Likert scale. Accordingly, the options are scored as Never (1), Rarely (2), Sometimes (3), Usually (4), Most of the time (5), and Always (6). The minimum score a respondent can obtain from this questionnaire is 30 and the maximum is 180, and higher scores indicate higher academic self-regulation. The developers estimated the reliability of the subscales using Cronbach’s alpha as follows: memory strategy 0.74, goal setting 0.75, self-evaluation 0.83, help seeking 0.71, responsibility 0.73, organization 0.76, and 0.87 for the total instrument. They also examined and confirmed the validity of the instrument through confirmatory factor analysis (Savari & Arabzadeh, 2013). In an Iranian study, the reliability of the questionnaire using Cronbach’s alpha

for the total scale was obtained as 0.92 (Ahrari et al., 2024). In the present study, reliability using Cronbach’s alpha for the total scale was 0.84.

Academic Buoyancy Questionnaire: This questionnaire was developed in 2012 by Dehghanizade & Hoseinchari (2013), modeled after the Academic Buoyancy Scale by Martin & Marsh (2006), with the difference that the Martin and Marsh scale included 4 items, whereas the scale designed by Hoseinchari and Dehghanizadeh contains 9 items. Scoring is based on a 5-point Likert scale, in which Strongly disagree = 1, Disagree = 2, Neither agree nor disagree = 3, Agree = 4, and Strongly agree = 5. The lower limit of scores is 9, the mid-point is 27, and the upper limit is 45. A score between 9 and 18 indicates low academic buoyancy, a score between 18 and 27 indicates moderate buoyancy, and a score above 27 indicates high academic buoyancy. In the study by Dehghanizade & Hoseinchari (2013), the reliability coefficient of the scale using Cronbach’s alpha was reported as 0.77, and the correlation of each item with the total scale score ranged from 0.54 to 0.64. The validity of this instrument was also reported using the correlation between each item and the total score, ranging from 0.51 to 0.68. In an Iranian study, Cronbach’s alpha was reported as 0.63 (Ghadampour & Beiranvand, 2018). In the present study, reliability using Cronbach’s alpha for the total scale was 0.71.

Emotional Intelligence Questionnaire: This questionnaire was developed by Schutte et al. (1998) to measure adolescents’ emotional intelligence based on the theoretical model of Mayer et al. (2008) and consists of 33 items. The items assess three subscales—emotion expression (13 items), emotion regulation (10 items), and emotion utilization (10 items)—on a 5-point Likert scale from Strongly disagree (1) to Strongly agree (5). The score range of the questionnaire is between 33 and 165. A score from 33 to 66 indicates low emotional intelligence, a score from 67 to 100 indicates moderate emotional intelligence, and a score above 100 indicates high emotional intelligence. The developers reported internal consistency for the subscales using Cronbach’s alpha ranging from 0.84 to 0.90 and test–retest reliability as 0.78. They also obtained convergent validity with the Bar-On Emotional Intelligence Questionnaire as

0.67 (Schutte et al., 1998). In Iran, reliability of the questionnaire using Cronbach's alpha and test-retest were obtained as 0.72 and 0.85, respectively, and criterion validity with the Bar-On Emotional Intelligence Questionnaire was 0.71 (Khosro Javid 2002); originally 1381. In another Iranian study, the overall reliability of the instrument was 0.77, and the subscales ranged from 0.78 to 0.91 (Golfam et al., 2024); originally 1403. In the present study, reliability using Cronbach's alpha for the total scale was 0.75.

Procedure

After the proposal was approved by the supervisor, advisor, and the university research council, the researcher visited the Gorgan Department of Education and obtained a list of boys' upper secondary schools in Gorgan City. From among these schools, five schools were selected, and the necessary steps to communicate with school administrators and students were carried out. Accordingly, by attending boys' schools in Gorgan City and holding a meeting with school principals, after providing explanations regarding the study and its purpose and obtaining the agreement of the principal and school officials, a session was held with students. In this session, the necessary explanations about how to conduct the study, confidentiality of identity information, absence of any physical or financial risk, and voluntary participation were provided. Then, the self-report instruments (questionnaires) were explained to the students, and they were asked to read all items carefully and leave no item unanswered. If any ambiguity or question arose while responding to the instruments, they could ask the researcher for clarification. After completion of all research

instruments and based on the required sample size in the present study (350 students), all questionnaires were collected and the obtained data were analyzed using the two software programs SPSS and AMOS. It should be noted that, in appreciation of the students' participation, all of them were assured that, if they wished, the researcher would provide the results to each of them while maintaining confidentiality of their identity information.

Data Analysis

To analyze the data, descriptive statistics including mean and standard deviation were used, and at the inferential level, Pearson correlation coefficient and structural equation modeling (path analysis) were applied. In addition, for examining demographic information, frequency and percentage were used. To assess the fit of the proposed model, fit indices including the normed fit index, comparative fit index, incremental fit index, goodness-of-fit index, adjusted goodness-of-fit index, and the root mean square error of approximation were used, and the data analysis software included SPSS and AMOS, version 24.

Findings and Results

The demographic characteristics of age status show that the highest frequency was for 17-year-olds and the lowest frequency was for 15-year-olds. The mean age of the participants was 16.85 and the standard deviation of age was 0.84. Based on the results, 110 individuals (31.4%) were in the 10th grade, 167 individuals (47.7%) were in the 11th grade, and 73 individuals (20.9%) were in the 12th grade.

Table 1

Number, minimum, maximum, mean, and standard deviation of the research variables

Research variables	N	Minimum	Maximum	Mean	Standard deviation
Behavioral engagement	350	4	19	9.85	5.02
Emotional engagement	350	6	24	14.47	7.87
Cognitive engagement	350	5	20	12.23	6.34
Total academic engagement score	350	15	62	36.54	17.35
Memory strategy	350	5	28	12.84	7.99
Goal setting	350	2	11	6.35	3.39
Self-evaluation	350	6	25	12.85	6.43
Help-seeking	350	6	23	12.27	5.78
Responsibility	350	4	19	10.43	5.22

Organization	350	7	26	15.68	7.56
Total academic self-regulation score	350	30	125	70.43	31.07
Academic vitality	350	9	30	14.69	7.38
Emotion expression	350	10	42	17.38	10.83
Emotion regulation	350	11	43	16.82	9.81
Emotion utilization	350	10	44	17.08	9.57
Total emotional intelligence score	350	32	129	51.28	26.56

Table 1 shows the number, minimum, maximum, mean, and standard deviation of the research variables. The number of participants who responded to the questions was 350. To conduct structural equation modeling using a parametric approach, the assumption of normality of the data and variables is required. To assess univariate normality of the data, skewness and kurtosis were used, and to examine multivariate normality, Mardia's index was employed.

To examine multivariate normality, the standardized Mardia kurtosis coefficient and the critical ratio were used. The obtained values for the Mardia coefficient and the critical ratio should be less than 5, indicating multivariate normality of the distribution of scores (Kline, 2023). Based on the results, the skewness and kurtosis values of the research variables were within the range of -2 to 2.

Therefore, the distribution of all research variables was normal. The Mardia coefficient and the critical ratio should be less than 5. In this study, the Mardia coefficient was 2.61 and the critical ratio was 1.36, indicating that the assumption of multivariate normality of the score distribution in this study was met. Therefore, structural equation modeling can be used and the results obtained from these statistical tests are reliable. The results of the Durbin-Watson statistic showed that none of the tolerance values were smaller than the permissible limit of 0.1 and none of the variance inflation factor values were greater than the permissible limit of 10. Since no multicollinearity was observed among the predictor variables, parametric tests such as Pearson's correlation coefficient and structural equation modeling can be used and their results are reliable.

Table 2

Correlation matrix among research variables

Research variables	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Academic engagement	1												
2. Memory strategy	0.63	1											
3. Goal setting	0.61	0.60	1										
4. Self-evaluation	0.52	0.66	0.63	1									
5. Help-seeking	0.66	0.60	0.57	0.51	1								
6. Responsibility	0.42	0.48	0.50	0.60	0.49	1							
7. Organization	0.61	0.53	0.53	0.65	0.42	0.63	1						
8. Total self-regulation	0.65	0.54	0.54	0.60	0.44	0.61	0.60	1					
9. Academic vitality	0.47	0.42	0.50	0.65	0.54	0.52	-0.66	0.63	1				
10. Emotion expression	0.58	0.52	0.63	0.60	0.62	0.65	0.59	0.57	0.57	1			
11. Emotion regulation	0.39	0.41	0.30	0.39	0.44	0.41	0.48	0.50	0.63	0.44	1		
12. Emotion utilization	0.34	0.40	0.34	0.31	0.57	0.61	0.53	0.53	0.57	0.35	0.63	1	
13. Total emotional intelligence	0.23	0.35	0.23	0.23	0.37	0.65	0.54	0.54	0.50	0.36	0.57	0.63	1

Relationships reported in the table are significant at the 0.01 level. Table 2 shows the correlation matrix among the research variables. There is a positive and significant

correlation between academic self-regulation, academic vitality, and emotional intelligence with academic engagement.

Table 3*Fit indices of the fitted research model*

Type of index	Indices	Obtained value	Acceptable value
Absolute indices	Normed chi-square (CMIN)	168.95	—
	Degrees of freedom	128	
	CMIN/DF	1.32	< 3
	Significance level	0.001	—
Relative indices	RMSEA	0.07	< 0.08
	SRMR	0.03	< 0.08
	PCLOSE	0.001	< 0.05
	CFI	0.92	> 0.90
	AGFI	0.94	> 0.90
	PCFI	0.70	> 0.60
	PNFI	0.85	> 0.60
	IFI	0.96	> 0.90
	TLI	0.96	> 0.90
	GFI	0.91	> 0.90
	NFI	0.98	> 0.90

In this study, the parameter estimation method was maximum likelihood estimation (MLE). Based on the results, all fit indices were desirable. The RMSEA should be below 0.08 (Kline, 2023; Ringle et al., 2020). The SRMR is defined as the difference between the observed correlations and the model-implied correlation matrix and allows evaluation of the average magnitude of differences between observed and expected correlations as an absolute measure of model fit (Henseler, 2017; Schermelleh-Engel et al., 2003). If the SRMR value is less than 0.08 (Veysi et al., 2025), values ≤ 0.05 indicate good fit and values ≤ 0.10 indicate acceptable fit. According to the results of Table 3, the RMSEA index was 0.07 and the SRMR was 0.03.

Therefore, it can be concluded that the model had a very good fit with the data and was appropriate. The 95% confidence interval around the RMSEA index was between 0.048 and 0.057, indicating a desirable model fit. The structural and fitted model shows that this research model explains 64% of academic engagement based on academic self-regulation and academic vitality with the mediating role of emotional intelligence and epistemological beliefs. Therefore, the main hypothesis of the study, stating that the structural model of academic engagement based on academic self-regulation and academic vitality with the mediating role of emotional intelligence and epistemological beliefs among students has an acceptable fit, was confirmed.

Table 4*Standardized direct coefficients of academic self-regulation with academic engagement*

Direct path	Standardized coefficient	Unstandardized coefficients	T	Sig
	Beta	b		
Academic self-regulation → Academic engagement	0.67	0.69	13.21	0.001
Academic vitality → Academic engagement	0.27	0.18	6.50	0.001
Emotional intelligence → Academic engagement	0.19	0.10	4.15	0.001

As shown in Table 4, the standardized and direct coefficient of academic self-regulation on academic engagement was significant. Therefore, the first sub-hypothesis stating that there is a direct relationship between academic self-regulation and academic engagement among

students was confirmed. The standardized and direct coefficient of academic vitality on academic engagement was significant. Therefore, the second sub-hypothesis stating that there is a direct relationship between academic vitality and academic engagement among students was confirmed.

The standardized and direct coefficient of emotional intelligence on academic engagement was significant. Therefore, the third sub-hypothesis stating that there is a

direct relationship between emotional intelligence and academic engagement among students was confirmed.

Table 5

Bootstrap results of the mediating role of emotional intelligence in the relationship between academic self-regulation and academic engagement

Indirect path	Indirect effect	Confidence interval (bounds)	Sig
	Lower	Upper	
Academic self-regulation → Emotional intelligence → Academic engagement	0.69	0.70	0.91

To determine the significance of academic self-regulation on academic engagement through the mediating role of emotional intelligence, the bootstrap method with 2000 resamples and a 95% confidence interval was used. The greater the number of resamples, the higher the prediction accuracy (Kline, 2023). According to Kline (2023), if the range of lower and upper bound estimates does not cross

zero, the indirect effect is considered significant. Based on Table 5, this rule applies to academic self-regulation on academic engagement with the mediating role of emotional intelligence. Therefore, the fifth sub-hypothesis stating that emotional intelligence has a mediating role in the relationship between academic self-regulation and academic engagement among students was confirmed.

Table 6

Bootstrap results of the mediating role of emotional intelligence in the relationship between academic vitality and academic engagement

Indirect path	Indirect effect	Confidence interval (bounds)	p-value
	Lower	Upper	
Academic vitality → Emotional intelligence → Academic engagement	0.55	0.33	0.46

To determine the significance of academic vitality on academic engagement through the mediating role of emotional intelligence, the bootstrap method with 2000 resamples and a 95% confidence interval was used. The greater the number of resamples, the higher the prediction accuracy (Kline, 2023). According to Kline (2023), if the range of lower and upper bound estimates does not cross zero, the indirect effect is considered significant. Based on Table 6, this rule applies to academic vitality on academic engagement with the mediating role of emotional intelligence. Therefore, the sixth sub-hypothesis stating that emotional intelligence has a mediating role in the relationship between academic vitality and academic engagement among students was confirmed.

Discussion and Conclusion

The results of the study showed that emotional intelligence plays a mediating role in the relationship between academic self-regulation and academic engagement among students. Therefore, the fifth sub-hypothesis, stating that emotional intelligence has a mediating role in the relationship between academic self-regulation and academic engagement among students, was confirmed. The findings of previous studies such as Ahrari et al. (2024), Babajani et al. (2022), Bordbar et al. (2025), Ghazaani et al., (2025), Haji Vosoogh et al. (2022), Nieto Carracedo et al. (2024), Hou & Phromphithakkul (2024), and McEown et al. (2024) were consistent with the results of the present study.

In explaining these results, it can be stated that students with high academic self-regulation, through interest and effort, try to make their assigned tasks more attractive and

enjoyable. Through internal dialogue about mastery, they remind themselves of the importance of learning and acknowledge that what brings them satisfaction from completing tasks is finishing them in order to achieve mastery over the situation and attain competence in performing the task. Through internal dialogue about performance, they overcome motivational barriers to performing their activities and set internal goals for themselves. Through environmental control, they arrange favorable environmental conditions for themselves and attempt to reduce environmental factors that interfere with completing tasks. Finally, through self-reward, by maintaining and increasing motivation toward performing activities, they promise themselves rewards. The combination of these behaviors leads to an increase in activities such as complex student-school relationships, planning, classroom activities, and following roles and behaviors related to studying, which reflect emotional, cognitive, and behavioral engagement.

On the other hand, in explaining the mediating role of emotional intelligence in the relationship between the two academic constructs, it can be said that students with high emotional intelligence function efficiently in regulating and managing their emotions in the school and learning context. They are more prone to experiencing positive emotions, and even when they experience negative emotions, they can manage and regulate them better and experience less distress, stress, or anxiety. These characteristics help them function effectively in interpersonal relationships, academic performance, goal pursuit, and other areas, and experience fewer problems in academic and school-related domains.

The results of the study showed that emotional intelligence plays a mediating role in the relationship between academic vitality and academic engagement among students. Therefore, the sixth sub-hypothesis, stating that emotional intelligence has a mediating role in the relationship between academic vitality and academic engagement among students, was confirmed. The findings of the present study were aligned with and consistent with the results of previous studies such as [Abbasi et al. \(2015\)](#), [Ghadampour & Beiranvand \(2018\)](#), [Orsini et al. \(2018\)](#),

[Chen & Jahromi \(2025\)](#), [Ghaderi Hesari & Mahmoodi \(2024\)](#), [Tortosa Martínez et al. \(2024\)](#) and [Apriliana & Wibowo \(2024\)](#).

Based on the above findings, it can be noted that academic vitality can enable learners to successfully cope with academic obstacles and challenges such as low grades, exam pressure, difficult assignments, and hardships encountered during schooling. When an individual performs tasks spontaneously, they not only do not feel fatigue or despair but also feel that their energy and strength increase, which can lead to enthusiasm for education and learning. Regarding the mediating role of emotional intelligence and the indirect effect of vitality on engagement, it can be argued that students with high academic vitality show greater effort to achieve success. Because they possess emotional intelligence and the ability to manage emotions, they believe that through effort, planning, perseverance, and timely help-seeking, they can achieve a desirable level of performance in school and learning. In other words, emotional intelligence alongside vitality can increase motivation in students, enabling them to deal more effectively with academic issues and to perceive the possibility of success through effort and study, which will be reflected in academic engagement.

The structural model of academic engagement based on academic self-regulation and academic vitality with the mediating role of emotional intelligence and epistemological beliefs among students has a desirable fit. This result is aligned with and consistent with previous findings such as [Babajani et al. \(2022\)](#), [Bordbar et al. \(2025\)](#), [Ghazaani et al. \(2025\)](#), [Davoodi et al. \(2025\)](#) [Abbasi et al. \(2015\)](#), [Chen & Jahromi \(2025\)](#); [Extremiera-Pacheco et al. \(2024\)](#), [Huang et al. \(2023\)](#), [Apriliana & Wibowo \(2024\)](#), [Barragan Martin et al. \(2021\)](#); [Tortosa Martínez et al. \(2024\)](#) [Meng & Zhang \(2023\)](#), [Zhang et al. \(2018\)](#).

In explaining this finding, it can be stated that students with self-regulation, due to their skills in practice and development, can better achieve positive academic outcomes. Considering that emotional intelligence is high in individuals who can easily manage and control their needs, it can assist students in achieving positive academic

outcomes. Therefore, it is natural that the results show that academic vitality is related to self-regulation and emotional intelligence. At the same time, it can be argued that when individuals possess epistemological beliefs and high emotional intelligence, they can manage themselves more effectively, choose long-term goals instead of short-term goals, and, instead of impulsive behavior, respond to situations through problem-solving, decision-making, planning, maintaining attention, hope, and optimism. As a result, students, due to appropriate attention and concentration, achieve positive academic outcomes. According to Bandura's theory, students judge their academic situation and abilities based on previous experiences, and thus emotional management and vitality, alongside academic self-regulation, can be associated with engagement in school and education.

Like any study, this research has limitations. The results are related to a specific time period (cross-sectional), and over time the results may change. The questionnaire itself is a limitation in that it assesses individuals' attitudes rather than necessarily reality. Another limitation is that the population and sample consisted only of male secondary school students in the city of Gorgan, which limits the generalizability of the results to other populations. Additionally, because the sample consisted of adolescent male students in upper secondary education, a period characterized by significant biological, psychological, social, and emotional changes, this may play an important role in self-regulation skills and academic engagement. This may cause potential confounding variables to influence individuals' judgments about themselves and their responses to questions. Therefore, generalizing these findings to other contexts requires caution.

It is suggested that, if possible, larger sample sizes be used, and for generalization at the national level, similar studies be conducted in other cities and at different educational levels. The findings can be used to enhance academic engagement in educational environments. The results of this study can be applied in educational policy-making by fostering academic engagement among learners and by teaching academic self-regulation and academic vitality to students, thereby

enhancing engagement in education and, consequently, academic success. Teachers and educators often emphasize the use of self-regulation and vitality to improve student performance; however, the findings of the present study show that focusing solely on academic constructs is not sufficient, because emotional intelligence and students' epistemological beliefs affect attention to school and academic engagement. Therefore, it is better to consider epistemological beliefs and emotional intelligence, as well as the role of these constructs, in school and educational programs to increase academic engagement.

It is recommended that researchers identify other variables related to academic engagement that, through training, can improve students' engagement in learning. Longitudinal studies can provide greater certainty regarding the effects of academic vitality and self-regulation on academic engagement. Given that concepts such as academic vitality, academic engagement, and academic self-regulation are part of positive psychology, attention to training these variables within integrated protocols can be considered as part of school programs for students with low academic engagement. Educational authorities and planners are advised to provide necessary training and workshops to improve emotional intelligence skills and increase academic self-regulation among students. Individual and school-related factors of academic vitality have an important impact on academic engagement, and since students' engagement in education is related to the future of society, educational authorities and schools should pay greater attention to low levels of engagement in components such as emotional, cognitive, and behavioral engagement. Closer attention to factors such as emotional intelligence, individual and family factors, motivation, strengthening academic vitality and self-regulation, curriculum content, teacher selection, teaching methods, and educational planning can help enhance academic engagement among students. Educational authorities can also hold in-service training courses for teachers to enhance their intrinsic motivation and provide them with strategies such as paying attention to individual and social skills, students' interests and creativity, the use of smart teaching methods, and attention to emotional

intelligence, with the aim of improving academic engagement.

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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 Declaration of Helsinki, which provides guidelines for ethical research involving human participants. Ethical considerations in this study were that participation was entirely optional.

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 contribute to this study.

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