

Original Article

Relationship Between Academic Self-Regulation and Academic Satisfaction in Medical Students: The Mediating Role of Spiritual Intelligence

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Article history:

Received: December 19, 2025

Revised: January 26, 2026

Accepted: February 9, 2026

ePublished: March 24, 2026

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Abstract

Introduction: Academic satisfaction is a critical determinant of academic persistence, professional competence, and psychological well-being among medical students. Given the challenging nature of medical education, identifying cognitive and personal resources that enhance students' academic satisfaction is highly important. The present study aimed to investigate the causal relationship between academic self-regulation and academic satisfaction, with an emphasis on the mediating role of spiritual intelligence (SI) in a sample of medical students.

Methods: This study employed a descriptive-correlational design utilizing structural equation modeling (SEM). The statistical population comprised all students studying at Hamadan University of Medical Sciences in 2024-2025, from whom 345 students were selected through convenience sampling. Data were collected using the Pintrich and De Groot (1990) Motivated Strategies for Learning Questionnaire, the King (2008) SI Self-Report Inventory, and the Anbari et al (2013) Academic Satisfaction Questionnaire. The proposed model was evaluated through path analysis and SEM using SPSS 20 and AMOS 26.

Results: The findings revealed that academic self-regulation exerted a significant direct positive effect on academic satisfaction ($\beta=0.28$, $P<0.01$) and SI ($\beta=0.45$, $P<0.001$). Furthermore, SI demonstrated a significant direct positive impact on academic satisfaction ($\beta=0.32$, $P<0.001$). The results of bootstrap analysis confirmed the indirect effect of academic self-regulation on academic satisfaction through the mediating role of SI ($\beta=0.098$, $P<0.01$), indicating partial mediation. The final structural model exhibited excellent fit with the data ($\chi^2/df=2.34$, CFI=0.94, TLI=0.93, RMSEA=0.06), confirming the adequacy of the hypothesized model.

Conclusion: The findings underscore the complementary roles of cognitive-metacognitive strategies and spiritual capacities in shaping medical students' academic satisfaction. Academic self-regulation directly contributes to satisfaction and indirectly enhances it by fostering SI, suggesting that medical educators and curriculum planners should integrate self-regulatory skill development and SI cultivation into medical training programs. Such integrative approaches may serve as protective factors against academic burnout and psychological distress while promoting sustained academic engagement and satisfaction among future physicians.

Keywords: Academic self-regulation, Academic satisfaction, Spiritual intelligence, Medical students



Please cite this article as follows: Ghavidel A, Ali Bakhshi N, Sharifi Rahnemo S. Relationship between academic self-regulation and academic satisfaction in medical students: the mediating role of spiritual intelligence. *Avicenna J Care Health Oper Room* 2026;4(1): 1-6. doi:10.34172/ajchor.1126

Introduction

Medical students, as the most valuable human capital of the healthcare system, bear the immense responsibility of maintaining and improving the nation's public health. In addition, the future of the healthcare system is inextricably linked to the psychological well-being and academic motivation of these national assets. Moreover, the academic satisfaction of this group transcends a mere

educational indicator in this context; more precisely, it is a vital prerequisite for their future professional commitment and the quality of care they will provide (1, 2). Academic satisfaction, defined as a student's positive feeling and favorable attitude toward their educational experiences and achievements, not only reflects the efficacy of the educational system but also ensures the continuation of effective learning and the development of committed and



competent physicians (3).

It is evident that this satisfaction is not a unidimensional phenomenon but is influenced by a network of cognitive, metacognitive, and personality factors. Within this complex network, academic self-regulation emerges as one of the most fundamental components (4, 5). It is noteworthy that self-regulation goes beyond simple study skills; it is an active and goal-oriented process through which learners take command of their learning by monitoring their cognition, motivation, and behavior (6). According to Pintrich and De Groot (1990), students who employ cognitive and metacognitive strategies not only experience deeper learning but are also capable of effectively facilitating and directing their educational path (7, 8). Similarly, some studies have confirmed a positive and significant relationship between self-regulation and academic satisfaction (9, 10).

However, in the highly challenging and stressful conditions of medical education (11), can self-regulation alone guarantee satisfaction and persistence in the academic path? This is where the role of more intrinsic and fundamental variables, such as spiritual intelligence (SI), becomes prominent. SI, considered the highest level of multiple intelligences, provides a fundamental capacity for adaptation, meaning-making, and psychological well-being (8). Likewise, King and DeCicco (2008) defines this intelligence not merely as a religious inclination, but as a set of adaptive abilities based on the transcendent aspects of existence, explaining it through critical existential thinking, personal meaning production, transcendent awareness, and the expansion of conscious states (9). These capabilities allow medical students to answer their fundamental questions amidst a deluge of information and relentless academic pressure in order to create meaning in their struggles and efforts, thereby achieving inner peace and satisfaction (12, 13).

Despite a wealth of research on each of these concepts, a significant gap exists in the current literature regarding the simultaneous interaction of these three variables, and specifically in explaining the mechanism through which self-regulation influences academic satisfaction via SI within the unique population of medical students. In other words, a fundamental question arises: can SI, as a mediating variable, strengthen or facilitate the impact of academic self-regulation on academic satisfaction? Given the unique stressors, high expectations, and frequent exposure to difficult human situations during medical school, understanding these mechanisms is of paramount importance. Therefore, the present study has been designed and conducted to investigate the relationship between academic self-regulation and academic satisfaction and test the mediating role of SI in this relationship among medical students. This research aims to take a step, however small, toward improving the quality of academic life for these students and, ultimately, enhancing the country's healthcare system.

Methodology

Study Design

The present study employed a descriptive-correlational design, utilizing structural equation modeling (SEM) to test the structural relationships between variables. This methodological approach allows researchers to simultaneously examine complex relationships between latent and observed variables.

Population, Sample, and Sampling Method

The target population included all students enrolled at Hamadan University of Medical Sciences during 2024–2025 (N = 3,278). Due to accessibility constraints, a convenience sampling method was employed, which represents a study limitation. For sample size determination, given that SEM requires relatively large samples, Krejcie and Morgan's (1970) table was initially consulted, which recommended 345 participants. Moreover, 380 questionnaires were distributed to account for potential attrition. Of these, 362 were returned (response rate = 95.3%). After excluding 17 cases due to multivariate outliers (n = 9), excessive missing data (n = 5), and patterned responses (n = 3), the final analytical sample comprised 345 participants, meeting the minimum requirements for SEM.

Convenience sampling was employed owing to the dispersion of students across various faculties and accessibility constraints. Although this method imposes limitations on the generalizability of findings, it is considered acceptable for cross-sectional studies aimed at examining relationships between variables. In this study, inclusion criteria were (a) being enrolled in either undergraduate or professional doctorate programs in medicine, (b) having completed at least one academic semester, and (c) providing informed consent to participate in the study.

Data Collection Instruments

Three standardized questionnaires were utilized for data collection. All items were rated on a five-point Likert-type scale ranging from 1 (strongly disagree) to 5 (strongly agree).

Motivated Strategies for Learning Questionnaire (Pintrich and De Groot (7))

This instrument is among the most widely used measures in the field of self-regulated learning. The present study utilized the 24-item version, comprising two main sections: learning strategies and motivational beliefs. The first section includes cognitive strategies subscales (rehearsal, elaboration, and organization) and metacognitive strategies. In addition, the second comprises self-efficacy and intrinsic value.

Scoring and Interpretation: Higher scores indicate higher levels of academic self-regulation, with total scores ranging from 24 to 120.

Validity and Reliability: Content validity was confirmed

through expert judgment (face validity). Reliability was also assessed using Cronbach's alpha ($\alpha=0.91$) and the split-half method ($r=0.84$), indicating excellent internal consistency and adequate instrument stability, respectively.

Spiritual Intelligence Self-Report Inventory (King and DeCicco) (9)

This 24-item inventory, developed by King and DeCicco (2008), measures SI through four primary components: critical existential thinking, personal meaning production, transcendental awareness, and conscious state expansion. Critical existential thinking is the capacity to contemplate the nature of existence, time, death, and reality (e.g., "I contemplate the relationship between my life and existence after death"). In addition, personal meaning production is the ability to derive meaning and purpose from physical and psychological experiences. Furthermore, transcendental awareness is the capacity to perceive transcendent and non-material dimensions of self and others. Finally, conscious state expansion is the ability to enter higher states of consciousness (e.g., meditation).

Validity and Reliability: Construct validity of this instrument was established in previous studies. In the present study, reliability was confirmed with Cronbach's alpha ($\alpha=0.90$) and split-half coefficient ($r=0.87$), indicating satisfactory reliability.

Academic Satisfaction Questionnaire (Anbari et al) (14)

This culturally-adapted instrument for the Iranian population consists of 18 items measuring various dimensions of student satisfaction, including satisfaction with field of study, faculty members, educational environment, and future career prospects. Sample items include: "I feel satisfied with my choice of academic discipline" and "I am satisfied with the quality of instruction provided by faculty members."

Validity and Reliability: Anbari et al previously established the instrument's validity through confirmatory factor analysis. In the current study, Cronbach's alpha coefficient ($\alpha=0.89$) and split-half reliability ($r=0.91$) were obtained, demonstrating excellent internal consistency.

Table 1. Descriptive Statistics of Study Variables

Variable	Mean	SD	Range
Academic satisfaction	52.01	7.20	18-90
Academic self-regulation	76.39	8.67	29-123
Spiritual intelligence	52.41	9.87	28-76
Self-regulation subscales			
Self-regulated learning strategies	38.98	3.37	13-63
Motivational beliefs	33.73	3.32	16-60
Spiritual intelligence subscales			
Critical existential thinking	15.93	2.43	7-14
Personal meaning production	10.73	2.38	5-10
Transcendental awareness	15.43	3.39	7-14
Conscious state expansion	10.30	2.90	5-10

Procedure

Following the acquisition of necessary permissions from the Vice-Chancellery for Research and Technology at Hamadan University of Medical Sciences and obtaining ethical approval, the researcher coordinated with various faculties (medicine, dentistry, pharmacy, nursing, and allied medical sciences) for questionnaire distribution. To adhere to ethical principles, comprehensive explanations regarding research objectives, data confidentiality, and voluntary participation were provided to students prior to questionnaire completion, and written informed consent was obtained from them. Data collection was completed over a 45-day period.

Statistical Analysis

Collected data were analyzed using SPSS (version 26) for descriptive statistics and AMOS (version 26) for SEM.

Results

Demographic Characteristics

A total of 345 medical students from Hamadan University of Medical Sciences participated in this study. The mean age ($\pm$ standard deviation) of participants was 22.31 ± 4.07 years. The sample consisted of 67% female and 33% male students. Moreover, the majority of participants (63.8%) were enrolled in the general medicine program, while the remaining were residents (24.6%) and PhD students in basic sciences (11.6%).

Descriptive Statistics

The means, standard deviations, and ranges of the main variables are presented in Table 1.

Measurement Model Assessment

The measurement model was evaluated using composite reliability (CR), average variance extracted (AVE), and discriminant validity (Fornell-Larcker criterion).

Based on the results (Table 2), all CR values exceeded the recommended threshold of 0.7, and all AVE values were above 0.5, indicating adequate reliability and convergent validity. Additionally, discriminant validity was established using the Fornell-Larcker criterion, as the square root of AVE for each construct was greater than its correlations with other constructs.

4. Structural Model Assessment

Prior to hypothesis testing, the structural model's fit was examined using several indices:

- **Coefficient of Determination (R^2):** The R^2 values for endogenous variables indicated a strong model

Table 2. Reliability and Convergent Validity

Construct	Composite Reliability	Average Variance Extracted
Academic satisfaction	0.90	0.51
Academic self-regulation	0.91	0.69
Spiritual intelligence	0.88	0.66

fit (academic satisfaction = 0.736, academic self-regulation = 0.547, spiritual intelligence = 0.722).

- **Predictive Relevance (Q^2):** All Q^2 values were greater than zero (academic satisfaction = 0.46, academic self-regulation = 0.44, spiritual intelligence = 0.37), demonstrating the model's adequate predictive power.
- **Goodness-of-Fit (GOF):** The GOF index was calculated as 0.372, which exceeds the threshold of 0.36 for strong fit, representing that the overall research model possesses excellent fit.

Hypothesis Testing

The results of the hypothesis testing are provided in Tables 3 and 4 as well as Figures 1 and 2.

Direct Hypotheses:

- **Academic Self-Regulation** had a direct, positive, and significant effect on academic satisfaction ($\beta = 0.538$, $t = 10.525$, $P < 0.001$).
- **Academic Self-Regulation** had a direct, positive, and significant impact on spiritual intelligence ($\beta = 0.340$, $t = 5.401$, $P < 0.001$).
- **Spiritual Intelligence** had a direct, positive, and significant effect on academic satisfaction ($\beta = 0.228$, $t = 2.675$, $P < 0.001$).

Mediation Hypothesis:

- The mediating role of SI in the relationship between academic self-regulation and academic satisfaction was confirmed. Based on the results, the indirect effect of academic self-regulation on academic satisfaction through spiritual intelligence was 0.098 (β indirect = 0.098), which

was significant at the 0.01 level ($t = 4.546$, $P < 0.001$). Given the significance of both direct and indirect paths, SI acts as a **partial mediator** in this relationship.

Final Research Model (Figures)

Figures 2 and 3 depict two versions of the final structural model. Figure 2 displays the standardized path coefficients (β), and Figure 3 shows the t-values, indicating the significance of each path.

Discussion

The results of the present study demonstrated that academic self-regulation has a direct and positive effect on academic satisfaction among medical students, which is consistent with the results of previous research (15). Students who possess higher self-regulation skills (e.g.,

Table 4. Results of Hypothesis Testing (Path Coefficients)

Path	Path Coefficient (β)	t-Value	Result
Academic self-regulation → Academic satisfaction	0.538	10.525	Supported
Academic self-regulation → Spiritual intelligence	0.340	5.401	Supported
Spiritual intelligence → Academic satisfaction	0.228	2.675	Supported
Academic self-regulation → Spiritual intelligence → Academic satisfaction (indirect)	0.098	4.546	Supported

Table 3. Path Coefficients by Gender

Path	Male (n = 128)	Female (n = 217)
X → M	0.42***	0.48***
M → Y	0.21**	0.22**
X → Y (direct)	0.31***	0.28***
Indirect effect (X→M→Y)	0.087*	0.104*

*Note: X: Academic self-regulation; M: Spiritual intelligence; Y: Academic satisfaction. * $P < 0.05$, ** $P < 0.01$, *** $P < 0.001$

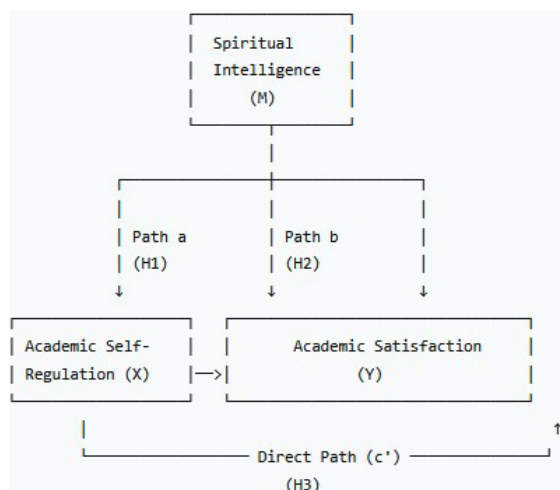


Figure 1. Conceptual Research Model

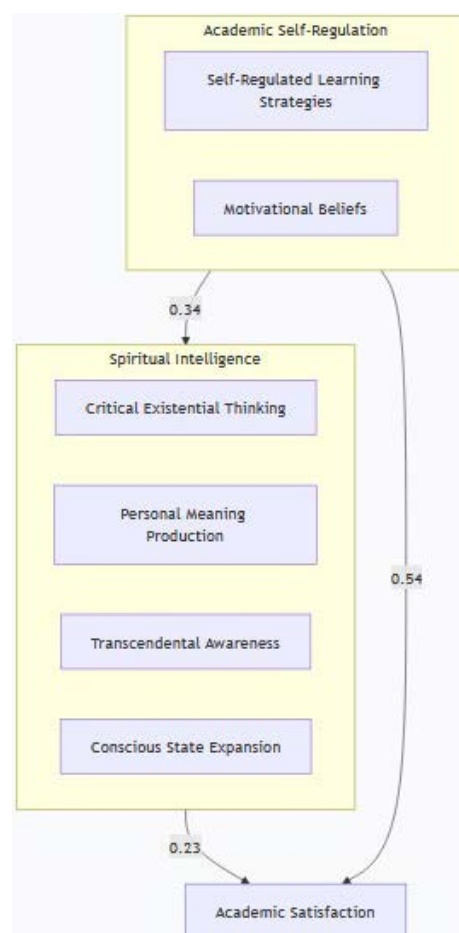


Figure 2. Final Model With Standardized Path Coefficients (β)

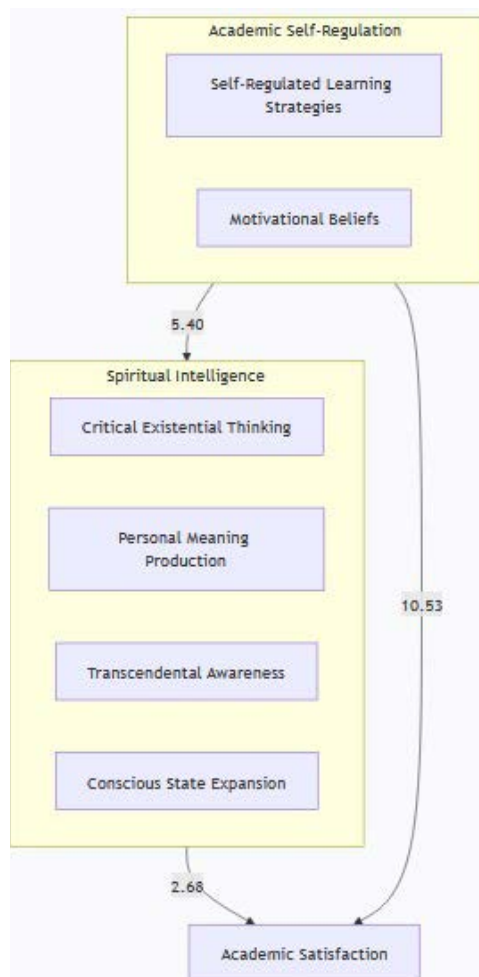


Figure 3. Final Model With t-Values

planning, progress monitoring, and time management) experience a greater sense of control over their learning process and consequently report higher satisfaction with their education. According to Deci and Ryan's (2000) Self-Determination Theory, the satisfaction of basic psychological needs, including competence and autonomy—which are fostered through self-regulation—leads to increased intrinsic motivation and satisfaction (16).

Our findings further revealed that academic self-regulation has a direct and positive effect on SI, which aligns with the findings of research examining the relationship between cognitive processes and spiritual development (17, 18). It appears that the capacity to regulate emotions, reflect on experiences, and manage time provides a favorable foundation for the development of SI components, such as existential thinking and meaning-making from experiences.

Furthermore, the findings indicated that SI directly affects academic satisfaction, which conforms to the results of previous studies on the relationship between SI and psychological well-being as well as life satisfaction (19, 20). Therefore, medical students with higher SI are better able to manage academic stressors through adaptive coping mechanisms and to find greater meaning and purpose in their academic endeavors.

The most significant finding of this research was the confirmation of the mediating role of SI in the relationship

between academic self-regulation and academic satisfaction, suggesting that self-regulation not only has a direct effect but also contributes to increased academic satisfaction through SI enhancement. In other words, self-regulation skills facilitate the development of students' spiritual capacities, such as existential thinking and meaning-making, which in turn enable them to interpret academic challenges from a deeper and more meaningful perspective. This pattern is consistent with the theory of multiple pathways of academic development (21), emphasizing the complex interplay between cognitive, metacognitive, and existential factors in predicting academic outcomes. Moreover, the observed partial mediation aligns with previous research in health professions education, demonstrating that SI serves as a meaningful mechanism through which cognitive skills translate into affective outcomes such as satisfaction.

Practical Implications

The findings of this study had important practical implications for medical education systems. Given the role of self-regulation and SI in predicting academic satisfaction, designing educational programs to strengthen both constructs could contribute to improving the academic experience and mental health of medical students. Recommended interventions include conducting workshops on self-regulation strategies (e.g., time management and goal-setting), creating reflective spaces for spiritual development (e.g., narrative medicine sessions or Balint groups), and incorporating topics related to meaning and purpose into the curriculum in order to help students connect their academic journey with their broader professional identity.

Limitations and Future Directions

Several limitations should be acknowledged. First, the reliance on self-report measures for data collection may have introduced response biases. In addition, the use of convenience sampling limited the generalizability of the findings. Further, the study was geographically confined to Hamadan University of Medical Sciences; therefore, extrapolation of results to other universities and academic disciplines should be approached with caution. Therefore, it is recommended that future research employ experimental designs to examine the effects of self-regulation training and interventions aimed at enhancing SI on academic satisfaction among medical students.

Conclusion

The present study demonstrated that academic self-regulation and SI play significant roles in predicting academic satisfaction among medical students. Specifically, SI serves as a mediating variable, explaining part of the relationship between self-regulation and academic satisfaction. These findings may assist educational planners, counselors, and faculty members in medical universities in designing effective interventions in order to enhance students' academic satisfaction. Finally, future interventional studies are warranted to investigate the impact of self-regulation skills training and SI cultivation

on medical students' academic satisfaction.

Acknowledgements

This article has been extracted from a research project conducted by the first author and colleagues. The authors sincerely thank all participants, administrative staff, and the university's esteemed Vice-Chancellor for Research for their valuable cooperation and support. Special thanks also go to Azam Ghavidel (supervisor) and Saeid Sharifi Rahmeh (advisor) for their guidance and support throughout this research.

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Competing Interests

The authors declare no conflict of interests with regard to this research. The research was independently performed without any financial or commercial relationships that could be construed as a potential conflict of interests.

Ethical Approval

This study was conducted in accordance with the ethical principles of research involving human participants (approval code: IR.IAU.H.REC.1403.082). All participants were informed about the purpose of the study and the voluntary nature of their participation. Moreover, written informed consent was obtained from all participants prior to data collection. Furthermore, the confidentiality and anonymity of the participants' information were guaranteed throughout the research process.

Funding

This study was self-funded by the authors and received no external financial support from any funding organization.

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