Original Article

How can academic engagement and flow of medical students be promoted? The roles of perceived autonomy and teacher support

Majid Sadoughi[1*], Najmeh Eskandari[1]

[1]Department of Psychology, Faculty of Humanities, University of Kashan, Kashan, Iran

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***Corresponding author:**
Majid Sadoughi, Department of Psychology, Faculty of Humanities, University of Kashan, Kashan, Iran
Email: sadoughi.psy@gmail.com

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Abstract

Background & Objective: One of the most considerable concerns of higher education systems is how to enhance students' academic engagement and flow. The present study aimed to examine the roles of emotional and autonomy support provided by teachers in students' academic engagement and flow.

Material & Methods: The study sample included students enrolled at Kashan University of Medical Sciences in winter 2023. A total of 356 students were chosen as participants using proportional stratified random sampling technique. The data collection instruments were Black and Deci's Perceived Autonomy Support Questionnaire, Sakiz's Teacher Emotional Support Questionnaire, Reeve and Tseng's Academic Engagement Questionnaire, and Martin and Jackson's Academic Flow Questionnaire. The data were analyzed using Structural Equation Modeling (SEM) in Amos-22 software.

Results: The SEM results indicated that the proposed model had a good fit. Perceived autonomy support predicted academic engagement (β =.692, p <0.01) and academic flow (β = 0.335, p < 0.01), and perceived emotional support predicted academic engagement (β = 0.226, p < 0.01) and academic flow (β = 0.312, p < 0.01).

Conclusion: The results highlight the importance of the roles of perceived autonomy and emotional support in students' academic engagement and flow. Therefore, medical science universities are recommended to improve the quality of students' learning to achieve higher levels of academic success by giving professors essential guidelines on how to provide students with more autonomy and emotional support.

Keywords: autonomy support, emotional support, academic engagement, academic flow, medical students

Introduction

Due to the increasing demand from universities to enhance their educational quality, there is a growing emphasis on monitoring not only the progress and academic success of medical students but also their essential contributing factors. It is now more important than ever for medical science universities to seriously consider how to promote their students' academic engagement and flow and implement appropriate plans for its improvement. One of the key effective factors in academic progress is academic engagement (1), which refers to students' active participation in academic activities (2).

Academic engagement is a multifaceted construct consisting of behavioral, cognitive, emotional, and agentic components (3). Behavioral engagement refers to students' behaviors towards classroom topics, effort and persistence in learning, classroom attendance, and homework completion (4). Cognitive engagement is known as students' use of cognitive strategies (e.g., acquisition, maintenance, and application of information) and metacognitive strategies (e.g., monitoring, self-regulation, evaluation, and planning) (5). Emotional engagement encompasses interest or disinterest in university, professors, and academic assignments, as well as positive emotions such as pleasure, curiosity, anxiety, anger, and fatigue (6). Agentic engagement involves constructive participation of learners in their learning processes, causing them to actively strive to personalize and optimize their learning conditions (3). Active engagement is essential for development and progress in education since high levels of academic engagement can contribute to academic progress, reduce behavioral problems, and prevent student dropout. Conversely, students with lower

academic engagement are more likely to experience negative emotions such as depression and exhibit maladaptive behaviors such as absenteeism and school drop-out (7).

Another factor related to students' performance and academic success is their academic flow. Flow refers to a positive psychological experience in which a person with a certain level of skill and consciousness is fully immersed in a challenging activity. In other words, it involves enthusiasm for, focus on, and intense interest in a task or activity that results in pleasurable feelings, allowing one to fully engage in the present situation without any distractions (8).

Students experiencing academic flow tend to devote more effort to and more actively participate in academic activities, have greater control over their learning process, and actively pursue their educational plans. This heightened engagement with course materials enables students to perform at an optimal level and improve the quality of their performance (9). Individuals with higher levels of academic flow devote all their energy to completing tasks and sustain their energy until they are finished (10). Therefore, focusing on the quality of learning among medical students through academic flow is particularly important and can significantly impact their academic progress and enhance their knowledge and skills. Due to the intricate nature of the medicine major and the unique educational conditions of medical students, it is essential for these students to be more engaged in their learning environment. Additionally, for completing more internships, they need to have a stronger presence in university and hospital environments. As a result, it becomes necessary to address medical students' academic engagement and flow. Acknowledging the importance of academic engagement and flow as well as their effects on the academic performance of medical students have prompted exploration of fundamental questions about their educational antecedents as influential factors in learning processes. Among the antecedent variables affecting students' academic engagement and flow is the support they perceive from their teachers during their challenging and lengthy learning journey. Research findings indicate that teacher support can engender positive emotions in learners (11), reinforce their positive learning experiences and motivated learning behavior (12), and bolster their resilience in the face of academic obstacles, thus helping them sustain their interest (13) and enhance their academic engagement. It appears that an important factor which can affect students' academic engagement and flow is the autonomy support they perceive from their teachers. Environments fostering autonomy encourage individuals to set their own goals, direct their behavior, choose problem-solving approaches, and follow their desires, preferences, and values. Autonomy-supportive teachers provide learners with options to feel comfortable and satisfied and allow them to make decisions and take control of their own learning (14). The results of studies by Ljubin-Golub et al. (15) and Ou et al. (16) indicate that professors' support for students' autonomy can enhance their academic performance, create more positive emotions in the classroom, strengthen their engagement, and reinforce their perseverance (17).

Emotional support is another type of support which appears to be effective in improving students' academic engagement and flow. This type of support refers to professors' behaviors and activities such as respect, interest in students, and attentive listening (18), which results in intimacy, empathy, attention to students, and a friendly relationship (19). Considering teachers' pivotal role in achieving educational goals, their emotional support of learners can facilitate teaching and learning processes (20). Professors' care for, interest in, and respect and concern for students can impact students' academic flow, which may enhance students' interest and motivation to study (21) and higher academic performance (22). When professors provide their students with more emotional support in classroom, students may be able to experience more positive academic emotions such as enjoyment (23) and feel less disengagement and apathy in doing assignments. Due to the pleasure students experience while studying, they can eagerly pay attention to their teachers' instruction and become completely immersed in academic activities (24). Therefore, positive perceptions of professors as emotional supporters may instill in students the feeling that they are valuable and respectable, which can consequently provide a foundation for increasing their efforts and success and significantly influence academic flow, academic engagement, and interest in university and learning processes (25).

The findings of studies by Ahmed et al. (26) and Romano et al. (27) indicate that when students experience a high level of emotional support from their professors, they tend to perform better, show more adaptive behaviors, and consequently demonstrate more motivation and participation in education. In fact, professors' emotional

support can provide an opportunity to enhance students' learning, reduce their apathy and inattention to course materials, and increase their participation and involvement in academic activities (11, 28).

Given that academic engagement and flow are linked to positive outcomes such as participation in learning activities, interest in completing homework, increased effort and investment in the learning processes, and ultimately improved academic performance of students, it would be essential to identify the factors which can influence students' academic engagement and flow. Understanding such essential factors helps optimize the learning experiences of medical students in their classroom, university, and other educational environments, which can enhance their academic flow and engagement and support their academic success.

A careful review of past studies indicates that scanty research has explored the predictors of academic engagement and flow among students of medical sciences. The existing research has been primarily conducted on other population groups and subject areas such as science and mathematics (16), and no research was found on the role of autonomy support and emotional support provided by professors in medical students' academic flow and engagement. Therefore, the present study aims to address this research gap by investigating the relationship between perceived autonomy and emotional support provided by professors and the amount of academic engagement and flow experienced by medical students. The following hypotheses guided the present study:

1. There is a relationship between perceived autonomy support and academic flow.
2. There is a relationship between perceived autonomy support and academic engagement.
3. There is a relationship between perceived emotional support and academic flow.
4. There is a relationship between perceived emotional support and academic engagement.

Material & Methods

Design and setting(s)

The research method of this study was descriptive correlational. This research was conducted in Kashan University of Medical Sciences (Iran).

Participants and sampling

The statistical population comprised all students of Kashan University of Medical Sciences in winter 2023 (N = 3560). Based on Cochran's formula, the required sample size was determined as 346, and 370 students were selected using proportional stratified random sampling technique. The required sample size for each faculty was calculated based on the ratio of the number of students in each faculty to the total number of the university students, and the students of each faculty were randomly selected to answer the questionnaires. The inclusion criteria included studying at Kashan University of Medical Sciences and providing consent for voluntary participation. The exclusion criteria were refusal to participate in the study and failure to complete the questionnaires.

Tools/Instruments

The data collection instruments were a demographic information registration form, Black and Deci's (29) perceived autonomy support questionnaire, Sakiz's (18) emotional support questionnaire, academic flow questionnaire by Martin and Jackson (30), and academic engagement questionnaire by Reeve and Tseng (3).

The Black and Desi's Perceived Autonomy Support Questionnaire consists of 14 items and utilizes a single-factor structure to assess learners' perceptions of their teachers' autonomy support. This questionnaire was designed for learning environments such as classrooms and employs a 7-point Likert scale ranging from 1 (I completely disagree) to 7 (I completely agree). Black and Deci (29) reported a high internal consistency ($\alpha = 0.93$) for this questionnaire. In a study by Teimouri et al. (31), this questionnaire demonstrated adequate validity, with a Cronbach's alpha of 0.92. In the present study, the validity of the questionnaire was assessed through confirmatory factor analysis, and the fit indices indicated an acceptable model fit ($\chi 2/df = 1.267$, GFI = 0.967, CFI = 0.993, NFI = 0.968, RMSEA = 0.027, SRMR = 0.024). Additionally, the reliability coefficient of the scale based on Cronbach's alpha was found to be 0.93, indicating good reliability. Sakiz's Emotional Teacher Support Questionnaire (18) has 9 items on a 5-point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The scores achieved on this scale can range from 9 to 45. Higher scores indicate a higher perceived level of emotional support from the teacher. Sakiz reported the reliability of this questionnaire using the Cronbach's alpha method ($\alpha = 0.87$) and confirmed its validity using the confirmatory factor analysis method. In a study conducted by Nademi et al. (32) in Iran, the internal consistency method was used to assess the reliability of this questionnaire, and the Cronbach's alpha was found to be 0.79, indicating good reliability. The confirmatory factor analysis method was used to check the validity of this questionnaire and the results showed that it was valid ($\chi 2/df = 1.99$, GFI = 0.973, CFI = 0.984, NFI = 0.970, RMSEA = 0.053, SRMR = 0.029). Additionally, the Cronbach's alpha coefficient was calculated as 0.89,

which demonstrates its good reliability. Martin and Jackson's academic flow questionnaire contains 9 items based on a 5-point Likert scale. It has nine dimensions including challenge-skill balance, action-awareness merging, clear goals, unambiguous feedback, concentration on task, a sense of control, loss of self-consciousness, time transformation, and autotelic experience. Martin and Jackson (30) reported the overall reliability of the questionnaire as 0.83, which shows good reliability. In Jalili et al.'s study (33), the reliability of the questionnaire was assessed using internal consistency ($\alpha = 0.85$) and split-half (0.82). To determine the validity of the questionnaire, three methods were employed: content validity, convergent, and divergent validity, and confirmatory factor analysis. The content validity of the academic flow questionnaire was confirmed by experts. The questionnaire also demonstrated a good fit using the confirmatory factor analysis method (χ^2/df = 1.420, GFI = 0.978, CFI = 0.991, NFI = 0.970, RMSEA = 0.035, SRMR = 0.034). Additionally, the reliability coefficient of the scale based on Cronbach's alpha was 0.88, indicating good reliability. Reeve and Tseng's (3) academic engagement questionnaire consists of 22 items with four dimensions, namely, behavioral, cognitive, emotional, and agentic. It utilizes a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). Reeve and Tseng reported the reliability the entire questionnaire as well as its different dimensions as 0.82, 0.94, 0.88, 0.78, and 0.82, respectively. In terms of validity, the results of confirmatory factor analysis indicated the appropriate fit of the model. In a study by Hajializadeh (34), the reliability of the entire questionnaire was assessed using the Cronbach's alpha method ($\alpha = 0.87$), indicating an acceptable internal consistency. The reliability each sub-scale was as follows: behavioral engagement (0.81), cognitive engagement (0.71), emotional engagement (0.74), and agentic engagement (0.79). In the present study, the validity of the questionnaire was assessed using confirmatory factor analysis, which indicated an appropriate fit (χ^2/df = 1.711, GFI = 0.917, CFI = 0.980, NFI = 0.953, RMSEA = 0.045, SRMR = 0.033). Additionally, the Cronbach's alpha values obtained for cognitive, emotional, behavioral, and agentic components were in the range of 0.91 to 0.95, indicating good reliability.

Data collection methods

After obtaining ethical approval from the research ethics committee, the objectives of the study and the confidentiality of the collected data were fully explained to the participants, and their consent to participate in the study was obtained. The questionnaires were administered in person, and the students were given approximately 20 minutes to complete them.

Data analysis

In order to analyze the data, the missing data were first examined through Little's test (35). Then, the univariate and multivariate outlier data were examined using standard scores and the Mahalanobis distance, respectively. Out of the 370 distributed questionnaires, 356 ones were included in the analysis after removing 14 defective and incomplete questionnaires. First, the demographic characteristics of the participants were checked. Then, to analyze the relationships between the variables, the structural equation modeling method was run in AMOS-22 software. The following indices were checked for model fit: χ^2, Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Comparative Fit Index (CFI), Norms Fit Index (NFI), Incremental Fit Index (IFI), Root Mean Square Error of Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR).

Results

The Little's test (35) results indicated that the data were Missing Completely at Random (MACR) (χ^2 = 0.1194/49, *df* = 1254, *p* = 0.884). The probability of missingness was equal for all cases and did not depend on any observed and unobserved variable. Subsequently, the Expectation-Maximization (EM) algorithm was employed to impute the missing values. Next, univariate and multivariate outlier analyses indicated one univariate outlier case, which was Winsorized. Out of 356 participants, 182 (51.1%) were female and 174 (48.9 percent) were male. The participants' age ranged from 19 to 27 years. No significant difference was observed among students in terms of their gender. The participants were students from different faculties: medicine (N = 191, 53.7%), nursing and midwifery (N = 80, 22.5%), paramedicine (N = 42, 11.8%), faculty of health (N = 28, 9.9%), and dentistry (N = 15, 4.2%). There was no significant difference in terms of age among students from different faculties. The participants' age was further analyzed based on their gender and faculty. **Table 1** shows the mean, standard deviation, and zero-order correlation coefficients between the variables.

Table 1. Descriptive indices and correlation coefficients between research variables

Demographic Variables	Frequency (%)	Age (Mean±SD)	value	P
Male	182 (51.1%)	20.08 ± 1.22	*t* = 1.95	0.052
Female	174 (48.9%)	20.66 ± 1.40		
School of medicine	191 (53.7%)	20.37 ± 1.35	F = 1.94	0.266
School of nursing & midwifery	80 (22.5%)	20.16 ± 1.36		
School of paramedicine	42 (11.8%)	20.59 ± 1.28		
School of health & hygiene	28 (7.9%)	20.07 ± 1.51		
School of dentistry	15 (4.2%)	20.34 ± 1.36		

Main variables	Autonomy support	Emotional support	Academic engagement	Academic flow
1) Autonomy support	1			
2) Emotional support	0.18**	1		
3) Academic engagement	0.58**	0.35**	1	
4) Academic flow	0.33**	0.34**	.42**	1
Mean ± SD	12 ± 65.47	6.4±28.22	25.05 ± 97.48	5.66 ± 28.30
Skewness	-0.01	. 0.32-	-0.57	-0.42
Kurtosis	-0.24	0.75-	-0.40	-0.36

Note: ** P-value < 0.01
Abbreviations: SD, standard deviation; t, student's t-test; F, analysis of variance test; P, probability-value.

According to **Table 1**, both perceived autonomy and emotional support had positive and significant relationships with academic engagement and flow. The maximum likelihood method was used to estimate structural coefficients and model fit indices. The normality of the data is an important assumption of this estimation method. As can be seen in **Table 2**, the skewness and kurtosis coefficients of the variables are between +2 and -2, which indicates that the normal distribution assumption has not been significantly violated. The maximum likelihood method is highly robust to moderate violations of the normality assumption. Therefore, in cases of severe non-violation of the assumption of normality of the data, the results could be considered as valid. Additionally, the multiple co-linearity of predictor variables was checked using the Variance Inflation Factor (VIF). The VIF values ranged from 1.396 to 2.494, indicating the absence of collinearity. Hence, as the aforementioned assumptions of SEM were supported, the obtained findings could be used safely.

The results indicated that autonomy support significantly and directly predicted academic engagement ($p < 0.01$, $ß = 0.692$) and academic flow ($p < 0.01$, $ß = 0.335$). Additionally, emotional support had a positive and significant effect on students' academic engagement ($p < 0.01$, $ß = 0.226$) and academic flow ($p < 0.01$, $ß = 0.312$). Overall, autonomy support and emotional support accounted for 59% of the variance in academic engagement and 25% of the variance in academic flow, while the remaining variance could be explained by variables outside the model.

Table 2. Fit indices of the research model

Indices	χ^2/df	GFI	AGFI	CFI	NFI	IFI	RMSEA	SRMR
Value	1.276	0.901	0.884	0.975	0.894	0.975	0.028	0.048
Criterion of good fit	< 3	> 0.90	> 0.90	> 0.90	> 0.90	> 0.90	< 0.08	< 0.08

Note: Abbreviations: χ^2/df, chi-square/degrees of freedom; GFI, goodness of fit index; AGFI, adjusted goodness of fit index; CFI, comparative fit index; NFI, normed fit index; IFI, incremental fit index; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual.

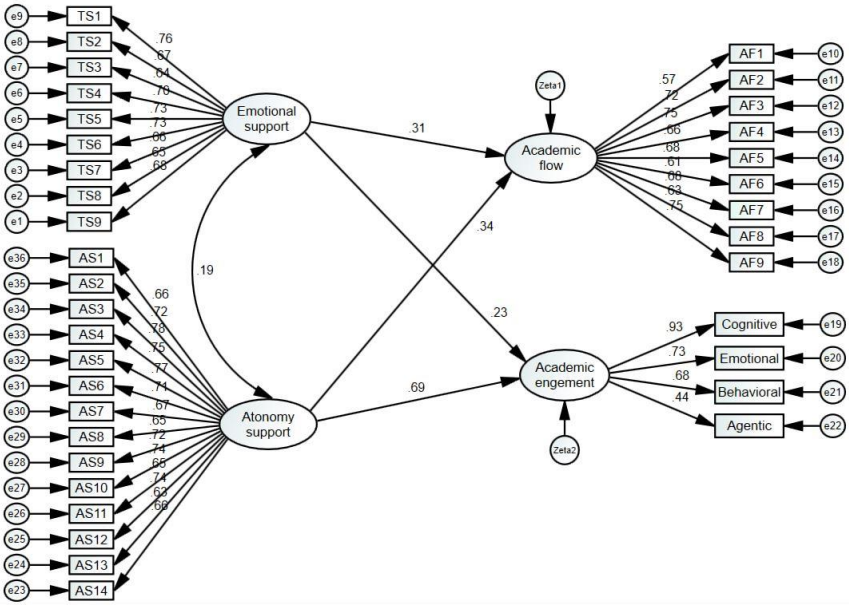

Figure 1. Standard coefficients (beta) of the structural model of the research

Discussion

The present study aimed to examine the link between perceived autonomy and emotional support and academic engagement and flow among medical students. The SEM results demonstrated the optimal fit of the proposed model. The first hypothesis of the study, assuming a positive and direct relationship between perceived autonomy support and academic flow, was supported. This finding is consistent with the results of Mills and Fullagar (36) and Liubin-Golub (15), which indicated that autonomy support had a direct association with academic flow. This can be explained by considering the fact that students' freedom in setting their goals, along with the opportunity to pursue their preferences and values, may lead to increased enjoyment of learning and, subsequently increased academic flow. Professors who foster their students' autonomy by delegating decision-making authority can enhance students' sense of control and satisfaction, thereby improving their performance and reinforcing their academic flow. Therefore, autonomy-supportive teaching can help cultivate intrinsic motivation in students, which is beneficial for enhancing the experience of academic flow. In other words, students' exploratory activities can elevate the experience of their academic flow; thus, autonomy-supportive teaching behavior should be highly emphasized in instructional processes (16). In line with Mills and Fullagar (36), motivated students experience a higher level of academic flow. Experiencing academic flow requires undivided attention and concentration, making it easier for students possessing internal motivation and a sense of autonomy (37). Moreover, in autonomy-supportive environments, by establishing a safe and supportive atmosphere, professors can create conditions for students to participate in academic activities with heightened energy and interest, derive more pleasure from their learning, and achieve better academic performance (38). The findings also revealed a significant direct effect of perceived autonomy support on academic engagement, which is consistent with Li et al. (7), Parker et al. (17), and Lee et al. (38) who reported the influence of autonomy support on academic engagement. Autonomy-supportive teaching can result in more positive academic outcomes such as enhanced ability and skill, greater satisfaction and willingness, positive reactions, and heightened enthusiasm, which are fundamental for students' participation in the learning process and can contribute to increased engagement in academic activities (39). In autonomy-supportive environments, students are more likely to perceive the course material as important and enjoyable, leading to not only the development of a positive teacher-student relationship but also increased motivation and interest among students. This stimulation and nurturing can lead to enhancement of students' involvement in their learning (40). However, students perceiving their teachers' tendency toward a controlling (versus autonomy-supportive) style are less engaged in their classes (41).

The third hypothesis of the study, positing a positive and direct relationship between emotional support and academic flow, was confirmed, which is consistent with the results of several studies (20, 21, 24). Students' perceptions of their professors as emotional supporters, along with their friendly behaviors and understanding, such as showing interest and being considerate, compassionate, and empathetic, can encourage students to better engage in challenging activities and assignments, which can encourage them to explore and question in the classroom environment. The resulting increased engagement in academic activities may foster positive experiences such as enjoyment among students, which can stimulate internal motivation in students, prompting them to approach their assignments with more interest and enthusiasm. Furthermore, this sense of enjoyment can contribute to deep and meaningful learning, enhance students' satisfaction with their courses and university, and cultivate more positive attitudes among them (28). Conversely, when students do not benefit from the emotional support of their professors, they may experience less academic flow, which suggests that students who do not perceive their assignments as useful, interesting, or valuable may lack interest in completing tasks, make minimal effort, and avoid challenging assignments, all of which can contribute to lower academic flow among students.

The results revealed a significant positive relationship between teachers' emotional support and students' academic engagement, which is in line with the findings of Ahmed et al. (26) and Romano et al. (27) concluding that emotional support by professors can encourage students to better focus on learning activities, foster more positive expectations towards classes, stimulate students' increased effort and perseverance in learning, and enhance self-confidence. Additionally, emotional support from professors can considerably mitigate learners' uncertainty, elevate the value of their assignments, and bolster their academic self-concept, which can consequently improve their academic participation. Therefore, it is imperative for professors to cultivate a positive and supportive relationship with their students and offer them substantial support to maximize their engagement and involvement in assignments while enhancing their enjoyment of the learning process (11). Furthermore, emotional support may assist students in experiencing greater enjoyment in learning, ultimately leading to heightened levels of persistence in effort and sustained interest (42).

Similar to previous studies, the current research has some limitations that should be considered. Firstly, the use of self-report questionnaires could have some drawbacks such as social desirability. Secondly, as the current research employed a correlational design, it is not possible to establish cause-and-effect relationships between variables. Therefore, future research should be performed experimentally to shed more light on the role of autonomy and emotional support on students' academic engagement and flow. Additionally, this study was conducted on medical students in Kashan (Iran); thus, caution should be exercised when generalizing the findings to other population groups. It is also suggested that the role of other moderating and mediating variables affecting academic flow and engagement be investigated in future research. It is recommended that professors create highly engaging and enjoyable classroom environments by assigning sufficiently challenging tasks for each student in order to stimulate greater interest and involvement among students. Counselors and educational authorities should be encouraged to implement educational counseling programs for promoting students' motivation to study.

Conclusion

Based on the findings, it can be concluded that perceived autonomy and emotional support can considerably enhance students' academic engagement and flow. When professors design the course structure and plan to support students' need for autonomy by allowing them to feel autonomous in initiating and regulating their activities, students can experience heightened levels of academic engagement and flow. Students who choose their activities based on their inner desires and interests exhibit greater enthusiasm and pleasure as well as a sense of mastery and competence in academic assignments, resulting in increased academic engagement. Furthermore, through emotional support and positive interactions with students, professors may create a classroom environment where students can feel satisfied and happy, interact with their peers, and engage in classroom activities and discussions based on their abilities and interests. By receiving emotional support from their professors, students may be able to develop a more positive view of themselves, consider themselves as valuable, capable, and competent in educational activities, which can ultimately promote their academic progress and success.

Ethical considerations

The study reported here was approved by the ethical committee of the University of Kashan (Iran) (ethical code: IR.KASHANU.REC.1402.020). The informed

consent of all participants was obtained, and they were given the option to withdraw from the study at any stage. All collected data were treated as anonymous and confidential, and the students were assured that the data would be aggregated to protect their anonymity.

Artificial intelligence utilization for article writing

The authors declare that they did not use generative Artificial Intelligence (AI) and AI-assisted technologies in the writing process of this paper.

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Conflict of interest statement

The authors declare that they have no conflict interests.

Author contributions

First author: Designed the study, analyzed the data, reviewed the article, and supervised all stages of the study implementation. Second author: Collected data and contributed to writing the initial manuscript.

Supporting resources

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Data availability statement

Data and materials could be made available upon reasonable request.

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