



Linking emotions to academic achievement: A sequential pathway through teacher support and student engagement in higher education

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Abstract: Academic achievement is influenced not only by students' cognitive abilities but also by personal emotional resources, environmental support, and behavioral engagement. However, the mechanisms linking emotional intelligence to academic achievement remain insufficiently understood. Drawing on Social Cognitive Theory, this study investigated the roles of perceived teacher support and behavioral engagement in the relationship between emotional intelligence and self-reported academic achievement. Data were collected from 472 Chinese undergraduate students (51.1% male, 48.9% female; age range = 18–24 years) using psychometrically validated instruments, and structural equation modeling was employed to examine the hypothesized relationships and mediating mechanisms. The results indicated that emotional intelligence was not directly associated with self-reported academic achievement. Instead, perceived teacher support and behavioral engagement independently and sequentially mediated this relationship, supporting a full mediation model. Specifically, higher emotional intelligence was positively associated with greater perceived teacher support and behavioral engagement, which, in turn, were positively associated with self-reported academic achievement. These findings extend Social Cognitive Theory by highlighting the interconnected roles of personal emotional resources, environmental support, and behavioral engagement in students' academic achievement. The findings also suggest that higher education institutions may strengthen teacher–student relationships and promote students' active engagement in learning to support academic achievement.

Keywords: emotional intelligence; academic achievement; perceived teacher support; behavioral engagement

Introduction

In today's knowledge-driven economy, higher education plays a critical role in national development and global competitiveness. Academic achievement, as a central outcome of higher education, is essential for both individual and broader societal progress (Madigan & Curran, 2021). Specifically, there is need to better understand the key factors that shape students' academic achievement in contemporary higher education contexts. Emotional intelligence, as a core personal resource, has been consistently linked to academic success through mechanisms such as emotional regulation and learning motivation (Zhoc et al., 2023). At the same time, perceived teacher support and behavioral engagement represent critical contextual and behavioral processes that influence students' learning. Supportive teacher–student interactions enhance students' motivation and participation (Lavy & Naama-Ghanayim, 2020), while behavioral engagement directly reflects students' effort and persistence, which are essential for effective learning and academic performance (Anokye Effah & Nkwantabisa, 2022; Guzey & Li, 2023).

Despite these insights, prior research has largely examined emotional intelligence, teacher support, and behavioral engagement in isolation, providing limited understanding of their joint mechanisms. In particular, how emotional intelligence relates to academic achievement through the combined roles of perceived teacher support and behavioral engagement remains underexplored. To address this gap, this study proposes a sequential mediation model among Chinese undergraduates, integrat-

ing personal, environmental, and behavioral perspectives to offer a more comprehensive and empirically testable account of academic achievement.

Emotional intelligence and academic achievement

Emotional intelligence reflects the ability to identify and understand emotional states, apply emotional information appropriately, and regulate emotions within oneself and in interactions with others (Mayer & Salovey, 1997). As an important construct in educational and positive psychology, it has been widely recognized as a key non-cognitive factor influencing students' academic achievement (Mudiono, 2019). Emotional intelligence shapes learning processes by enhancing attention, facilitating emotional regulation, and promoting adaptive coping with academic stress. Students with higher emotional intelligence are more likely to manage negative emotions effectively, maintain motivation, and engage in goal-directed learning behaviors, thereby supporting academic achievement (Yan et al., 2024).

However, the relationship between emotional intelligence and academic achievement remains inconclusive. Some studies suggest that emotional intelligence may not be the most decisive predictor of academic success (Quílez-Robres et al., 2023), and higher levels of emotional intelligence do not always translate into improved academic competencies. Moreover, cultural and contextual factors may further shape this relationship (Shengyao et al., 2024). Therefore, despite its recognized importance, the role of emotional intelligence in academic achievement



warrants further investigation. In particular, it remains unclear how emotional intelligence influences academic outcomes through underlying psychological and contextual processes, especially within the context of Chinese higher education.

Perceived teacher support mediation

Perceived teacher support refers to students' subjective evaluation of teachers' availability and responsiveness in providing academic and emotional assistance (Grey et al., 2020). In academic settings, teachers are often regarded as the most influential source of support, shaping students' motivation and learning experiences. When students perceive higher levels of teacher support, they are more likely to feel valued and confident, which enhances their self-efficacy and academic motivation, ultimately contributing to improved academic outcomes (Zhang et al., 2024; Zhao et al., 2021). Moreover, emotional intelligence may facilitate students' ability to perceive and effectively utilize teacher support, enabling them to engage more actively with academic resources (Bao, 2024). In summary, perceived teacher support may play a mediating role in the association between emotional intelligence and academic achievement. Individuals with stronger emotional intelligence are generally more capable of building supportive interactions with teachers and recognizing available academic and emotional assistance, which may further strengthen learning motivation and facilitate better academic outcomes.

Behavioral engagement mediation

Behavioral engagement, as a core dimension of student engagement, reflects students' active participation, persistence, and effort in learning activities (Skinner & Pitzer, 2012; Wang et al., 2019). It represents the behavioral manifestation of motivation and is closely linked to academic performance. Students with higher levels of behavioral engagement tend to invest greater effort and sustain participation in academic tasks, thereby achieving better academic outcomes (Bryce et al., 2019; Derakhshan, 2021; Li et al., 2022). However, behavioral engagement may decline over time (Wang & Eccles, 2012), highlighting the need to identify factors that promote sustained engagement. Emotional intelligence has been identified as one such factor, as it supports emotional regulation and facilitates adaptive learning behaviors (Aziz et al., 2020; Zeidner & Matthews, 2018). Taken together, behavioral engagement may help explain how emotional intelligence contributes to students' academic achievement. Students possessing higher emotional intelligence are more likely to adopt effective emotional regulation strategies and demonstrate active involvement in learning tasks, which can increase persistence and academic effort, ultimately contributing to higher levels of academic success.

Perceived teacher support and behavioral engagement chain mediation

Although prior research has examined perceived teacher support and behavioral engagement separately as mediators between emotional intelligence and academic

achievement, limited attention has been paid to their potential sequential mechanism, particularly in the context of Chinese higher education (An et al., 2023). Grounded in Social Cognitive Theory (Bandura, 1986), emotional intelligence, as a personal factor, influences how students perceive environmental resources, whereas supportive environments facilitate subsequent behavioral responses.

Students with higher emotional intelligence are more likely to perceive greater teacher support, which has been linked to a stronger sense of belonging and academic security (Dhliwayo & Coetzee, 2020). Greater perceived teacher support is positively associated with students' motivation and behavioral engagement by providing emotional encouragement and instructional guidance (Furrer & Marchand, 2020; Yan et al., 2024). Active involvement in learning tasks, including sustained participation, effort, and persistence, is an important behavioral correlate of students' academic achievement (Derakhshan, 2021; Goble et al., 2017). Taken together, these findings suggest that emotional intelligence may be associated with self-reported academic achievement through a sequential process in which perceived teacher support promotes behavioral engagement. Accordingly, this study proposes that perceived teacher support and behavioral engagement sequentially mediate the relationship between emotional intelligence and self-reported academic achievement.

Theoretical Foundations

According to Social Cognitive Theory (Bandura, 1986), personal, environmental, and behavioral factors jointly shape individuals' outcomes through their dynamic interactions. In the present study, emotional intelligence is conceptualized as a personal factor, perceived teacher support as an environmental factor, and behavioral engagement as a behavioral factor. From this perspective, students' emotional intelligence may influence how they perceive support from their teachers, while supportive learning environments encourage greater behavioral engagement. These interrelated processes provide a theoretical foundation for understanding how emotional intelligence is associated with self-reported academic achievement.

Goals of the study

Guided by prior research, we examine whether university students' emotional intelligence is related to their reported levels of academic achievement. The conceptual framework guiding the study is presented in Figure 1.

Hypothesis 1: Higher levels of emotional intelligence are expected to correspond to greater academic achievement.

Hypothesis 2: Perceived teacher support is expected to serve as an intervening mechanism linking emotional intelligence with academic achievement.

Hypothesis 3: Behavioral engagement is proposed to explain the association between emotional intelligence and academic achievement.

Hypothesis 4: The influence of emotional intelligence on academic achievement is expected to operate sequentially through perceived teacher support and behavioral engagement.

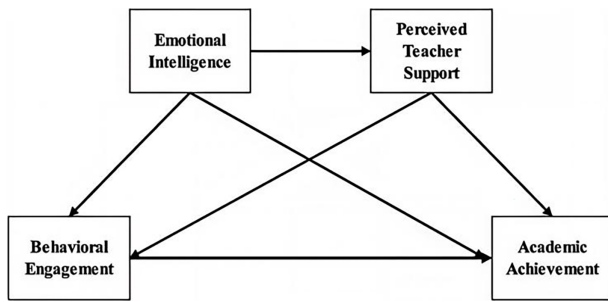


Figure 1. Hypothetical model

Table 1. Demographic characteristics of participants (N = 472)

Variable	Category	n	%
Gender	Male	241	51.1
	Female	231	48.9
Age	18	7	1.5
	19	120	25.4
	20	91	19.3
	21	116	24.6
	22	111	23.5
	23	26	5.5
	24	1	0.2
Academic year	First year	140	29.7
	Second year	92	19.5
	Third year	128	27.1
	Fourth year	112	23.7
Major	Science & Engineering	113	23.9
	Humanities	137	29.0
	Economics & Management	118	25.0
	Others	104	22.0

Method

Research design, participants and setting

Using a stratified random sampling method, data were collected from a diverse sample of undergraduate students with varied academic backgrounds and performance in Northeast China. A total of 472 participants were recruited for study (see Table 1 for demographics). The sample exhibited a relatively balanced gender distribution (51.1% male, 48.9% female) and was mainly composed of students aged 19–22. Participants were distributed across academic years and disciplines, indicating a diverse and representative sample.

Measures

A translation-back-translation process was conducted to establish the linguistic and cultural comparability of the measures (Brislin, 1970). Validated self-report instruments were used to assess all study variables, and participants indicated their responses on a seven-point Likert-type scale from 1 (strongly disagree) through 7 (strongly agree). The reliability results reported in Table 2 indicate acceptable internal consistency across the measures, as reflected by Cronbach's alpha values between 0.80 and 0.91, all of which surpassed the commonly recommended criterion of 0.70 (Taber, 2018).

Procedure

The Human Research Ethics Committee of Universiti Sains Malaysia approved the study (JEPeM-USM; Protocol No. USM/JEPeM/PP/25060545). All participants provided informed consent prior to their involvement in the research.

A three-wave time-lagged survey design was employed to examine the hypothesized sequential relationships. The same participants completed three online surveys at one-month intervals. To enable individual-level matching while maintaining anonymity, participants used the same anonymous identification code across all three waves. Emotional intelligence and demographic information were collected at Time 1 (November 2025), perceived teacher support and behavioral engagement at Time 2 (December 2025), and academic achievement at Time 3 (January 2026). Responses were first matched across the three waves using the anonymous identification codes and then screened for data quality. Questionnaires were excluded if they could not be matched across all three waves, contained incomplete responses, showed straight-line responding (i.e., the same response option selected for all items), or were completed in less than two minutes. After data screening, the final analytical sample comprised 472 participants.

Data analysis

All statistical procedures were carried out with SPSS 20.0 and AMOS 24.0. Potential common method bias was initially investigated through Harman's one-factor procedure and the unmeasured latent method construct (ULMC) technique. The adequacy of the measurement model was subsequently examined through confirmatory factor analysis (CFA) conducted in AMOS. Evidence for convergent validity was established based on standardized loadings, composite reliability (CR), and average variance extracted (AVE), whereas discriminant validity was examined according to the heterotrait-monotrait (HTMT) ratio. Descriptive indices and Pearson's correlation coefficients were subsequently calculated to identify the associations among the study variables. The hypothesized structural relationships were then evaluated through structural equation modeling (SEM). To determine the significance of indirect effects, bias-corrected bootstrapping was conducted with 5000 iterations and 95% confidence intervals, thereby yielding more reliable estimates of the mediation effects.

Common method bias test

Potential common method bias was examined through a combination of procedural safeguards and statistical assessments. Specifically, temporal separation was established by collecting data across three waves, thereby reducing the likelihood that responses to the study variables were influenced by a common measurement context. As reported in Table 3, the unrotated first factor accounted for 44.9% of the overall variance in Harman's single-factor analysis, which remained below the 50% criterion (Podsakoff & Organ, 1986). Furthermore, incorporating the unmeasured latent method construct (ULMC) produced no substantial change in the measurement model. The comparison of model fit indices (CFI = 0.90 vs. baseline

Table 2. Measurement properties of study variables

Variable	Scale source	Items	Dimension	Example item	Cronbach's alpha
Emotional intelligence	Wong and Law (2002)	16	Self-emotion appraisal	"I really understand what I feel."	0.86
			Others' emotion appraisal	"I am a good observer of others' emotions."	0.88
			Use of emotion	"I am a self-motivated person."	0.88
Self-reported academic achievement	Bao and Zhang (2012)	9	Regulation of emotion	"I have good control of my own emotions."	0.91
			Professional literacy	"My ability to apply knowledge from my academic field."	0.80
			Core competence	"My critical thinking skills."	0.88
Perceived teacher support	Zimet et al. (1988)	4	—	"There is a teacher who is around me when I am in need"	0.84
Behavioral engagement	Skinner et al. (2009)	5	—	"I try hard to do well in school"	0.85
Control variables	This study	4	Gender; age; academic year; major		

Table 3. Measurement model fit and assessment of common method bias

Model	CFI	Δ CFI	Variance explained by first factor (%)
Baseline model	0.94	—	44.9%
CLF model (with ULMC)	0.90	−0.04	

Note. ULMC = unmeasured latent method construct. Δ CFI represents the change in CFI relative to the baseline model.

Table 4. Reliability and convergent validity of constructs

Construct	Dimension	CR	AVE
Emotional intelligence	Self-emotion appraisal	0.86	0.61
	Others' emotion appraisal	0.89	0.68
	Use of emotion	0.88	0.65
	Regulation of emotion	0.90	0.70
Academic achievement	Professional literacy	0.82	0.60
	Core competence	0.88	0.55
Perceived teacher support	—	0.84	0.56
Behavioral engagement	—	0.86	0.55

CFI = 0.94, Δ CFI = −0.04) therefore provided additional evidence that common method bias was unlikely to have a substantial impact on the results (Podsakoff et al., 2003).

Confirmatory factor analysis

The measurement and structural models demonstrated satisfactory reliability, validity, and fit. As shown in Table 4, CR values ranged from 0.82 to 0.90, exceeding 0.70, while all AVE values surpassed 0.50, supporting convergent validity (Fornell & Larcker, 1981; Peterson & Kim, 2013). Table 5 shows that HTMT coefficients ranged from 0.52 to 0.62, below the 0.85 criterion, confirming adequate discriminant validity (Henseler et al., 2015).

Table 5. Discriminant validity (HTMT ratio)

	1	2	3	4
1. Emotional intelligence	—			
2. Academic achievement	0.62	—		
3. Perceived teacher support	0.58	0.52	—	
4. Behavioral engagement	0.55	0.60	0.57	—

Table 6. Descriptive statistics of study variables (N = 472)

Variable	Min	Max	Mean	SD
Emotional intelligence	2.50	7.00	5.36	1.12
Academic achievement	1.78	7.00	5.53	0.95
Perceived teacher support	2.00	7.00	5.41	1.01
Behavioral engagement	2.40	7.00	5.71	0.85

Results

Descriptive statistics

Table 6 presents the descriptive statistics of the study variables. Overall, participants reported relatively high levels of behavioral engagement (M = 5.71, SD = 0.85), academic achievement (M = 5.53, SD = 0.95), perceived teacher support (M = 5.41, SD = 1.01), and emotional intelligence (M = 5.36, SD = 1.12). These results suggest

Table 7. Correlations among study variables (N = 472)

Variable	1	2	3	4	5	6	7	8
1. EI	1							
2. AA	0.54**	1						
3. PTS	0.58**	0.71**	1					
4. BE	0.52**	0.64**	0.62**	1				
5. Gender	0.01	-0.09	-0.12*	-0.03	1			
6. Age	0.03	-0.05	-0.04	-0.04	0.36**	1		
7. Grade	0.02	-0.01	-0.02	-0.02	0.26**	0.44**	1	
8. Major	0.06	-0.17**	-0.18**	-0.14**	0.07	-0.03	-0.02	1

Note. ** $p < 0.01$, * $p < 0.05$. EI = emotional intelligence; AA = academic achievement; PTS = perceived teacher support; BE = behavioral engagement.

Table 8. Direct effects of latent constructs

Path	β (Standardized)	S.E.	C.R.	p
Main effects				
PTS $\leftarrow$ EI	0.67	0.04	13.47	***
BE $\leftarrow$ EI	0.16	0.04	2.62	0.01
AA $\leftarrow$ EI	0.04	0.03	0.91	0.36

Note. *** $p < 0.001$.

that the variables were generally above the midpoint of the scale. All variables scored well above the theoretical midpoint of 3.5, suggesting generally favorable perceptions and performance among the participants (Dawes, 2008).

Table 7 presents the correlations among the study variables. Emotional intelligence (EI) was positively correlated with academic achievement (AA; $r = 0.54$), perceived teacher support (PTS; $r = 0.58$), and behavioral engagement (BE; $r = 0.52$). Academic achievement was also positively associated with PTS ($r = 0.71$) and BE ($r = 0.64$), while PTS was positively correlated with BE ($r = 0.62$). Regarding control variables, gender was negatively correlated with PTS ($r = -0.12$), and major was negatively associated with AA ($r = -0.17$), PTS ($r = -0.18$), and BE ($r = -0.14$). Other correlations were not significant.

Emotional intelligence main effect on academic achievement

The SEM results indicated that the proposed model demonstrated an acceptable fit to the empirical data ($\chi^2/df = 2.61$, CFI = 0.91, TLI = 0.90, RMSEA = 0.06, SRMR = 0.06) (Bagozzi & Yi, 1988; Hayduk, 1987; Hu & Bentler, 1999; Salum et al., 2012). Given the acceptable model fit, we further examined the standardized direct paths within the model. As shown in Table 8, After controlling for demographic variables, the direct effect of EI on AA was not significant ($\beta = 0.04$, $p = 0.36$), suggesting that EI may not influence AA directly. However, EI positively predicted perceived teacher support (PTS; $\beta = 0.67$, $p < 0.001$), and had a smaller but significant direct effect on behavioral engagement (BE; $\beta = 0.16$, $p = 0.01$). Therefore, Hypothesis 1 was not supported.

Table 9. Mediation effect analysis of PTS and BE

Path	Effect	Lower	Upper	p
EI $\rightarrow$ PTS $\rightarrow$ AA	0.31	0.22	0.43	***
EI $\rightarrow$ BE $\rightarrow$ AA	0.02	0.001	0.07	<0.05
EI $\rightarrow$ PTS $\rightarrow$ BE $\rightarrow$ AA	0.06	0.01	0.12	<0.05
EI $\rightarrow$ AA (direct)	0.03	-0.05	0.12	0.44
Total effect	0.42	0.32	0.53	***

Note. *** $p < 0.001$, Lower and Upper represent the lower and upper bounds of the 95% confidence interval (CI).

Perceived teacher support mediation

To test Hypothesis 2, bias-corrected bootstrapping with 5000 resamples and 95% confidence intervals was conducted. As shown in Table 9, the direct effect of emotional intelligence (EI) on academic achievement (AA) was not significant ($\beta = 0.03$, 95% CI = $[-0.05, 0.12]$, $p = 0.44$). However, EI had a significant indirect effect on AA through perceived teacher support (PTS; $\beta = 0.31$, 95% CI = $[0.22, 0.43]$, $p < 0.001$), indicating that higher emotional intelligence was associated with higher self-reported academic achievement through greater perceived teacher support. These results support Hypothesis 2.

Behavioral engagement mediation

Hypothesis 3 examined whether behavioral engagement (BE) mediates the relationship between EI and AA. The analysis showed a small but significant indirect effect of EI on AA through BE ($\beta = 0.02$, 95% CI = $[0.001, 0.07]$, $p < 0.05$), suggesting that EI promotes academic achievement by encouraging students' behavioral engagement, as shown in Table 9. These results support Hypothesis 3.

Chain mediation effects

Hypothesis 4 tested a sequential mediation pathway from EI $\rightarrow$ PTS $\rightarrow$ BE $\rightarrow$ AA. The indirect effect of EI on AA via this chain was significant ($\beta = 0.06$, 95% CI = $[0.01, 0.12]$, $p < 0.05$), indicating that EI may first increase perceived teacher support, which subsequently enhances behavioral engagement, ultimately leading to higher academic achievement, as shown in Table 9. These results support Hypothesis 4.

Discussion

The present study examined the relationships among emotional intelligence, perceived teacher support, behavioral engagement, and academic achievement by testing a chain mediation model among Chinese university students. By integrating personal, environmental, and behavioral factors, the findings provide a more comprehensive understanding of how emotional intelligence influences academic outcomes in higher education.

Contrary to expectation, emotional intelligence did not show a significant direct association with academic achievement. This finding contrasts with earlier studies suggesting that emotionally intelligent students tend to achieve better academic outcomes (Chinyere & Afeez, 2022; Li, 2019; Roy et al., 2021; Zhi et al., 2023). Such inconsistencies indicate that emotional intelligence may not directly translate into academic success but instead operates through indirect pathways. Similar findings have been reported in prior research (Quílez-Robres et al., 2023), suggesting that its influence is contingent upon contextual and process-related factors. This underscores the importance of examining mediating mechanisms rather than assuming direct effects.

As expected, emotional intelligence was positively related to perceived teacher support, indicating that students with higher levels of emotional intelligence were more likely to regard their teachers as caring and responsive. This result is in line with previous studies showing that emotionally intelligent individuals are more capable of identifying social and emotional cues, which helps foster positive interpersonal interactions (Brackett et al., 2011). These emotional abilities may strengthen students' perceptions of support within academic contexts, especially support received from teachers (Shao et al., 2024). Prior research has also demonstrated that emotional recognition contributes positively to students' perceptions of teacher support (Sommer et al., 2025). Students with stronger emotional intelligence are generally better at understanding and regulating emotions during social interactions, which may promote more constructive teacher-student relationships and improve academic experiences (Malinauskas & Malinauskiene, 2020).

In addition, perceived teacher support was positively associated with academic achievement. Supportive teachers can provide both emotional encouragement and instructional guidance, which may promote students' learning effectiveness and academic development (Luan et al., 2023). The findings further indicated that perceived teacher support mediated the association between emotional intelligence and academic achievement. Specifically, students with higher emotional intelligence were more likely to perceive stronger teacher support, which subsequently contributed to better academic outcomes. Emotionally intelligent students may be more inclined to interpret teachers as approachable and supportive, thereby enhancing their academic confidence and sense of connection within the learning environment (Chinyere & Afeez, 2022).

As hypothesized, emotional intelligence was found to positively predict behavioral engagement. This finding accords with earlier studies showing that emotional

intelligence is positively linked to continued involvement in learning processes (Wang et al., 2019). In addition, emotionally adaptive competencies may further encourage students' active engagement and support their long-term academic growth (Alenezi et al., 2020). These results suggest that emotional intelligence represents an important psychological resource that facilitates positive learning behaviors.

A positive association was identified between students' behavioral engagement and their academic achievement, in line with earlier evidence highlighting the role of active learning involvement and supportive educational environments in promoting academic success (Goble et al., 2017; Zhang et al., 2024). The mediation analysis further suggested that behavioral engagement represents an underlying pathway linking emotional intelligence to academic achievement. In particular, students with stronger emotional intelligence appeared more inclined to participate actively in learning activities, which may subsequently enhance their academic performance. Given that greater engagement is generally associated with more favorable learning outcomes, behavioral engagement may explain, at least in part, how emotional intelligence translates into improved academic performance (Prananto et al., 2025; Zeidner & Matthews, 2018).

Importantly, perceived teacher support and behavioral engagement jointly mediate the relationship between emotional intelligence and academic achievement. These findings suggest that academic success may emerge from the interaction between individual emotional resources and supportive educational environments rather than from personal characteristics alone. Individuals with stronger emotional intelligence are generally more capable of recognizing emotional and interpersonal cues, which may facilitate more positive social interactions and strengthen perceptions of teacher support (Entrata & Nicomedes, 2024). Furthermore, perceived teacher support positively predicted behavioral engagement, indicating that students who experienced greater support from teachers were more likely to participate actively and remain consistently involved in learning activities. This finding is consistent with previous research showing that supportive teacher-student relationships can enhance students' motivation, confidence, and willingness to invest effort in academic tasks (Schnell et al., 2025; Zhao et al., 2021). In addition, teacher support may promote classroom participation, intrinsic motivation, and sustained engagement, thereby facilitating improved academic outcomes (Zhang et al., 2024). Overall, these findings highlight that perceived teacher support and behavioral engagement jointly function as important mechanisms through which emotional intelligence contributes to academic achievement.

In summary, unlike earlier studies that primarily investigated emotional intelligence, teacher support, and behavioral engagement separately, the present study incorporated these variables into an integrated framework. By examining both direct and indirect associations simultaneously, this study offers a more comprehensive understanding of the mechanisms associated with academic achievement. Moreover, by focusing on the context of Chinese higher education, the findings help address an

existing contextual gap and underscore the important roles of environmental support and behavioral engagement in linking emotional intelligence to academic success.

Implications for research and practice

The present research adds to prior scholarship by testing a sequential mediation process through which emotional intelligence may contribute to students' academic achievement via teacher support as perceived by learners and active involvement in learning. Combining individual, contextual, and action-oriented dimensions, the framework grounded in SCT explains how emotional resources may operate together with interpersonal conditions to shape educational outcomes. The lack of a direct association between emotional intelligence and academic achievement, alongside the observed indirect pathways, indicates that its contribution may emerge through interconnected psychological-contextual processes.

The study also extends the theoretical relevance of this framework to Chinese university settings. Within a higher-education environment marked by substantial academic pressures, non-cognitive capacities may be particularly relevant to students' educational development. The observed positive associations among emotional intelligence, perceived support from teachers, and students' engagement in learning, together with their links to students' academic attainment, are consistent with related evidence (An et al., 2023; Entrata & Nicomedes, 2024). Evidence drawn from Chinese undergraduates further broadens the cultural scope of SCT and offers insight into whether its proposed mechanisms can explain educational outcomes across diverse cultural and institutional settings.

The findings likewise offer several implications for university practice. Higher-education institutions could implement initiatives that strengthen students' emotional competencies while complementing conventional academic skill development. Activities designed to cultivate recognition and regulation of emotions may help learners make more effective use of interpersonal resources and participate more consistently in coursework (MacCann et al., 2020). Moreover, nurturing constructive teacher-student interactions and creating opportunities for active participation may further promote learning engagement and favorable academic outcomes.

Limitations and future directions

Several limitations warrant consideration when interpreting the findings. First, the study relied on self-reported measures to capture all variables, including students' reported academic achievement. Although temporal separation across measurement waves was used to mitigate common method bias, responses obtained from participants themselves may remain susceptible to social desirability and response tendencies. Future investigations could draw on complementary sources of information, including teacher assessments and objective academic records, to improve the accuracy of measurement.

Second, the three-wave time-separated survey design does not eliminate the observational nature of the study, and thus causal inferences should be made with caution. Further research could implement extended longitudinal

studies with longer observation periods or experimental designs to generate stronger evidence concerning the directional links among emotional intelligence, perceived teacher support, behavioral engagement, and self-reported academic achievement.

Third, the present analysis included a relatively small set of demographic control variables. Subsequent research could incorporate a broader range of personal and contextual characteristics, including personality traits, academic ability, learning motivation, and socioeconomic status, to develop a more comprehensive account of students' academic development.

Finally, the participants were exclusively university students from China, which may restrict the extent to which the findings can be transferred to other cultural or educational environments. Replication with samples from different geographical areas and educational contexts would be valuable for examining whether the proposed model remains applicable across diverse populations.

Conclusion

This study examined the relationships among emotional intelligence, perceived teacher support, behavioral engagement, and academic achievement among Chinese university students. The findings indicate that emotional intelligence does not directly predict academic achievement but operates through perceived teacher support and behavioral engagement, both independently and sequentially. The evidence indicates that academic achievement is best understood by considering students' personal characteristics, surrounding contexts, and behavioral patterns. By identifying key mediating mechanisms, this study provides a more nuanced explanation of how emotional intelligence contributes to academic outcomes and offers valuable insights for improving educational practices in higher education.

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Availability of Data and Materials: The data supporting this study's findings are available from the corresponding author upon reasonable request.

Ethics Approval: The study was conducted in accordance with the Declaration of Helsinki and approved by the Human Research Ethics Committee of Universiti Sains Malaysia (JEPEN-USM; Protocol Code:

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