Factors Influencing the Academic Achievement of Chinese International Students: An Analysis from the Perspective of Business Administration

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Abstract

This study investigates the impact of academic motivation, self-efficacy, and emotions on Chinese international students' academic performance. With a focus on students enrolled in institutions across the United States, United Kingdom, Canada, Australia, Thailand, and Hong Kong, the study utilizes quantitative data from 700 Chinese students. Structural equation modeling and confirmatory factor analysis were employed to examine the relationships among the variables. The findings indicate that academic motivation and self-efficacy significantly enhance academic emotions and performance. Additionally, positive academic emotions are shown to contribute directly to higher academic achievement. These results highlight the critical role of motivation, confidence, and emotional engagement in academic success for Chinese international students. The study provides actionable insights for educators and policymakers to support this student group's academic and personal development, fostering a conducive learning environment for international education.

Keywords: academic motivation; academic self-efficacy; academic emotions; academic achievements; Chinese international students

Introduction

Studying abroad has become increasingly prevalent and essential for developing a globally competitive workforce with the ongoing globalization of higher education. Recognizing the advantages of international experience, the Chinese government has actively encouraged students to pursue education at renowned institutions worldwide. According to the "China Study Abroad Development Report (2022)," despite recent challenges—such as economic fluctuations, geopolitical uncertainties, and the COVID-19 pandemic—the trend of Chinese students studying abroad continues to grow. This trend underscores the critical need to understand the factors that influence the academic success of Chinese international students, who face unique challenges in adapting to new cultural and academic environments.

In this context, academic motivation, self-efficacy, and emotions emerge as three essential factors significantly shaping students' learning outcomes. Academic motivation drives the effort and dedication needed for successful learning, while self-efficacy reflects a student's confidence in their ability to achieve academic goals. Academic emotions, encompassing feelings such as enthusiasm, anxiety, and satisfaction, also play a crucial role in influencing how students engage with their studies. Research indicates that these variables are particularly impactful for international students, who often encounter heightened academic and social pressures in their host countries.

This study aims to explore the relationships between these factors—academic motivation, self-efficacy, and academic emotions—and academic achievement among Chinese students studying abroad. By focusing on these elements from a business administration perspective, the research seeks to provide a nuanced understanding of how these factors interconnect and contribute to academic success. The findings are intended to support educators, policymakers, students, and institutions by offering practical insights to enhance Chinese international students' academic experience and outcomes, ultimately fostering a supportive environment that promotes academic excellence and personal development.

Table 1 The number of international students receiving higher education in the eight major study destinations worldwide from 2019 to 2021 academic year. (Unit: Person%)

Ranking	Country	2019–2020 academic year		2020~2021 academic year	
		Number of people	year–on–year growth	Number of people	year–on–year growth
1	USA	1075496	–1.81	914095	–15.01
2	UK	556625	6.18	605130	8.71
3	Canada	503270	15.58	256455	–49.04
4	China	—	—	—	—
5	Australia	463643	10.26	429382	–7.39
6	France	358000	4.25	370052	3.37
7	Russia	353331	5.63	395263	11.87
8	Germany	302157	7.15	319902	5.87

Note: The data for China in the academic years 2019–2020 and 2020–2021 have not been released.

The overseas study industry remains a pillar for countries receiving international students, bringing significant positive economic impacts. In the 2019–2020 academic year, despite the COVID–19 pandemic's severe effects on global travel and the economy, international students in California and New York alone contributed US$11.9 billion and supported 125,000 jobs. Beyond tuition fees, their spending on accommodation, retail, transportation, and health insurance fuels job creation and economic growth. Furthermore, they drive innovation and entrepreneurship in their host countries. Among 29 countries surveyed regarding COVID–19, nearly half adjusted their international student admission policies for the 2020–2021 academic year, adopting more open and positive approaches to encourage study abroad. From the third quarter of 2021, European countries, excluding Russia, generally resumed offline teaching, followed by America, Oceania, and Africa in the first quarter of 2022. Due to the pandemic's fluctuating impact in Asia, academic institutions have adopted hybrid or online teaching, with policies changing frequently. To boost confidence in studying abroad, key destinations worldwide have introduced favorable policies to encourage international students.

Table 2 The number and growth rate of international students from the source countries of higher education international students from 2018 to 2019. (Unit: Person%)

Rank	Country	2019	2018	Growth rate
1	China	1061511	997702	6.4
2	India	461792	377849	22.2
3	Vietnam	126059	108301	16.4
4	Germany	122445	122524	–0.1
5	France	103161	99567	3.6
6	United States	102246	86029	18.9
7	South Korea	101493	101694	–0.2
8	Nibir	93921	82047	14.5
9	Kazakhstan	89292	88118	1.3
10	Brazil	81882	70055	16.9

Source: UNESCO Institute for Statistics

China continues to lead as the largest source of international students worldwide, with significant growth also seen among other Asian countries, notably India. In 2019, 1,061,511 Chinese students were enrolled in higher education institutions abroad, nearly 600,000 more than the second–largest group from India, which accounted for 461,792 students. The number of Indian students studying abroad has risen rapidly, with Indian enrollment approaching or surpassing Chinese enrollment in several host countries. Vietnam ranks as the third–largest exporter of international students globally, while Nepal has seen its outbound student mobility rate grow substantially, from 9.1% in 2015 to 22.8% in 2021. This upward trend in outbound student numbers is expected to continue, with Kazakhstan projected to become a key contributor to the global pool of international students in the coming years.

Research Objectives

This study aims to conduct an in–depth examination of the factors influencing the academic success of Chinese international students, with a specific focus on academic motivation, self–efficacy, and academic emotions. By analyzing these variables, the study seeks to:

1. Identify key factors that impact the academic achievement of Chinese international students.

2. Examine how academic motivation influences academic emotions and overall academic performance.

3. Assess the role of academic self–efficacy in shaping academic emotions and its contribution to academic achievement.

4. Determine the effect of academic emotions on academic success.

These objectives provide insights for educators, policymakers, and institutions to develop effective strategies that support Chinese students in achieving better academic outcomes during their overseas studies.

Scope of Research

As China has emerged as the world's largest source of international students, understanding the factors that impact their academic performance has become increasingly important. However, existing research on the academic success of Chinese international students remains limited, often lacking the depth needed to provide practical guidance. This study applies business administration theory to investigate how academic motivation, self–efficacy, and emotions influence Chinese students' academic achievement abroad. By focusing on these variables, the research aims to offer strategic insights that support Chinese students in enhancing their academic performance, providing valuable references for educators, policymakers, and students seeking effective ways to improve learning outcomes in international education contexts.

Literature Review

The concept of cross–border education has a long history, rooted in the medieval European tradition of welcoming students regardless of nationality, fostering scholarly exchange across regions (Haskins, 1927). In the modern era, economic globalization and the internationalization of higher education have greatly expanded the scale of studying abroad. Scholars like Altbach (2004) and Knight (2004) argue that studying abroad promotes knowledge exchange and fosters cultural and educational advancements that benefit both students and host countries.

1. Academic Motivation

Academic motivation, the driving force behind students' engagement in learning activities, is a critical factor in higher education (Locke, 1996; Dörnyei, 1998). Studies by Woolfolk (2001) and Chue and Nie (2016) reveal that motivation encompasses elements such as goal orientation and resilience, which are closely linked to academic success. Research on Chinese students abroad, such

as that by Jin (2022) and Yan and Berliner (2011), has shown that highly motivated students are more likely to pursue and achieve personal and academic goals.

2. Academic Self–Efficacy

Self–efficacy is another significant predictor of academic performance, defined as one's belief in their ability to achieve specific academic goals (Bandura, 1977). Educational studies by Patrick et al. (2011) demonstrate that higher self–efficacy enhances students' willingness to engage in academic tasks and is closely linked to their self–concept. Recent studies, such as Chen's (2023) work on Chinese international students, emphasize the role of self–efficacy in motivating students to strive for academic excellence.

3. Academic Emotions

Academic emotions, including enthusiasm, anxiety, and satisfaction, are increasingly recognized as crucial to student success (Pekrun, 2006). Pekrun et al. (2014) have contributed extensively to understanding how emotions affect academic engagement and performance. Chinese scholars Yan and Guoliang (2007) have expanded this concept within the context of Chinese classrooms, noting that positive emotions can significantly enhance learning experiences and outcomes.

4. Academic Achievement

Academic achievement extends beyond grades to include cognitive skill development and a lifelong commitment to learning (Bloom, 1956). For international students, academic success also entails overcoming language barriers and adapting to cultural differences. Studies by Daller and Yixin (2017) highlight that cultural and linguistic challenges can impact academic performance, underscoring the need for support systems. Cruickshank (2016) and Zhang (2016) further argue that adapting to new assessment methods and accessing academic resources are critical to international students' success.

In summary, prior research indicates that academic motivation, self–efficacy, and academic emotions play pivotal roles in students' academic outcomes, particularly in the context of studying abroad. This study builds on these foundations to examine how these factors interact and influence the academic performance of Chinese international students.

5. Hypothesis

Building on prior research, this study proposes that academic motivation, self–efficacy, and academic emotions are key factors influencing the academic achievement of Chinese international students. The following hypotheses outline the anticipated relationships among these variables:

Hypothesis 1: Academic motivation positively impacts academic emotions among Chinese international students, enhancing their emotional engagement with academic tasks.

Hypothesis 2: Academic motivation directly affects academic achievement, contributing to improved academic performance through increased engagement and persistence.

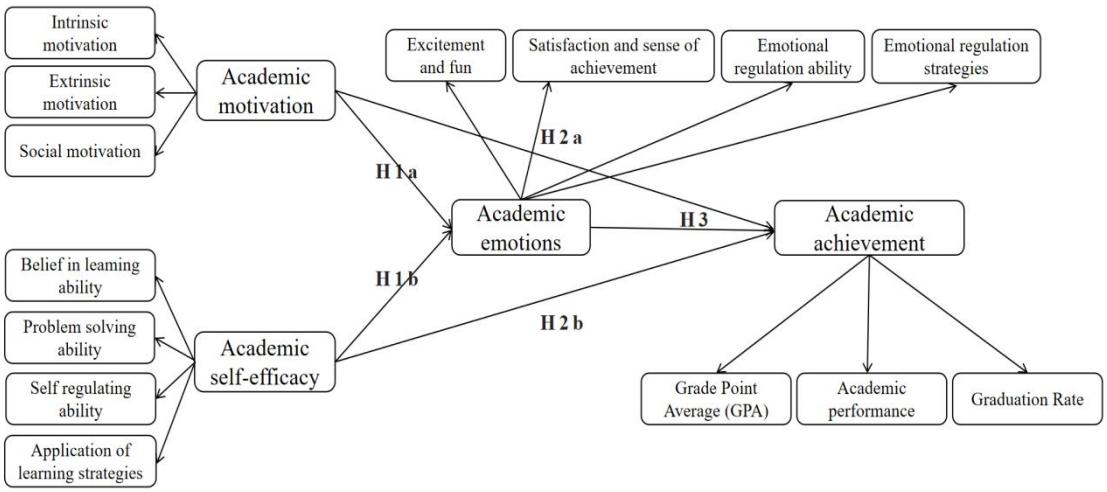
Hypothesis 3: Academic self–efficacy positively influences academic emotions, fostering better emotional stability and positivity in learning.

Hypothesis 4: Academic self–efficacy positively impacts academic achievement, as students with higher self–efficacy are more likely to engage actively in their studies and achieve better academic outcomes.

Hypothesis 5: Academic emotions positively affect academic achievement, with students who experience positive emotions more likely to achieve higher academic results.

These hypotheses aim to clarify how motivation, self–efficacy, and emotions interact to shape the academic success of Chinese students studying abroad, providing insights that can inform educational practices and policy decisions.

Conceptual Framework



Research Methodology

This study employs a quantitative research approach to examine the influence of academic motivation, self-efficacy, and emotions on Chinese international students' academic performance. The methodology includes data collection through surveys, data analysis using structural equation modeling (SEM), and confirmatory factor analysis (CFA) to validate the proposed hypotheses.

Data Collection

A questionnaire survey was conducted among 700 Chinese international students studying in the United States, Canada, Australia, Thailand, and Hong Kong. The questionnaire consisted of two sections: the first collected demographic information, including gender and age, while the second measured the primary variables—academic motivation, self-efficacy, and academic emotions—using a 5-point Likert scale.

Two methods were used to distribute the survey: an online version was sent to students currently studying abroad, and a separate version was administered to students who had returned to China. This approach ensured a diverse sample and increased the reliability of the data.

Research Instruments

The study employed established scales to measure the key variables. Academic motivation was assessed across intrinsic, extrinsic, and social dimensions, while self-efficacy included belief in learning ability, problem-solving, and self-regulation. Academic emotions encompassed positive emotions such as excitement and satisfaction. The reliability of each scale was tested using SPSS (version 27), with Cronbach's alpha values exceeding 0.80, indicating high internal consistency.

Data Analysis

Data analysis was performed using structural equation modeling (SEM) and confirmatory factor analysis (CFA) to assess the validity and reliability of the constructs and test the relationships between variables. SEM was employed to evaluate the causal paths among academic motivation, self-efficacy, emotions, and achievement. Model fit was assessed using several indices, including the Chi-square/degrees of freedom ratio (CMIN/DF), Root Mean Square Error of Approximation (RMSEA), and Comparative Fit Index (CFI), with results indicating an acceptable model fit.

Data Validation

A "member check" process was conducted to ensure data accuracy, where a summary of responses was sent to participants for confirmation. Additionally, participant feedback during the

survey was incorporated to refine data interpretation further and reduce the likelihood of misrepresentation. This rigorous validation process strengthens the credibility and reliability of the findings.

Research Results

This section presents the study's findings, focusing on the relationships among academic motivation, self–efficacy, academic emotions, and academic achievement among Chinese international students. Structural equation modeling (SEM) was employed to test the hypotheses, revealing significant positive effects across all variables.

Objective 1: Assessing the Impact of Academic Motivation on Academic Emotions and Academic Achievement.

Academic motivation is a crucial factor influencing both emotional and academic performance. Understanding its impact can guide interventions aimed at enhancing student experiences and outcomes.

1. Influence on Academic Emotions:

Academic motivation significantly and positively influences academic emotions, with a non–standardized path coefficient of 0.502 ($p < 0.001$). This finding suggests that students with high academic motivation are more likely to experience positive emotions related to their studies, including enthusiasm for learning, enjoyment of challenges, and reduced anxiety. These positive emotions can enhance engagement and academic performance.

2. Influence on Academic Achievement:

Motivation also significantly enhances academic achievement, as evidenced by a non–standardized path coefficient of 0.363 ($p < 0.001$). This indicates that motivated students are more likely to achieve higher academic outcomes, likely due to increased effort, persistence, and resilience in overcoming academic challenges. Thus, cultivating academic motivation is key to improving academic success.

Objective 2: Evaluating the Role of Academic Self–Efficacy in Promoting Academic Emotions and Academic Achievement.

Academic self–efficacy, defined as a student's belief in their ability to accomplish academic tasks, plays a fundamental role in shaping emotional responses and academic outcomes.

1. Effect on Academic Emotions:

Academic self–efficacy positively affects academic emotions, with a non–standardized path coefficient of 0.404 ($p < 0.001$). Students with high self–efficacy tend to exhibit better emotional stability and positivity towards their academic work, feeling more confident and less stressed. This emotional stability fosters a positive learning environment and enhances overall well–being.

2. Contribution to Academic Achievement:

Academic self–efficacy significantly contributes to academic achievement, with a non–standardized path coefficient of 0.292 ($p < 0.001$). Students who believe in their academic capabilities are more likely to perform well, as they engage in effective learning strategies, manage their time efficiently, and persist through challenges. Enhancing self–efficacy could therefore lead to improved academic outcomes.

Objective 3: Determining the Influence of Academic Emotions on Academic Achievement.

Understanding the role of academic emotions in academic success provides insights into the non–cognitive factors that contribute to educational attainment.

1. Promotion of Academic Achievement:

Academic emotions significantly promote academic achievement, with a non–standardized path coefficient of 0.230 ($p = 0.002$). This indicates that students experiencing positive academic emotions are more likely to achieve higher academic results. Positive emotions enhance concentration, facilitate information processing, and improve memory retention, leading to better academic performance. Encouraging positive academic emotions should be considered a strategic approach to enhancing students' academic achievements.

2. Validation of Measurement Constructs Through CFA

Confirmatory factor analysis (CFA) was conducted to validate the measurement constructs. This analysis assesses the theoretical relationships among academic motivation, self–efficacy, emotions, and achievement. The results of the CFA indicate a good fit for the proposed model, confirming the validity of the constructs used in this study.

2.1 First–level Dimensional Correlation Analysis

Pearson correlation analysis investigated the relationships between academic achievement and the dimensions of academic motivation, self–efficacy, and emotions. The correlation coefficients

provide insight into the strength of these relationships. The analysis revealed the following correlations:

Table 3 First-level dimension analysis table

	Academic motivation	Academic self-efficacy	Academic emotions	Academic achievement
Academic motivation	1			
Academic self-efficacy	0.561	1		
Academic emotions	0.564	0.573	1	
Academic achievement	0.558	0.571	0.545	1

Note: * p<0.05 p<0.01

The correlation coefficient between academic achievement and motivation is 0.558, which is significant at the 0.01 level and indicates a significant positive correlation. Similarly, the correlation coefficient between academic achievement and self-efficacy is 0.571, which is also significant at the 0.01 level, demonstrating a strong positive relationship. Finally, the correlation coefficient between academic achievement and emotions is 0.545, significant at the 0.01 level, reflecting a noteworthy positive association.

These findings highlight that higher levels of academic motivation, self-efficacy, and positive academic emotions are associated with improved academic achievement among Chinese international students, underscoring the importance of fostering these factors to enhance academic success.

2.2 Second-level Dimensional Correlation Analysis

Pearson correlation analysis was employed to examine the relationships between academic achievement and various factors, including average grade point, exam scores, graduation rates, and dimensions of motivation and self-efficacy. This analysis quantifies the strength and direction of these relationships. The results are summarized in the following table:

Table 4 Second-level dimension analysis table

	Mean	Standard deviation Mean	Intrinsic motivation	Extrinsic motivation	Social motivation	Belief in learning ability	Problem-solving ability	Self-regulation ability	Application of learning strategies	Excitement and enjoyment	Satisfaction and accomplishment	Emotional regulation ability	Emotional regulation strategies	Grade Point Average (GPA)	Test scores	Graduation rate
Intrinsic motivation	3.433	0.93	1													
Extrinsic motivation	3.408	0.964	0.5	1												
Social motivation	3.453	0.966	0.475	0.535	1											
Belief in learning ability	3.399	0.948	0.346	0.358	0.4	1										
Problem-solving ability	3.389	0.987	0.421	0.358	0.407	0.525	1									
Self-regulation ability	3.433	0.969	0.359	0.362	0.352	0.491	0.523	1								
Application of learning strategies	3.374	0.99	0.382	0.363	0.343	0.495	0.558	0.529	1							
Excitement and enjoyment	3.412	0.938	0.381	0.412	0.323	0.344	0.389	0.388	0.365	1						
Satisfaction and sense of accomplishment	3.443	0.931	0.346	0.375	0.342	0.313	0.35	0.347	0.324	0.463	1					
Emotional regulation ability	3.38	0.979	0.348	0.371	0.349	0.379	0.349	0.386	0.348	0.417	0.478	1				
Emotional regulation strategies	3.433	0.981	0.341	0.353	0.334	0.345	0.329	0.356	0.338	0.471	0.465	0.464	1			
Grade point average	3.39	0.999	0.348	0.344	0.374	0.405	0.359	0.363	0.367	0.313	0.311	0.327	0.325	1		
Test scores	3.412	0.975	0.373	0.419	0.412	0.402	0.391	0.39	0.39	0.365	0.375	0.352	0.325	0.475	1	
Graduation rate	3.4	1.015	0.371	0.352	0.347	0.332	0.322	0.376	0.35	0.38	0.351	0.366	0.324	0.45	0.538	1

Note: *p<0.05 p<0.01

The analysis identifies significant positive correlations at the 0.01 level between educational outcomes (GPA, exam scores, and graduation rates) and various motivational and cognitive factors. Specifically, GPA positively correlates with intrinsic, extrinsic, and social motivation; belief in learning ability; problem-solving ability; self-regulation; application of learning strategies; excitement and enjoyment; satisfaction and sense of accomplishment; and emotional regulation abilities and strategies. Exam scores exhibit similar correlations, powerful with extrinsic and social motivations. Graduation rates also positively correlate with these factors, highlighting the roles of self-regulation and excitement in academic success. These findings suggest that motivation and cognitive abilities significantly influence educational outcomes such as GPA, exam scores, and graduation rates.

2.3 First-order Confirmatory Factor Analysis

The first-order confirmatory factor analysis involved 14 sub-level constructs. These included intrinsic motivation, extrinsic motivation, social motivation, belief in learning ability, problem-solving ability, self-regulation ability, application of learning strategies, excitement and enjoyment, satisfaction and sense of accomplishment, emotional regulation ability, emotional regulation strategies, average grade point average (GPA), academic performance, and graduation rate, encompassing a total of 73 measurement items.

The confirmatory factor analysis (CFA) data indicate a strong fit with the empirical evidence. The CMIN/DF value is 1.164, well below the threshold of 3–5, indicating minimal discrepancy per degree of freedom. The RMSEA index is recorded at 0.015, significantly lower than the upper limit of 0.08, suggesting negligible model error.

Additionally, the Goodness–of–Fit Index (GFI) is 0.900, meeting the criterion of being more significant than 0.85. The Normed Fit Index (NFI), Tucker–Lewis Index (TLI), Incremental Fit Index (IFI), and Comparative Fit Index (CFI) all exceed the benchmark of 0.9, with values of 0.911, 0.985, 0.986, and 0.986, respectively. These indices collectively affirm that the model aligns well with the data and effectively captures the theoretical framework proposed, demonstrating its robustness for further academic research.

Table 5 Model fit index

Adaptation index	CMIN/DF	RMSEA	GFI	NFI	IFI	TLI	CFI
Adaptation standard	<3–5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9
Test result	1.164	0.015	0.900	0.911	0.986	0.985	0.986
Adaptation judgment	match	match	match	match	match	match	match

Overall, each of these fit indices collectively confirms that the model not only aligns well with the data but also robustly encapsulates the theoretical framework proposed, thereby affirming its utility in further academic research.

2.4 Convergent Validity

Two key metrics were utilized to assess convergent validity: Average Variance Extracted (AVE) and Composite Reliability (CR). Strong convergent validity is indicated by an AVE greater than 0.5 and a CR value exceeding 0.7. If either the AVE or CR values fall below these thresholds, it may be necessary to reconsider including specific factors and reanalyze the convergent validity.

Table 6 Model AVE and CR indicator results

Factor	Average variance extraction AVE value	Combined reliability CR value
Intrinsic motivation	0.581	0.893
Extrinsic motivation	0.613	0.927
Social motivation	0.607	0.885
Belief in learning ability	0.593	0.897
Problem–solving ability	0.617	0.906
Self–regulation ability	0.604	0.901
Application of learning strategies	0.611	0.887
Excitement and enjoyment	0.577	0.872
Satisfaction and sense of accomplishment	0.571	0.870
Emotional regulation ability	0.620	0.920
Emotional regulation strategies	0.569	0.798
GPA	0.600	0.818
Test scores	0.601	0.883
Graduation rate	0.599	0.817

The analysis demonstrates that all 14 factors possess AVE values above the 0.5 threshold and CR values exceeding 0.7. This indicates a high degree of convergent validity, confirming that the measures effectively capture the intended constructs. The strong AVE and CR values bolster confidence in the robustness and integrity of the analysis, supporting the reliability of the constructs under consideration.

2.5 Discriminant Validity

The analysis shows that all constructs exhibit good discriminant validity. For each factor, the square root of the AVE exceeds the maximum correlation between factors. The following values illustrate this:

Intrinsic Motivation: AVE square root = 0.762, surpassing maximum correlation of 0.500.

Extrinsic Motivation: AVE square root = 0.783, exceeding maximum correlation of 0.535.

Social Motivation: AVE square root = 0.779, more significant than the maximum correlation of 0.535.

Belief in Learning Ability: AVE square root = 0.770, higher than the maximum correlation of 0.535.

Problem–Solving Ability: AVE square root = 0.785, greater than 0.558.

Self–Regulation Ability: AVE square root = 0.777, exceeding maximum correlations.

Application of Learning Strategies: AVE square root = 0.782, surpassing maximum correlations.

Excitement and Enjoyment: AVE square root = 0.759, exceeding maximum correlation of 0.471.

Satisfaction and Sense of Accomplishment: AVE square root = 0.756, greater than 0.478.

Emotional Regulation Ability: AVE square root = 0.788, exceeding maximum correlation of 0.478.

Emotional Regulation Strategies: AVE square root = 0.754, surpassing 0.478.

GPA: AVE square root = 0.775, greater than maximum correlations.

Test Scores: AVE square root = 0.775, exceeding maximum correlations.

Graduation Rate: AVE square root = 0.774, surpassing maximum correlations.

In summary, the AVE square roots for all constructs exceed their highest inter–factor correlations, indicating robust discriminant validity.

Table 7 Discriminant validity: Pearson correlation and AVE square root value

	Intrinsic motivation	Extrinsic motivation	Social motivation	Belief in learning ability	Problem–solving ability	Self–regulation ability	Application of learning strategies	Excitement and enjoyment	Satisfaction and accomplishment	Emotional regulation ability	Emotional regulation strategies	GPA	Test scores	Graduation rate
Intrinsic motivation	0.762													
Extrinsic motivation	0.500	0.783												
Social motivation	0.475	0.535	0.779											
Belief in learning ability	0.346	0.358	0.400	0.770										
Problem–solving ability	0.421	0.358	0.407	0.525	0.785									
Self–regulation ability	0.359	0.362	0.352	0.491	0.523	0.777								
Application of learning strategies	0.382	0.363	0.343	0.495	0.558	0.529	0.782							
Excitement and enjoyment	0.381	0.412	0.323	0.344	0.389	0.388	0.365	0.759						
Satisfaction and sense of accomplishment	0.346	0.375	0.342	0.313	0.350	0.347	0.324	0.463	0.756					
Emotional regulation ability	0.348	0.371	0.349	0.379	0.349	0.386	0.348	0.417	0.478	0.788				
Emotional regulation strategies	0.341	0.353	0.334	0.345	0.329	0.356	0.338	0.471	0.465	0.464	0.754			
GPA	0.348	0.344	0.374	0.405	0.359	0.363	0.367	0.313	0.311	0.327	0.325	0.775		
Test scores	0.373	0.419	0.412	0.402	0.391	0.390	0.390	0.365	0.375	0.352	0.325	0.475	0.775	
Graduation rate	0.371	0.352	0.347	0.332	0.322	0.376	0.350	0.380	0.351	0.366	0.324	0.450	0.538	0.774

2.6 Second–order Confirmatory Factor Analysis

(1) Academic Motivation

The second–order confirmatory factor analysis for Academic Motivation encompasses three sub–dimensions: intrinsic motivation, extrinsic motivation, and social motivation, collectively represented through 14 measurement items. The model's overall fit is assessed using several fit indices, including the chi–square/degrees of freedom ratio, RMSEA, GFI, AGFI, NFI, IFI, TLI, and CFI.

Table 8 Academic motivation model fit index

Adaptation index	CMIN/DF	RMSEA	GFI	AGFI	NFI	IFI	TLI	CFI
Adaptation standard	<3-5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9	>0.9
Test result	1.570	0.029	0.963	0.953	0.971	0.989	0.988	0.989
Adaptation judgment	match	match	match	match	match	match	match	match

The CMIN/DF value 1.570 is below the adaptation standard, indicating an excellent model fit. The RMSEA stands at 0.029, significantly below the threshold of 0.08, suggesting minimal model error. The GFI and AGFI values exceed their respective benchmarks, confirming the model's robustness.

Additionally, the incremental fit indices (NFI, TLI, IFI, CFI) all exceed the critical value of 0.9, with scores indicating strong support for the theoretical framework. Collectively, these fit indices confirm that the model effectively represents the structure of Academic Motivation.

(2) Academic Self-efficacy

The second-order confirmatory factor analysis for Academic Self-Efficacy includes four sub-dimensions: belief in learning ability, problem-solving ability, self-regulation ability, and application of learning strategies. The analysis covers 23 measurement items.

Table 9 Academic self-efficacy model fit index

Adaptation index	CMIN/DF	RMSEA	GFI	AGFI	NFI	IFI	TLI	CFI
Adaptation standard	<3-5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9	>0.9
Test result	1.433	0.025	0.957	0.948	0.967	0.990	0.989	0.990
Adaptation judgment	match	match	match	match	match	match	match	match

The CMIN/DF value of 1.433 indicates an excellent fit, with an RMSEA of 0.025, suggesting minimal approximation errors. The fit indices (GFI, AGFI, NFI, TLI, IFI, CFI) exceed 0.9, confirming the model's strong construct validity and alignment with theoretical expectations.

(3) Academic Emotions

The second-order confirmatory factor analysis for Academic Emotions encompasses four sub-dimensions: excitement and fun, satisfaction and sense of accomplishment, emotional regulation ability, and emotional regulation strategy, comprising 20 measurement items.

Table 10 Academic emotion model fit index

Adaptation index	CMIN/DF	RMSEA	GFI	AGFI	NFI	IFI	TLI	CFI
Adaptation standard	<3-5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9	>0.9
Test result	1.481	0.026	0.961	0.951	0.968	0.989	0.988	0.989
Adaptation judgment	match	match	match	match	match	match	match	match

The model demonstrates excellent fit across multiple indices, with a CMIN/DF ratio of 1.481 and an RMSEA of 0.026. The GFI and AGFI values exceed the required thresholds, confirming the model's validity.

(4) Academic Achievement

The second-order confirmatory factor analysis for Academic Achievement includes three sub-levels: average GPA, test scores, and graduation rate, encompassing 11 measurement items.

Table 11 Academic achievement model fit index

Adaptation index	CMIN/DF	RMSEA	GFI	AGFI	NFI	IFI	TLI	CFI
Adaptation standard	<3-5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9	>0.9
Test result	1.928	0.036	0.979	0.966	0.979	0.990	0.986	0.990
Adaptation judgment	match	match	match	match	match	match	match	match

The data from the academic achievement model's fit indices indicate excellent adherence to the desired thresholds. The CMIN/DF value is recorded at 1.928, comfortably below the recommended standard of 3–5, suggesting a perfect fit relative to the number of free parameters in the model. The RMSEA stands at 0.036, indicating a well-fitting model with low error variance, significantly below the upper limit of 0.08.

Furthermore, additional fit indices such as GFI, AGFI, NFI, IFI, TLI, and CFI all exceed the threshold of 0.9, with values of 0.979, 0.966, 0.979, 0.990, 0.986, and 0.990, respectively. These values represent a superior fit over baseline models and provide robust validation for the theoretical constructs proposed in this analysis. These metrics underscore the model's exceptional capacity to represent academic achievement dynamics accurately.

Overall, the confirmatory factor analysis findings across all constructs—academic motivation, self-efficacy, academic emotions, and academic achievement—demonstrate strong reliability and validity. The models align well with empirical data and support the research's theoretical framework, thus providing a solid foundation for further statistical analysis and interpretation.

3. The Structural Equation Models and Hypothesis Testing

The structural equation model (SEM) is a method for establishing, estimating, and testing causal relationship models. It is a comprehensive analytical approach that can replace traditional methods such as path analysis, factor analysis, and covariance analysis. It allows for a precise examination of the effects of individual indicators on overall outcomes and the interrelationships among those indicators.

The structural equation model comprises two main components: measurement and structural relationships. When both measurement and structural relationships are included, the research can be classified as a structural equation model. The primary focus of SEM is to investigate the structural relationships and conduct hypothesis testing; however, the quality of the measurement relationships significantly impacts model fit. Therefore, researchers need to ensure the quality of measurement relationships before formal analysis.

Based on this framework, this study conducts structural equation modeling as outlined in the previous section, as illustrated in Figure 1:

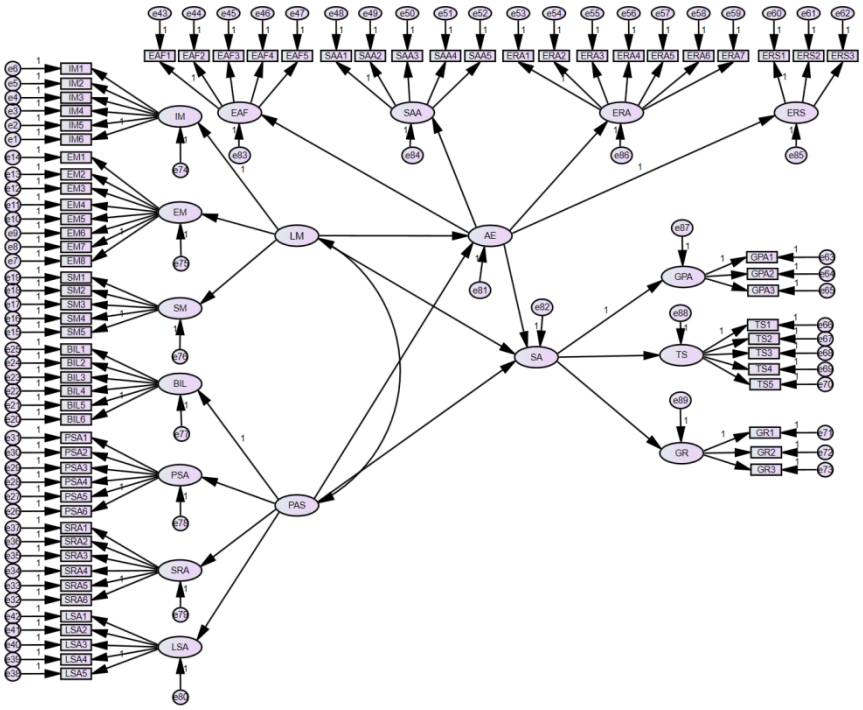


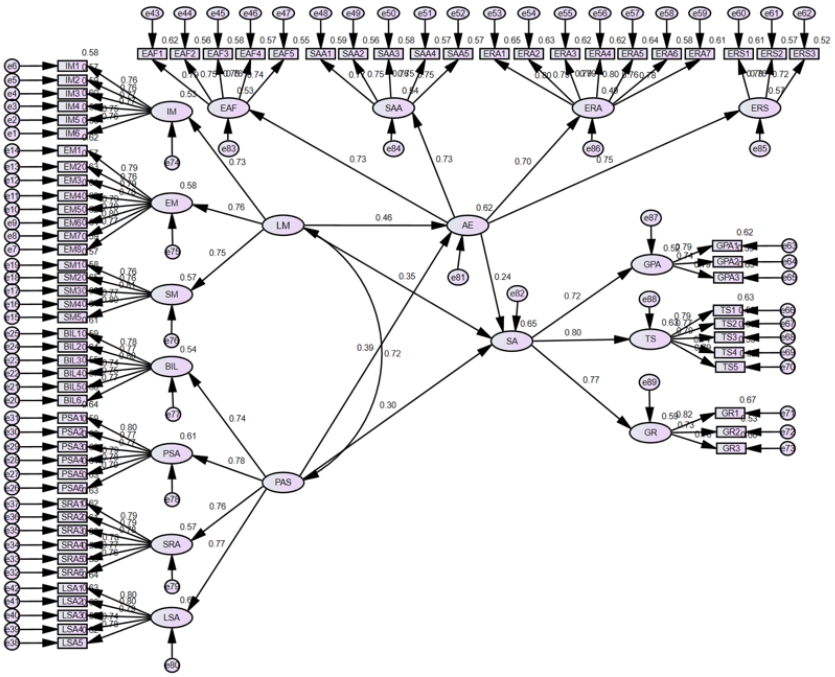
Figure 1 Structural equation modeling

Ensuring the measurement relationships demonstrate high quality before performing the formal analysis. This is achieved through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA), which ensure robust measurement quality prior to the construction of the SEM. The model is then run using AMOS 28, and the results are presented below.

3.1 Standardized Path Coefficient

The standardized path coefficient in SEM represents the strength and direction of the relationships between variables. In the model, relationships are depicted with arrows, and the coefficients at each end indicate the strength of the correlation. Values range from 0 to 1: a positive coefficient indicates a positive correlation between variables, while a negative coefficient indicates a negative correlation. A coefficient of zero signifies no relationship.

The model output provides standardized coefficients, as shown in Figure 2:



Chi-square=2947.326;Df=2535; Relative Chi-Square=1.163
p-value=0.000;GF1=0.898:NFI=0.909:TLI=0.986;
CFI=0.986:RMSEA=0.015:RMR =0.041

Figure 2 Standardized coefficient output results

3.2 Structural Equation Model Fit

Table 12 Structural equation model fit

Adaptation index	CMIN/DF	RMSEA	GFI	NFI	IFI	TLI	CFI
Adaptation standard	<3-5	<0.08	>0.85	>0.9	>0.9	>0.9	>0.9
Test result	1.163	0.015	0.898	0.909	0.986	0.986	0.986
Adaptation judgment	match	match	match	match	match	match	match

The structural equation model fit results indicate that the CMIN/DF value is 1.163, which meets the fit standard of <3–5. The RMSEA value is 0.015, significantly lower than the critical value of 0.08. Furthermore, fit indices such as GFI, NFI, IFI, TLI, and CFI all reach their respective fit standards, confirming that this model demonstrates good fit and ideal internal quality.

3.3 Hypothesis verification

Table 13 Structural equation model path coefficients

Structural equation approach			Unstandardized path coefficients	S.E.	C.R.	P	Standardized path coefficient
Academic emotions	<---	Academic motivation	.502	.083	6.069	*	.458
Academic emotions	<---	Academic self-efficacy	.404	.074	5.492	*	.391
Academic achievement	<---	Academic self-efficacy	.292	.072	4.044	*	.299
Academic achievement	<---	Academic motivation	.363	.086	4.227	*	.350
Academic achievement	<---	Academic emotions	.230	.075	3.077	.002	.244

The path coefficients indicate that:

1.Academic motivation significantly impacts academic emotions (non–standardized path coefficient = 0.502, P < 0.001), supporting the hypothesis.

2. Academic self–efficacy significantly influences academic emotions (non–standardized path coefficient = 0.404, P < 0.001), confirming the hypothesis.

3. Academic self–efficacy positively impacts academic achievement (non–standardized path coefficient = 0.292, P < 0.001), validating the hypothesis.

4. Academic motivation significantly affects academic achievement (non–standardized path coefficient = 0.363, P < 0.001), affirming the hypothesis.

5. Academic emotions positively influence academic achievement (non–standardized path coefficient = 0.230, P = 0.002), establishing the hypothesis.

.3.4 Mediation Effect Test

The mediation analysis examines the process of X influencing Y through M. Here, aaa represents the coefficient from X to M, bbb represents the coefficient from M to Y, ccc represents the total effect from X to Y, and c*c^*c* represents the direct effect from X to Y. If c*≠0c^* \neq 0c*=0, then M is considered a partial mediator; if c*=0c^* = 0c*=0, M is a complete mediator. The mediating effect is calculated as a×ba \times ba×b, and the total effect is the sum of the direct effect and the mediating effect, expressed as c=a×b+c*c = a \times b + c^*c=a×b+c*.

The mediation paths analyzed in this model are: "Academic Motivation ⇒ Academic Emotion ⇒ Academic Achievement" and "Academic Self–Efficacy ⇒ Academic Emotion ⇒ Academic Achievement." The results are summarized in the table below:

Table 14 Intermediary path analysis table

Item	C Total Effect	a	b	a*b Mediating Effect	c* Direct Effect	Effect ratio calculation formula	Effect ratio	Test conclusion
Academic Motivation => academic emotions => academic achievement	0.475	0.50	0.23	0.115	0.36	a * b / c	31.94%	Some intermediaries
Academic Self–efficacy => academic emotions => academic achievement	0.382	0.40	0.23	0.092	0.29	a * b / c	31.72%	Some intermediaries

The above results indicate that c*≠0c^* \neq 0c*=0, confirming that both mediation paths—"Academic Motivation ⇒ Academic Emotion ⇒ Academic Achievement" and "Academic Self–Efficacy ⇒ Academic Emotion ⇒ Academic Achievement"—are partial mediators.

Discussion

The findings of this study provide valuable insights into the factors that significantly impact the academic achievement of Chinese international students. This section discusses the implications of these results, highlights their alignment with previous research, and suggests potential applications for educators and policymakers.

The Role of Academic Motivation

The study reveals that academic motivation substantially positively affects academic emotions and achievement. This finding supports previous research, which suggests that motivated students are more likely to experience positive emotions, such as enthusiasm and engagement, that contribute to higher academic performance. The results suggest that educators should prioritize fostering intrinsic motivation through goal-setting activities, personalized learning approaches, and the promotion of long-term academic objectives. By cultivating motivation, institutions can create environments that support sustained engagement and resilience among Chinese international students.

The Impact of Academic Self-Efficacy

Academic self-efficacy also played a critical role in enhancing students' emotional and academic outcomes. Consistent with Bandura's (1977) self-efficacy theory, students with a strong belief in their academic capabilities are better equipped to manage challenges and maintain positive emotions, which fosters academic success. The findings underscore the need for programs that build self-efficacy, such as workshops on effective study strategies, time management, and problem-solving skills. Resources that strengthen students' confidence in their academic abilities can improve outcomes, especially for international students adjusting to new academic environments.

Influence of Academic Emotions on Achievement

The positive relationship between academic emotions and achievement highlights the critical role emotions play in learning. Consistent with Pekrun's (2006) theory of academic emotions, the results indicate that students who experience positive emotions, such as excitement and satisfaction, are more likely to achieve academically. This finding suggests that institutions should create supportive, inclusive learning environments that promote positive emotional experiences. Peer support programs, culturally sensitive counseling, and interactive teaching methods can help students manage stress and anxiety, improving academic performance.

Practical Implications and Future Directions

The insights gained from this study have several practical implications for educators and policymakers. By enhancing motivation, self–efficacy, and positive emotional experiences, institutions can create a more supportive academic environment catering to the unique needs of Chinese international students. Future research could expand on these findings by exploring additional variables, such as cultural adaptation and language proficiency, which may also influence academic success. Longitudinal studies that track students over time would further contribute to understanding how these factors evolve and impact performance across different stages of their academic journey.

Conclusion

This study examined the influence of academic motivation, self–efficacy, and emotions on Chinese international students' academic achievement. The findings confirm that these three factors are pivotal in shaping students' academic outcomes. Specifically, academic motivation and self–efficacy enhanced positive emotions and academic performance, while positive emotions independently contributed to improved achievement. These results underscore the importance of fostering motivation, confidence, and emotional resilience to support academic success.

The study has several practical implications. For educational institutions, creating programs that bolster students' motivation and self–efficacy, such as goal–setting workshops, mentorship initiatives, and skill–building sessions, can help students navigate academic challenges more effectively. Also, fostering positive emotional experiences through supportive learning environments, peer networks, and counseling resources can enhance academic performance, particularly for international students adapting to new cultural and educational settings.

In conclusion, addressing the specific needs of Chinese international students through targeted support can significantly improve their academic experiences and outcomes. Future research could explore other potential influences on academic success, including cultural adaptation and language proficiency, to develop a more comprehensive understanding of the factors affecting international students. Longitudinal studies may also provide valuable insights into how these factors evolve, offering guidance for institutions striving to foster successful and fulfilling academic journeys for all international students.

Suggestions

Based on this study's findings, several recommendations can be made to support the academic success of Chinese international students.

1. Enhance Academic Motivation: Educational institutions should implement programs and resources that foster intrinsic motivation among students. Personalized learning goals, mentorship opportunities, and encouragement of long-term academic aspirations can help increase students' commitment to their studies and overall engagement.

2. Build Academic Self-Efficacy: It is crucial to provide resources that strengthen students' self-efficacy. Institutions could offer workshops on effective study strategies, time management, and problem-solving skills, enabling students to approach academic challenges with greater confidence and resilience.

3. Promote Positive Academic Emotions: Students' emotional well-being significantly impacts their academic outcomes. Universities should create an inclusive and supportive learning environment through peer support networks, culturally sensitive counseling, and interactive teaching methods. Such resources can help students manage stress and foster positive emotions, enhancing their learning experience.

4. Facilitate Cultural Adaptation: Cultural adjustment can significantly influence academic performance, so institutions should provide orientation sessions focused on cultural integration, language proficiency, and social adaptation. Building a culturally supportive environment can help students feel more comfortable and capable within their new academic context.

5. Monitor Academic Progress and Provide Ongoing Support: Regular academic progress assessments and periodic check-ins with students can help identify challenges early on. Advisors and faculty members can work with students to address difficulties and provide tailored support, ensuring students remain on track to meet their academic goals.

By implementing these strategies, educational institutions can create a more inclusive and supportive environment that promotes Chinese international students' academic success and well-being. Such initiatives benefit individual students and contribute to a more diverse and globally engaged academic community.

New Knowledge

This study offers new insights into the academic success of Chinese international students by emphasizing the significant roles of academic motivation, self–efficacy, and academic emotions. Specifically, it establishes that these three factors are interconnected and affect students' academic performance, providing a more comprehensive understanding of how personal and emotional factors influence learning outcomes.

One key contribution of this research is the demonstration that academic emotions, influenced by both motivation and self–efficacy, play a mediating role in academic achievement. This insight underscores the importance of fostering positive emotions, such as enthusiasm and satisfaction, in educational settings to enhance students' engagement and resilience. Additionally, the study expands existing knowledge by exploring these relationships within a cross–cultural context, focusing on Chinese students navigating new academic environments abroad.

These findings offer valuable implications for educators and policymakers. Institutions can better support Chinese international students through targeted interventions and resources by understanding how motivation, self–efficacy, and emotions interact. This research fills a gap in the literature on international student success and provides a foundation for future studies on how similar factors affect diverse student populations in various educational contexts.

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