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Cross-cultural adaptation for international nursing students from the Belt and Road Initiative in China: A follow-up survey study

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ABSTRACT

Background: and Purpose: As the number of international students from Belt and Road Initiative countries continues to increase in China, it is essential to find methods to improve cross-cultural adaptation in the host country, a crucial aspect of the experiences of international nursing students. Therefore, this study aimed to investigate the change in cross-cultural adaptation of international nursing students during the first year in China.
Methods: Data collection was conducted for international nursing students (n = 108) between September 2019 and August 2020, focusing on sociocultural adaptation, academic adaptation, and academic performance of international nursing students using validated questionnaires.
Results: The mean score at the follow-up time verified an increased level of sociocultural and academic adaptation and academic performance. Academic adaptation is a complete mediator between sociocultural adaptation and academic performance at two-time points, and the size of the mediation effect accounted for 95.9 % of the total effect in six months and 99.0 % in one year.
Conclusions: The findings emphasized the importance of sociocultural and academic adaptation in cross-cultural adaptation and suggest that educational institutions should provide learning environments supporting these factors to ensure academic success.

1. Introduction

1.1. International student's education in China

The number of nations that have joined the Belt and Road Initiative (BRI) has increased in tandem with the trend of economic globalization. The main component of the BRI is the networking of countries and people who engage in trade and cultural exchange in various disciplines [1]. Intercultural communication and cooperation in the workplace and educational institutions in our daily lives are increasing steadily under the BRI umbrella. In educational fields, intercultural exchange within the framework of BRI has become the norm, including cultural values, intercultural adaptation, intercultural relationships, cultural flow and media, and intercultural communication competence [2]. China has become one of the top destinations for international students in the world. According to the latest data from the Ministry of Education of the People's Republic of China (MOE), China was the third most popular destination for overseas students in 2018, after the United States and the United Kingdom. Most of its international students come from countries along the Belt and Road Routes, particularly Asia. Jiangsu Province is the third most popular province for international students among

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the top 10 provinces/cities [3].

China now has the largest vocational education programme in the world. With the development of the Chinese Belt and Road policy, increasingly more vocational education programs are offered to countries in BRI. Previous studies on international students in China showed that their education typically differs from that of Chinese students [4]. International students in China are legally required to reside in designated classrooms and accommodations apart from the classroom and accommodation for domestic students. In order to draw international students, programs are given using English as the language of teaching, with a curriculum designed differently than that of domestic students. Furthermore, some studies have presented that on-campus segregation of international and domestic students from admission to graduation has resulted in difficulties that result in cross-cultural adaptation challenges, linguistic and pedagogical barriers, and education quality concerns for foreign learners in China [5,6]. Consequently, a research void was identified regarding whether cross-cultural adaptation influenced academic adaptation and academic performance.

The Academic Degrees Committee of the State Council of China awarded first-class subject status to the nursing discipline in 2011 [7]. Chinese nursing programs have met the global demand for high-quality healthcare. For international nursing students, the knowledge of nursing professionals is based on clinical practice in diverse contexts, especially in an unfamiliar language context. At present, most Chinese vocational colleges have adopted the "1 + 1+1" pattern of the reform in the unique nursing talent cultivation (Fig. 1) [8]. International nursing students studying abroad experience many difficulties in academic adaptation coming from a lack of knowledge of academic norms and conventions, unfamiliar teaching methods, and cultural variations in classroom interactions [9,10]. However, cross-cultural adaptation impacts their academic adaptation to the new educational model and achievements. Despite the fact that an increasing number of scholars have focused on the education of international students in China [10], there are still deficiencies in the educational management of international students. Therefore, this study selected the cross-cultural adaptation of international nursing students in China, which represents psychological, social, and cultural adjustment for international students.

1.2. Literature review

As a dynamic process, cross-cultural adaptation is a health status encompassing both language and cultural adaptation issues in a different culture, language, and country [11]. According to the theory of cross-cultural adaptation [12–15], sociocultural adaptation and psychological adaptation are two dynamic dimensions. Sociocultural adaptation is related to the ability to adjust to a new culture in handling daily life problems and social interactions. In contrast, psychological adaptation is the sense of happiness and emotional satisfaction in a new cultural environment [12,14]. In previous studies, psychological and sociocultural adaptation have been empirically proven to be correlated [16]. However, it is insufficient to analyze international students' acculturation by only considering psychological and sociocultural adaptations. A systematic review that showed considerable insights into factors predicting international student adjustment in China suggested three domains: psychological, sociocultural, and academic adjustment [17]. Moreover, Aycan and Berry added a third dimension to the cross-cultural adaptation model, i.e., job adaptation [18]. In the context of international education, another dimension of acculturation must be proposed, implying that academic adaptation to the new educational systems was among the primary concerns for international students [19]. In particular, the differences in the academic learning environment include variations in the educational system, lecture styles, classroom cultures, instructional methods, teaching styles, peer communication, and evaluation systems among countries [20]. Previous studies indicated that language barriers, cultural differences, and teaching models contributed to the adaptation difficulties of international pupils in China [21,22]. Consequently, paying close attention to distinctions in the academic adaptation dimension is crucial, particularly in cross-cultural studies.

Due to the COVID-19 pandemic, the Chinese government tried to contain its spread by implementing safety measures such as wearing masks, social distancing and social gathering restrictions, post-exposure quarantine, and business closures [23]. Social lockdown which caused cultural distance increase made emotional challenges for international students in China and indirectly affected cross-cultural adaptation [24,25]. International students' cross-cultural adaptation as a subjective, sense-making, and

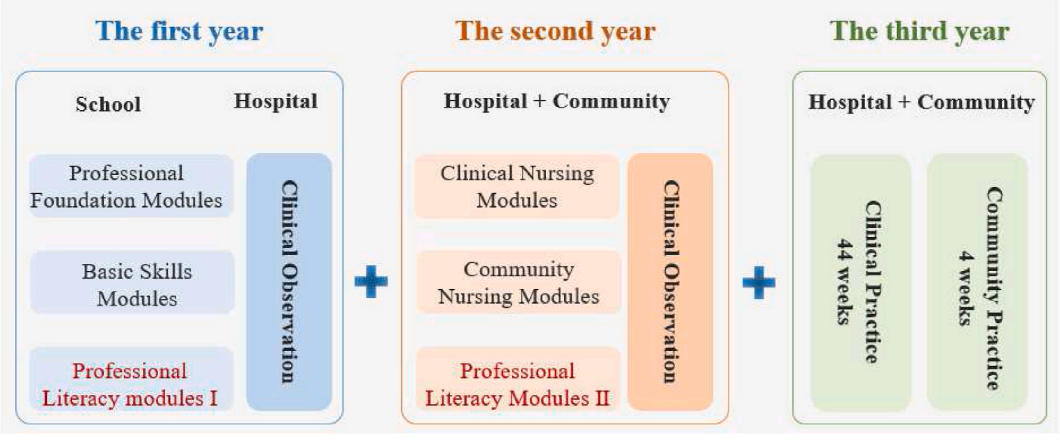

Fig. 1. The new model of nursing talent cultivation in higher vocational education.

culture-specific experience encountered obstacles within the pandemic context [26]. Numerous studies have examined international students' adaptation problems in recent years using cross-cultural adaptation theories and empirical research. For instance, in a longitudinal study conducted on international students in China, it was discovered that coping buffered the negative impacts of sociocultural and psychological adaptation over time [27]. Moreover, some studies confirmed no different relationships in the stress-coping adjustments in ethnicity between Asians and Westerners [28,29]. During COVID-19, international students in China focused on diverse forms of emotional distress, such as anxiety and depression about their health, and the social support from various sources at host universities and local communities, including students, teachers, and administrators [24]. Based on the unique characteristics of international nursing students in China, a deeper understanding of sociocultural adaptation and academic adaptation under varying social isolation policy contexts could enhance the application of cross-cultural adaptation theory. For these reasons, this study was conducted to comprehensively understand international nursing students' acculturation process by investigating the change and effects of their sociocultural and academic adaptation on academic performance.

Besides sociocultural adaptation, academic adaptation is another important element of international students' experience. Despite academic adaptation being a crucial indicator of academic success, it has received little attention in nursing education [30]. This concept involves components of the student's perception of psychological well-being, relationships with classmates and teachers, career perspective, studying skills, time management, and teaching quality of the educational institution. International students face challenges in adapting to new academic environments, as they must master new skills. Thus, academic adaptation has been a crucial indicator of international students' adjustment to the host society. International students face a variety of challenges as a result of the new nursing educational system, with a completely new design, new assessment methods, and different requirements, which leads international students to various difficulties [28]. International students in China utilized various coping strategies to fulfill the requirements of new academic systems, including evaluation, course selection, understanding lectures, interacting with lecturers, and doing homework [28,31]. Academic adaptation in a cross-cultural environment is distinct from academic adaptation within their own country and familiar educational systems [19]. For example, Zhu et al. found that learning communication, course learning, and self-regulation were the primary factors affecting academic adaptation of international students, with course learning being the most significant [32]. International students who acclimate to their new academic environment tend to achieve or perform better academically [27].

Academic success is important for international students and is often linked to students' performance on standardized test scores [16,19]. Most international students have issues adapting to a new environment in a host country, and those problems negatively affect their academic achievement. From the students' perspective, sociocultural and academic adaptation impact academic performance [16]. Although research indicates many factors that affect low academic performance, such as difficulty in academic adaptation, psychological adjustment, and cultural adaptation [33,34], it is still necessary to understand their interrelations to improve the nurse's education process. Therefore, this study will evaluate the sociocultural adaptation that influences academic adaptation and performance.

1.3. Research hypothesis

Based on prior studies, sociocultural adaptation was better than psychological adaptation in the transcultural adaptation of nursing students [35]. We examined the change in sociocultural adaptation, academic adaptation, and academic performance of international students in China during their first year, as well as the relationships among sociocultural adaptation, academic adaptation, and academic performance. Thus, this study addressed the following hypotheses: (1) the level of sociocultural adaptation, academic adaptation, and academic performance would change significantly over time; (2) sociocultural adaptation and academic adaptation influence academic performance directly at different time points; (3) academic adaptation mediates the positive relationship between sociocultural adaptation and academic adaptation at different time points.

2. Methods

2.1. Study design

This was a two-time observational study conducted during the fall semester (September 2019) and winter (January 2020). After completing the course, international nursing students from Jiangsu Vocational College of Medicine in China participated in the survey. International nursing students graduate after three years of study, including six semesters in both theory courses and clinical practice.

2.2. Sample and sample size

Using G × Power, the sample size was estimated with a 95 % probability of detecting an increase in the primary outcome and a 5 % alpha level. The G × Power analysis determined that a total sample size of 107 participants was required for the investigation. Moreover, following some popular rules of thumb, a minimum sample size of 100 for the mediation models was acceptable using the bootstrap method [36,37]. A total of 108 participants were recruited from Jiangsu Vocational College of Medicine. All subjects in the survey came from four countries of the BRI in the study. Participants had to meet the following inclusion criteria: 1) international students studying at colleges or universities in China; 2) passing the minimum requirement of IELTS 5.5 before enrolment.

2.3. Data collection procedure

This study was conducted between September 2019 and August 2020, and data collection was performed in two different phases. All participants completed the survey about 10 every time. The questionnaire was written in English and was finished voluntarily and anonymously online. Phase 1: Participants completed the questionnaire when they finished the first-semester course within the first six months after arriving in the People's Republic of China (T1), and Phase 2: Questionnaires were investigated at the end of the second semester within twelve months (T2). The demographic information was only collected at the first time point, and others were collected at two time points. There was no collection objects drop-off because they were registered students and participated in teaching evaluation at the end of semesters. In each phase, participants returned filled electronic questionnaires via email to the research team within one month.

2.4. Instruments

The questionnaire in this survey consisted of the following three parts. The first part was the participants' demographic information, including gender, age, religion, previous overseas experience, education level, and home country.

The second part adopted the Sociocultural Adaptation Scale (SCAS) on cross-cultural communication and interaction among international students encountered in a new culture [38]. Searle and Ward developed the SCAS, with all the questions using a scale ranging from 1 (no difficulty) to 5 (extreme difficulty). The first version of the SCAS contained 16 items. The development of a 41-item SCAS is a flexible instrument and can be easily revised according to the characteristics of the sojourning sample [39]. This study used a 20-item version of the SCAS to measure the cross-cultural transition and adaptation of international students in China. The total score reflects the change in individual social and cultural adaptation. Higher scores reflect higher difficulty in sociocultural adaptation. International students widely used this tool, showing good reliability and validity [39–41]. In this study, Cronbach's alpha coefficient of the SCAS is 0.890.

The third part used the Academic Adaptation Scale (AAS) to evaluate the academic adjustment process. The original scale was developed to explore international students' adaptation to an American college with high internal reliability [42]. It consisted of five dimensions (general academic skills, psychosocial development, understanding of and comfort with diverse individuals, time management, and motivation) with a range from 1 (extreme difficulty) to 5 (no difficulty). Higher scores indicate a lower level of academic difficulty and a higher level of better academic adaptation. The present study utilized the first dimension of the original scale relating to academic skills, with Cronbach's alpha (α) of the AAS at 0.910.

In addition, to measure academic performance, we used the unweighted cumulative vocational college grade point averages (GPAs) on a scale from 0 to 5 obtained from their transcripts during their studies in China. GPA was considered a criterion for the academic achievement evaluation of international nursing students. The average academic performance of a student was calculated by dividing the total GPA by the number of subjects. A high average GPA can indicate a student with strong academic competence.

2.5. Ethical considerations

Ethical compliance was approved by the institutional research ethics committee at Jiangsu Vocational College of Medicine (number: 201909). Before data collection, participants gave their written informed consent.

2.6. Data analysis

Data were analyzed using SPSS and AMOS (version 24) statistical software to run all statistical analysis work. All measures in the study were administered electronically using SPSS. The two-sided *p*-value of less than 0.05 for all the tests indicated statistically significant differences. After the normality assumption, the paired samples T-test was used to analyze the change in SCAS scores, AAS scores, and GPA for intercultural adaptation over the first year after entry into China. Then, associations through the Pearson correlation coefficients were performed to determine what might have influenced the international students' academic performance. In order to perform the mediation analysis, the regression-based approach was used to carry out a series of analyses [43]. Following this approach, bias-corrected bootstrap confidence intervals were computed to verify the significance of effects using a resampling procedure. First, the relationship between independent and dependent variables (Path *c*) must be significant. In the current study, the

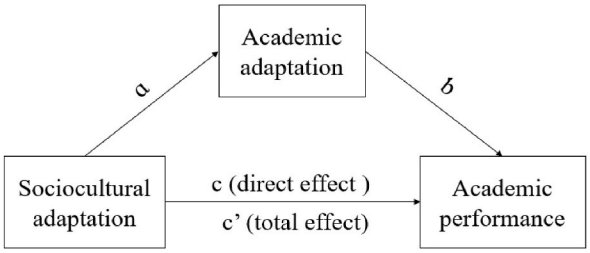

Fig. 2. A simple mediation model of academic adaptation in the relationship between sociocultural adaptation and academic performance.

relationship between sociocultural and academic performance was significant at two-time points ($p < 0.01$). Second, the significance of the relationship between the independent variables and the mediating variable (Path *a*). In this study, the relationship between sociocultural adaptation and academic adaptation was also significant at two-time points ($p < 0.01$). Third is the significant relationship between the mediating and dependent variables (Path *b*). In the present study, the relationship between academic adaptation and academic performance was also considerable on both occasions ($p < 0.01$). As shown in Fig. 2, *a* is the effect of sociocultural adaptation on academic adaptation, *b* is the effect of academic adaptation on academic performance, *c* is the direct effect of sociocultural adaptation on academic performance, and *c'* is the total effect of sociocultural adaptation on academic performance. According to the hypothesis model, the simple mediating effect model was conducted using AMOS to analyze the mediating effect of academic adaptation in the relationship between sociocultural adaptation and academic performance. For the analysis of the mediation effect, bootstrapping was used to generate 95 % confidence intervals (CI). The sample bootstrap was 5000.

3. Results

3.1. Characteristics of participants

At both time points (T1 and T2), the response rate was 100 %. The participants were full-time international nursing students, comprising 12 males and 96 females, with a mean age of 20.39 years. Of these, only eleven international students had no religion, and only two had overseas experience. The international students represented some general countries in BRI: Indonesia (39.8 %), Laos (28.7 %), Russia (18.5 %), and Tajikistan (13.0 %). In terms of education level, all international students had finished high school or over education. The first part determined the participants' demographic information, including gender, age, previous overseas experience, education level, and home country. The demographic information is shown in Table 1.

3.2. Changes in sociocultural adaptation, academic adaptation, and performance

After testing the assumption of variables, the Pairwise Sample T-tests were performed to examine the change in cross-cultural adaptation, including sociocultural adaptation, academic adaptation, and academic performance between 6 months and 12 months (Table 2). There were statistically significant differences in the decline of sociocultural difficulty with time after entering China ($t = 12.517, p < 0.001$), the improvement of professional learning ($t = -12.025, p < 0.001$), and the increase in academic performance ($t = -11.757, p < 0.001$). Follow-up data confirmed that cross-cultural adaptation significantly developed in the international nursing students group over the analyzed time.

3.3. Relationships of three variables at two-time points

The Pearson correlation coefficients indicated that the sociocultural difficulty had significantly negative relationships with academic adaptation and academic performance ($p < 0.01$), whereas academic adaptation was positively and significantly correlated with academic performance at both time points ($p < 0.001$) (Table 3). These correlations served as the foundation for further analysis.

3.4. Mediator of academic adaptation

The mediation effect was estimated using the bootstrapping method. The results showed that sociocultural adaptation had a

Table 1
Demographic characteristics of participants.

Characteristic	Frequency (%)	Mean (SD)
Gender	12 (11.1)	
Male	96 (88.9)	
Female		
Age		20.39 (0.95)
Religion		
Yes	97 (89.8)	
No	11 (10.2)	
Overseas experience		
Yes	2 (1.9)	
No	106 (98.1)	
Education level		
Senior middle school	93 (86.1)	
Diploma	15 (13.9)	
Nationality		
Indonesia	43 (39.8)	
Laos	31 (28.7)	
Russia	20 (18.5)	
Tajikistan	14 (13.0)	

Note. SD = standard deviation.

Table 2
Comparison of Cross-cultural adaptation across in the first year after entry into China.

Time	Sociocultural adaptation	Academic adaptation	GPA
6-month (T1)	23.96 ± 1.51	10.19 ± 2.72	2.17 ± 0.33
12-month (T2)	21.91 ± 1.40	12.84 ± 3.47	2.44 ± 0.37
t	12.517	−12.025	−12.227
p-value	<0.001	<0.001	<0.001

Note. GPA = academic performance.

Table 3
Pearson correlation coefficients between scores on the sociocultural adaptation, academic adaptation, and academic performance at two-time points.

Variable 1	SCAS1	AAS1	GPA1	Variable 2	SCAS2	AAS2	GPA2
SCAS1	1	–	–	SCAS2	1	–	–
AAS1	−.355**	1	–	AAS2	−.567**	1	–
GPA1	−.308**	.835***	1	GPA2	−.397**	.696***	1

**$p < 0.01$(2-tailed). ***$p < 0.001$(2-tailed). 1 is at T1, and 2 is at T2.
Note. SCAS = sociocultural adaptation; AAS = academic adaptation; GPA = academic performance. 1 is at T1, and 2 is at T2. ***$p < 0.001$.

significant negative impact on academic performance (bootstrap coefficient = −0.067, 95 % CI = [−0.116, −0.017]) at both T1 and (bootstrap coefficient = −0.104, 95 % CI = [−0.146, −0.056]) T2. Furthermore, the results indicated that the indirect path coefficient between sociocultural adaptation and academic performance via academic adaptation was significant (bootstrap coefficient = −0.064, 95 % CI = [−0.106, −0.025]) at T1, the same as significant (bootstrap coefficient = -0.103, 95 % CI = [−0.141, −0.073]) at T2. However, we found that the direct effect of sociocultural adaptation and academic performance was insignificant because CI was always zero between them at any time (bootstrap coefficient = 0.005, 95 % CI = [−0.037, 0.026] at T1; bootstrap coefficient = −0.001, 95 % CI = [−0.040, 0.042] at T2, respectively) (Table 4). The mediating effect contributed 95.9 % of the total effect at T1 and 99.0 % at T2. Therefore, these findings supported the full mediation effect, implying that academic adaptation completely mediated the effect of sociocultural adaptation on academic performance (Fig. 3). Moreover, sociocultural adaptation and academic adaptation explained 83.0 % and 69.4 % of the variance in academic performance at T1 and T2, respectively.

4. Discussion

4.1. Cross-cultural adaptation

International nursing students in China who studied abroad for an extended period experienced a significant decrease in cross-cultural adaptation difficulty and a. Sociocultural adaptation refers to a person's proficiency in managing tasks required for daily intercultural living; it is best clarified within a cultural learning framework, which has been empirically demonstrated to be correlated with psychological adaptation [12,39]. Through contact with host nationals, international students can develop social skills that promote involvement in the host culture [44] and better understand the minds and behaviors of locals [45], which leads to fewer social adaptation difficulties, improves communication competence, and better adapts to life overseas. Prior researchers showed that the first year of study abroad was critical for the adjustment of international students [46]. The present findings confirmed the cross-cultural dynamic process, consistent with previous findings that cross-cultural adjustment is one of the most common social challenges first-year foreign students encounter when studying abroad [46,47]. Due to the COVID-19 pandemic hindering the process of cross-cultural adaptation, the decrease in the difficulty of sociocultural adaptation was only two points, despite being statistically significant. The lack of social support from the local community and university administration cannot be ignored [24,48]. Understanding the difficulties international students face in adapting before and after a pandemic, educational institutions can provide targeted support and well-planned intervention with social support links to the local community in the first year.

Table 4
Parameters of the direct effects of variables in unstandardized regression weights.

Variable	B	Standard error	*C.R.*(*t*)	*p*
Model 1 at T1				
Sociocultural adaptation →Academic adaptation	−0.641	0.163	−3.934	<0.001
Academic adaptation →Academic performance	0.100	0.007	14.590	<0.001
Sociocultural adaptation →Academic performance	−0.003	0.012	−0.221	0.825
Model 2 at T2				
Sociocultural adaptation →Academic adaptation	−1.400	0.197	−7.117	<0.001
Academic adaptation →Academic performance	0.073	0.009	8.242	<0.001
Sociocultural adaptation →Academic performance	0.002	0.022	−0.090	0.964

Note. B = unstandardized coefficient beta. C.R. = critical ratio.

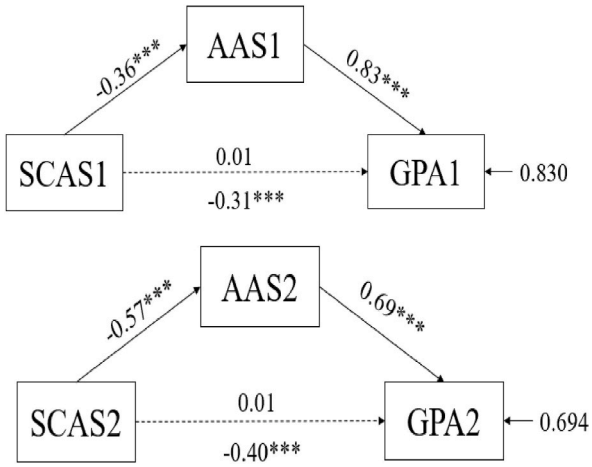

Fig. 3. The mediating effect of academic adaptation in the relationship between sociocultural adaptation and academic performance in standardized regression weights. Note. SCAS = sociocultural adaptation; AAS = academic adaptation; GPA = academic performance. All presented effects are standardized. 1 is at T1, and 2 is at T2. ***$p < 0.001$.

Academic adjustment, a significant aspect of the lives of international students in China, has piqued the interest of researchers in cross-cultural adaptation studies [10,31]. In line with our expectations and the findings of prior research [19,47], the findings of this study presented that academic adaptation and academic performance also increased during the first year. Conceptually, these results suggest that international students appreciate the college environment and have acclimated to the classroom setting. Academic adaptation at an early stage as well as social integration into new study environments were crucial for successful adaptation [47,49]. Although there were significant differences in academic adaptation and performance scores between the two time periods, the value change was minimal. One important reason is that the impact of COVID-19 may exacerbate the stress of international students, which caused greater stress in their host societies during the COVID-19 pandemic. Consequently, international students may find it more challenging to activate their academic adaptability in an environment that is more unstable and stressful [48]. Therefore, through carefully designing courses, adopting motivational pedagogy, and providing opportunities for group learning, educational institutions and faculty encouraged international student participation in learning, supporting their linguistic, social, and academic adaptation.

4.2. The mediator of academic adaptation on sociocultural adaptation and academic performance

The findings of this study are consistent with the previous studies and our expectations that international students with greater sociocultural adaptation would also be better academically [16]. Our findings indicate that academic adaptation improves the academic performance of nursing students. Interestingly, as revealed in this study, academic adaptation completely mediated the indirect effect of sociocultural adaptation on academic performance. This result showed that academic adaptation increased with sociocultural adaptation, enhancing academic performance and supporting prior research [16,41,50]. These findings are in line with self-regulated learning and cross-cultural theories [12,19]. Academic success can be improved through good academic adaptation, such as time management [51], academic skills [52], psychosocial development [53], study environment adjustment [16], and individual motivation [54]. As the model of this study depicts, nursing international students should enhance their sociocultural and academic adaptation to maintain academic success. Moreover, a safe, friendly, inclusive, caring, and supportive learning environment is crucial for enhancing a stronger sense of identification and belonging for international students.

Furthermore, as revealed in our model, sociocultural adaptation did not directly affect academic performance. This finding indicates that the sociocultural adaptation of international students could not affect their academic success directly while studying abroad, whereas it had an indirect effect on academic success through academic adaptation. One possible explanation is that sociocultural adaptation might boost academic adaptation because it can encourage study-related discussions and increase the likelihood that a student will request academic support [16,55]. Another possible explanation is that sociocultural adaptation could allow international students to improve their comprehension of the new teaching pattern through discussion in social interactions and intellectual exchanges [56,57]. This may somewhat mitigate the direct impact of sociocultural adaptation on academic performance. Additionally, the participants in this study were mostly non-native English speakers. This issue may have created communication difficulties and hampered their academic performance during cross-cultural adaptation. In contrast to the present findings, Mokhothu and Callaghan identified that sociocultural adaptation had both a direct and indirect effect on academic performance [58]. Sociocultural adaptation may influence social support, impacting academic performance [25]. Therefore, it is advised that educational institutions actively support the sociocultural adaptation and learning strategies of incoming international students.

5. Relevance to education, policy or research

This study offers a few implications in light of the findings. First, the findings of this study extend support to cross-cultural adaptation in the nursing international education context. It confirms that sociocultural and academic adaptation as positive coping factors improves students' performance, allowing them to adjust to the conditions of studying abroad. Therefore, nursing education institutions can offer more social and multicultural opportunities to develop their social skills to facilitate adapting to the new host culture. Second, the results elucidate that nursing international students get used to Chinese social and cultural customs and keep up with China's nursing vocational education programs. Consequently, the impact of cross-cultural adaptation on the life of international students should be evaluated in both a social and an educational context. Third, this study found that academic adaptation fully mediates the relationship between sociocultural adaptation and academic performance. This indicates that sociocultural adaptation is a common facilitator with a similar psychosocial impact on academic adaptation across all participants surveyed. When endeavoring to comprehend the performance or achievement of international students in higher education, sociocultural and academic factors cannot be ignored. Finally, since academic adaptation mediates the sociocultural adaptation and academic performance relationship, nursing educational institutions should seek ways to enhance the effects of sociocultural adaptation on academic adaptation. One possible strategy can be to pay more attention to delivering international education in transcultural nursing and academic expectations. Additionally, to improve academic performance, nursing educational institutions should foster a multicultural environment that encourages friendly interactions between domestic and foreign students.

6. Limitations and future directions

This study has certain limitations. First, the sample size of this study was slightly constrained, and all participants were enrolled in only one college. Thus, generalization to a larger population may not be warranted. Samples from different countries could provide a wider picture of the cross-cultural state among international students. A larger sample size in the group of nursing multi-international students would be needed to understand the impact of the cross-cultural adaptation process. Another limitation is that this research applied a two-wave survey design. The changing trajectory of the cross-cultural adaptation process cannot be captured. Although the results suggest that international nursing students demonstrated a higher level of sociocultural, academic, and academic performance, this may be because these participants were only evaluated at two time periods without long-term follow-up. Future research is needed to extend data collection to cover a longer period, and a mixed method design is recommended, which can contribute to presenting the panorama of the cross-cultural adaptation process and analyzing it in depth. Furthermore, this research has only studied sociocultural and academic adaptation from a cross-cultural perspective. It has thus neglected to tap the psychological effects of cross-cultural adaptation on academic performance. Nevertheless, the associations between sociocultural and psychological adaptation may well indicate a potential for inducing changes in levels of depression and anxiety [16]. Therefore, future research is suggested to evaluate the relationship between academic and psychological adaptation in cross-cultural adaptation and examine their relevance among three dimensions (e.g., sociocultural, psychological, and academic adaptation).

7. Conclusions

Cross-cultural adaptation is becoming increasingly crucial to the successful adjustment of foreign nursing students with the rise in students across cultural boundaries for higher education. Through a two-wave follow-up survey design, this study finally unraveled the change in a cross-cultural adaptation that affects academic success. It was found that sociocultural adaptation influences academic performance through academic adaptation, implying that international students adjust to a new culture not only because they want to improve their academic adaptation to a new education system but also because they want to understand a new social-cultural system. Managers in nursing schools need to devise strategies to facilitate the development of international students' cross-cultural competence, as this may improve the academic performance of international students. Furthermore, this study observed that academic adaptation influenced academic performance directly, and educational institutions can integrate teaching methods to help international students learn and earn global nursing knowledge, skills, and values. Our findings contribute to the research by illustrating that colleges and universities can further formulate and improve the nursing educational system for international students studying in China, thereby establishing a new system of higher vocational education. The study provides new insights into overseas education based on cross-cultural adaptation theory and guides education management practice and research.

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Data availability statement

Data will be made available on request from the first author (H. Sun).

Additional information

No additional information is available for this paper.

CRediT authorship contribution statement

Haiyan Sun: Conceptualization, Data curation, Formal analysis, Funding acquisition, Methodology, Writing – original draft, Writing – review & editing, Project administration, Validation. **Suqin Liu:** Data curation, Methodology, Supervision. **Ayano Nagai:** Conceptualization, Funding acquisition, Resources, Validation, Visualization. **Lingling Guo:** Data curation, Investigation, Methodology. **Yin Lű:** Investigation, Methodology.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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