

Psychometric properties and measurement invariance of the sociocultural adjustment scale among international students in Malaysia



Cui En¹, Mohd Roslan Rosnon^{1,*}, Zeinab Zaremohzzabieh², Muhammad Afiq Abd. Razak¹, Samir Muhazzab Amin¹

¹Faculty of Human Ecology, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

²Institute for Social Science Studies, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia

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ABSTRACT

The sociocultural adaptation scale is a tool commonly used to assess how international students adjust to new cultures. Although it has been shown to be useful, there's little proof that it works well for students in non-Western countries. Our study aimed to create and test a version of this tool for international students in Malaysia, with 428 participants. We looked at whether the tool worked the same way for people of different genders, ages, and academic majors. At first, our results showed that the tool was not a perfect fit, but after careful adjustments, including removing items that did not fit well and improving how items were linked, we significantly improved how well the tool worked. The updated tool effectively measures how well international students adapt to new cultures. Moreover, our study found that the tool worked consistently across different demographic groups, offering new insights into how gender, age, and academic major affect students' sociocultural adaptation. These findings make the tool more useful in various settings and help us better understand the complex factors that influence how international students adjust to living in multicultural environments.

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1. Introduction

The era of global integration has opened up significant opportunities for cultural interactions across the globe. Organizations, particularly large multinational companies, frequently deploy their employees to work in foreign branches. Similarly, educational institutions, such as universities, have embraced this global trend by actively enrolling students from various countries (De Wit and Altbach, 2021; Gao and Liu, 2020). The growing number of international students underscores the importance of educational institutions in assisting them in smoothly adapting to local cultures (Wen et al., 2018). Challenges in adaptation can lead to various difficulties, negatively affecting the mental well-being and overall functioning of international students (Hussain and Shen, 2019; Rathakrishnan et al., 2021). Therefore, it becomes crucial for these students to undergo sociocultural adaptation to

effectively manage potential challenges in unfamiliar foreign environments. Sociocultural adjustment refers to an individual's ability to navigate unfamiliar cultural environments while managing their daily responsibilities (Huff et al., 2021; Jackson et al., 2019). This concept is closely linked to learning effective socialization in the new cultural context. International students possess the inherent capability to adapt to new academic and cultural settings through their determination and resilience (Wang et al., 2023). While initially challenging, adjusting to a foreign education system, adopting new cultural norms, and understanding complex social dynamics often result in personal growth and skill development (Gong et al., 2021; Wang et al., 2021).

Furthermore, successfully adapting to a new culture yields positive outcomes in terms of both academic performance and the overall quality of life for international students (BenGhasheer and Saub, 2020; Cho et al., 2021). A seamless adjustment process is associated with several benefits. Firstly, it is connected to lower stress levels, as students become better equipped to navigate cultural and social differences (Liu et al., 2023; Zhao et al., 2023). Secondly, it leads to reduced feelings of homesickness and loneliness, indicating that students are finding a sense of belonging and

* Corresponding Author.

Email Address: roslan_rosnon@upm.edu.my (M. R. Rosnon)

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Corresponding author's ORCID profile:

<https://orcid.org/0000-0003-4903-7368>

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connection in their new environment (Koo et al., 2021; Zhang et al., 2023). Additionally, successful adjustment diminishes the sense of isolation from residents, promoting a more integrated experience (Chen and Zhou, 2019; Humphrey and Forbes-Mewett, 2021; Hussain and Shen, 2019). These positive impacts on academics and well-being are closely tied to the university's commitment to creating an international-friendly campus environment. When students undergo such positive adjustments, it contributes to a more supportive and inclusive learning atmosphere, further aiding their academic and personal growth (Huang, 2023).

Researchers have been interested in understanding the benefits of adapting to a new culture, and they have worked to figure out the different aspects of this process (Chien, 2016; Zhang et al., 2022). Some of these aspects include how people perceive the differences between their home culture and the new culture, the strategies they use to adjust, the challenges they expect to face, how well they know a new culture, and how much they interact with the local people. Looking at how people behave when they adapt to a new culture, we suggest that successfully adjusting to the new country is akin to achieving a transformation in one's behavior and actions. The sociocultural adaptation is a tool that researchers use to measure how well people are adapting to a new culture (Valenti et al., 2022; Wilson et al., 2017). It facilitates the assessment of proficiencies required to navigate social contexts within unfamiliar cultural landscapes (Avolonto, 2019). This implies that sociocultural adaptation translates to the acquisition of behavioral competencies geared toward proficient functioning in an unfamiliar cultural domain.

Additionally, noteworthy investigations have explored the potential influence of gender and age on sociocultural adjustment (Gebregergis et al., 2020). Younger international students appear to encounter higher levels of adaptation. The increased adaptability of younger students can be attributed to several factors. These factors include their flexibility in adapting to new environments, exposure to contemporary global trends, and enthusiasm for embracing novel cultural experiences (Sullivan and Kashubeck-West, 2015). Younger students also tend to hold fewer preconceived notions about cultural norms, rendering them more open-minded when navigating new surroundings. In contrast, older international students might face greater challenges due to their established routines, deeply ingrained cultural habits, and stronger attachments to their home culture (Mahmood and Burke, 2018). These complexities can make the process of adapting to new environments somewhat more demanding for them. Currently, only one study, conducted by Mahmood and Burke (2018), has delved into potential differences in how both genders and various age groups perceive or respond to sociocultural adaptation.

Furthermore, a gap exists in prior research concerning the examination of the impact of

academic majors on sociocultural adjustment within the same cohort of individuals (Ivemark and Ambrose, 2021). An academic major pertains to the specific field of study that students choose during their educational journey. This choice profoundly influences their learning trajectory, the courses they undertake, and their future career pathways (Wang, 2021). For international students, the chosen academic major holds considerable sway over how effectively they acclimate to their new surroundings in the host country. Diverse academic disciplines may offer varying degrees of academic challenges, interactions with local peers, and opportunities for cultural engagement. Hence, it remains crucial to ascertain whether the sociocultural adaptation holds validity for these students and maintains consistency across distinct factors such as gender, age, and academic major. The study is also situated in Malaysia, which suggests a unique sociocultural context. Sociocultural adaptation can vary significantly across different countries and regions, and understanding its psychometric properties in the context of Malaysia adds a valuable dimension to the existing body of literature.

2. Literature review

2.1. Sociocultural adaptation

Sociocultural adaptation is a multifaceted concept initially developed to distinguish and explore the various dimensions of how individuals adjust to a new cultural environment (Şafak-Ayvazoğlu et al., 2021). It was designed to go beyond a simple examination of behavioral and emotional adjustments and instead delves into the acquisition of skills and competencies necessary for effectively navigating the intricacies of daily life in a foreign culture (Gong et al., 2021). While the development of social skills was considered a crucial component of this concept, its scope extended far beyond just interpersonal interactions in a multicultural context. At its core, sociocultural adaptation encompassed a wide range of adaptive behaviors, making it a comprehensive framework for understanding the process of adjusting to a new cultural milieu. This encompassed not only the acquisition of social skills but also practical aptitudes needed to manage the intricacies of life in a novel cultural context (Chen and Gabrenya Jr, 2021). These practical skills might involve activities as diverse as shopping, using public transportation, and adapting to the local climate and pace of life.

Furthermore, sociocultural adaptation was concerned with the subtleties of negotiating casual interactions with members of the host culture (Furnham, 2019). This aspect recognized that effective adjustment involved not just mastering the surface-level behaviors but also understanding the cultural nuances and dynamics that underlie social interactions. Crucially, the concept of sociocultural adaptation was initially developed with a specific focus on individuals who were cultural novices or

newcomers to a foreign culture (Ward, 2022). It was tailored to those who were in the process of acquiring new cultural competencies as they embarked on their journey of adapting to a different cultural environment (Hoang and Tran, 2017). This framework was not originally intended to be applied to long-resident first-generation immigrants or members of well-established ethnic minority communities, as these individuals had already undergone a more extended process of cultural adaptation.

In essence, sociocultural adaptation served as a comprehensive lens through which researchers and scholars could examine the multifaceted nature of how individuals adjust to and thrive within new cultural contexts. It recognized that effective adaptation involved not just emotional and behavioral aspects but also the acquisition of practical skills and an understanding of the intricate social dynamics within the host culture.

2.2. International student adaptation in Malaysia

Malaysia has emerged as a highly sought-after destination for advancing one's education (Sia and Adamu, 2020). In recent years, a remarkable surge has been witnessed in the number of international students choosing Malaysia as their higher education hub (Lam et al., 2017). This surge is notably reflected in the growing population of foreign fee-paying students (Ahrari et al., 2019). Education Malaysia Global Services (EMGS), a government-appointed organization responsible for promoting Malaysia as a top-choice study location, has documented significant yearly increases in new international student applications for 2022, as mentioned in studies by Aminudin et al. (2023) and Sulong (2022). The top five countries sending students to Malaysia include China, Indonesia, Bangladesh, India, and Nigeria. China stands out as the leading source market, accounting for a significant share of applicants (Singh and Jamil, 2021). In 2022, Chinese students comprised 43% of all applications, marking a notable 15% increase from the previous year (Filipi and Chuang, 2023). Nevertheless, other leading sending nations, such as Bangladesh, Nigeria, and India, have experienced even more rapid growth. This shift in application trends explains why the proportion of Chinese applicants relative to the total has decreased despite their continuing growth in absolute numbers.

This substantial influx of international students has brought forth various challenges related to their adjustment to life and studies in Malaysian universities. These students, hailing from diverse sociocultural backgrounds, have contributed to the diversity and multiculturalism of Malaysian universities. Because of this diversity, it's important for international students to effectively become part of their new living situation and way of life in the country they are studying in. This has important consequences for their social, psychological, and academic well-being, as discussed by Bailey and

Phillips (2016). International students frequently encounter unique challenges when they adjust to a new culture, and these challenges can affect their academic success and mental health. Previous studies have looked into problems such as culture shock, feelings of being disconnected, and isolation (McLeod et al., 2021). Given the potential consequences of these challenges on the well-being of newcomers, international students may encounter significant hurdles related to their overall welfare.

However, despite the substantial body of research devoted to sociocultural adaptation and multiculturalism on university campuses worldwide (Sheng et al., 2022; Ward, 2022), there has been a conspicuous lack of attention directed toward assessing a social-cultural adjustment scale specifically tailored to international students in Malaysia. This research gap underscores the significance of our study in addressing this previously overlooked facet of international student experiences in Malaysia.

2.3. The current study

In previous research, sociocultural adaptation was measured using the Sociocultural Adaptation Scale (SCAS), which originated from Furnham and Bochner's (1982) Social Situations Questionnaire (SSQ), as outlined by Ward and Kennedy (1999). However, these studies primarily focused on challenges rather than effective behaviors, which contradicted the culture learning theory. To address these gaps, the revised Sociocultural Adaptation Scale (SCAS-R) was developed, incorporating domain-specific adjustments such as academic and work adaptations, as proposed by Wilson et al. (2017). Bochner's (2003) classification of adaptive behaviors and Berry's (2022) eco-cultural framework further guided the development of the SCAS-R, emphasizing cultural competence across various contexts.

This study aimed to expand the research base in Malaysia by employing quantitative methods. Specifically, it sought to assess the sociocultural adjustment experiences of international postgraduate students at Malaysian public universities, with a particular focus on their social and academic aspects. The research aimed to address the need for a structured evaluation of international students' requirements to improve their learning and living experiences in host environments, challenging the assumptions that underlie support services. Additionally, we investigated whether the resulting factor model remained consistent across different groups based on gender, age, and academic majors. Variations in sociocultural adaptation invariance related to gender, academic major, and age group had been infrequently explored. We observed disparities based on gender and age, emphasizing the necessity for robust evidence regarding measurement consistency.

3. Method and analysis

3.1. Participants and procedures

The research involved 428 international postgraduate students at five prominent research universities in Malaysia: Universiti Putra Malaysia (UPM), Universiti Malaya (UM), Universiti Teknologi Malaysia (UTM), Universiti Sains Malaysia (USM), and Universiti Kebangsaan Malaysia (UKM). All these institutions are public and located in various regions of Malaysia. The participants were aged between 21 and 30 years, with an average age of 24.83 years and a standard deviation of 3.827. According to UPM's guidelines, this study did not require IRB approval. About 59% (218 individuals) of the participants were female. The largest group, making up about 66.1%, identified as Chinese. Other self-reported nationalities included Indonesian (9.8%), Bangladeshi (6.8%), Pakistani (4.9%), Nigerian (4.2%), and Yemeni (3%). Fewer participants identified as Indian (2.1%), Sri Lankan (1.2%), Egyptian (0.9%), Iranian (0.5%), and South Korean (0.5%). In terms of academic disciplines, 64% (274 individuals) were studying arts, humanities, and social sciences, while the remaining 35% (154 individuals) were enrolled in science, technology, and health medicine programs.

While translating the survey measures, the researchers considered the cultural backgrounds and ages of the participants. As a result, the survey was made available in both Malay and English. After agreeing on the phrasing, a preliminary test was carried out with 50 students. This test produced Cronbach's alpha scores between .776 and .997, indicating high internal consistency and removing the need for additional adjustments. Permission to conduct the study among undergraduate students was granted by the involved universities. Instructors were briefed on the distribution of the questionnaire and the goals of the study. Students were informed that their participation was voluntary and anonymous, and they could withdraw at any time. They provided written consent prior to participation. Of the 450 questionnaires distributed, 22 (4.8%) were incomplete and excluded from the analysis.

3.2. Measures

In this study, participants completed a 33-item sociocultural adjustment questionnaire adapted from previous research (Ward and Kennedy, 1999; Wilson et al., 2017). These items aimed to assess individuals' confidence in adapting their behavior to a new cultural environment. Participants rated each question on a 5-point scale, ranging from 1 (indicating no difficulty) to 5 (indicating extreme difficulty). Higher scores indicated greater challenges in adapting to the new culture.

To assess participants' quality of life, a condensed version of the WHOQOL-BREF Questionnaire (Achangwa et al., 2022) was employed, consisting of

26 items covering dimensions related to physical health, psychological well-being, interpersonal relationships, and environmental surroundings. The initial two questions asked about international students' perceptions of their quality of life and health satisfaction, both rated on a 5-point scale. The study reported a reliability score of .867 for this measure.

Additionally, the international friendly campus scale (IFCS) (Wang et al., 2014) was used to evaluate international students' perceptions of how inclusive their college campuses were. This instrument featured 32 questions, and participants rated each item on a 5-point scale. The tool demonstrated strong internal consistency with a coefficient of .997, as determined by Cronbach's alpha.

3.3. Psychometric analysis

The authors used a statistical method called Confirmatory Factor Analysis (CFA) in AMOS v.26 (Arbuckle, 2019) to check how well our model fits the data. Regarding the scale's factor validity, we opted for confirmatory factor analysis (CFA) over exploratory factor analysis (EFA). This choice was made because existing theory and empirical research already suggest a one-dimensional relationship pattern before conducting the analysis (Swami and Ng, 2015). First, we looked at the normed chi-square (χ^2 normed) value, where lower values are better. If χ^2 normed was less than 3.00, we considered it a good fit (Byrne, 2016a). Next, we considered the Root Mean Square Error of Approximation (RMSEA) and its 90% confidence interval. An RMSEA close to .06 was seen as a good fit, while values up to .10 were considered okay (Shi et al., 2019). We also looked at the Standardized Root Mean Square Residual (SRMR), which measures the average difference between predicted and actual values. A smaller SRMR value indicated a better fit, and a value "close to" or less than .09 was recommended (Byrne, 2016b). Lastly, we used the Comparative Fit Index (CFI) to see how well our model compared to a more basic one. A CFI "close to" or greater than .95 meant our model fit well (Arbuckle, 2019). To assess whether our sociocultural adjustment scale functioned consistently across various groups (gender, academic major, and age), we evaluated it at multiple levels: configural (the basic structure of measured factors is comparable), factor loading (consistency of factor loadings), and intercept (uniformity in the relationship between items and factors) (Counsell et al., 2020).

4. Results

4.1. Confirmatory factor analysis

The skewness of the items (ranging from -0.64 to -0.98) and their kurtosis values (ranging from -0.05 to -0.82) confirmed the fulfillment of the assumption of univariate normality. As advised by Bishara et al.

(2021), when skewness and kurtosis values are below 2 and 7, respectively, it signifies that normality is not significantly violated. The CFA was conducted to expose an unsatisfactory model fit when utilizing the replaced values. This yielded $\chi^2(89) = 713.150$, $p < 0.001$, $GFI = 0.922$, $CFI = 0.834$, $TLI = 0.787$, $RMSEA = 0.105$ (with a 90% CI of 0.093 to 0.118), and $SRMR = 0.0914$. Consequently, items 1, 3, 4, 6, 8, 26, 27, 28, and 29 were eliminated from the measurement model due to their insignificance, indicated by factor loadings below 0.7. To enhance

the model fit, a recommended modification entailed introducing an error covariance between items 5 and 10 ($MI = 121.71$). Post-implementation of this modification, the model fit was enhanced and deemed acceptable, $\chi^2(29) = 144.971$, $p < 0.001$, $GFI = 0.934$, $CFI = .947$, $TLI = 0.918$, $RMSEA = 0.060$ (with a 90% CI of 0.046 to 0.074), and $SRMR = 0.056$. Factor loadings for the final 33 items are shown in Table 1, and the convergent validity for the scale met the minimum criterion (AVE value of 0.50 or higher) (Hair et al., 2017).

Table 1: Items and their factor loading for socio-cultural adjustment

| No. | Indicators (items/parcels) | Standardized factor loading |
|-----|--|-----------------------------|
| 1 | Adjusting to the local weather and climate | – |
| 2 | Adapting to the regional cuisine and dietary choices | 0.95 |
| 3 | Settling into the provided local housing | – |
| 4 | Establishing and nurturing relationships with others | – |
| 5 | Effectively managing one's academic responsibilities | 0.71 |
| 6 | Communicating in a manner that is respectful of the local culture | – |
| 7 | Learning and comprehending the language used in the host country | 0.819 |
| 8 | Developing proficiency in reading and writing in the host language | – |
| 9 | Adapting to the pace of life in the new environment | 0.917 |
| 10 | Becoming accustomed to the population density of the area | 0.932 |
| 11 | Facing challenges in understanding the Malaysian English accent | 0.942 |
| 12 | Interacting with individuals from diverse ethnic backgrounds | 0.847 |
| 13 | Encountering difficulties in speaking English instead of one's native language | 0.927 |
| 14 | Adjusting verbal behavior, including tone and accent, as needed during cross-cultural interactions | 0.93 |
| 15 | Understanding the academic expectations and requirements at the university | 0.863 |
| 16 | Managing academic coursework effectively | 0.925 |
| 17 | Adhering to institutional rules and regulations | 0.942 |
| 18 | Expressing one's thoughts and ideas confidently in a classroom setting | 0.854 |
| 19 | Interacting with university administrative staff and personnel | 0.952 |
| 20 | Facing communication challenges when interacting with individuals from other countries while in Malaysia | 0.878 |
| 21 | Ensuring effective communication and mutual understanding with others | 0.918 |
| 22 | Navigating the local transportation system | 0.951 |
| 23 | Living independently or away from family members in a foreign country | 0.784 |
| 24 | Attending social events, gatherings, and functions | 0.628 |
| 25 | Building friendships with individuals in Malaysia | 0.934 |
| 26 | Comprehending and appreciating local humor and jokes | – |
| 27 | Adapting to the customary etiquette and social norms of the host culture | – |
| 28 | Adjusting to the academic program and course requirements | – |
| 29 | Familiarizing oneself with the teaching methods employed by lecturers | – |
| 30 | Successfully adapting to the university environment | 0.951 |
| 31 | Seeking assistance and support from classmates | 0.784 |
| 32 | Consistently meeting assignment deadlines | 0.628 |
| 33 | Actively participating in classroom discussions and academic discourse | 0.934 |

The results of the measurement invariance assessment of the SCAS across gender, age, and academic major are concisely summarized in Table 2, following the guidelines set forth by Putnick and Bornstein (2016). The progression of analysis entailed evaluating four fundamental levels of measurement invariance: configural invariance, metric invariance, scalar invariance, and residual invariance (Leitgöb et al., 2023). As presented in Table 2, our investigation encompassed the examination of $\Delta RMSEA$ and ΔCFI values for gender, age, and academic major, with these values remaining beneath the respective thresholds of .01 and .015 (Counsell et al., 2020). Consequently, the SCAS model demonstrated complete configural and metric invariance across gender, age, and academic major. The assessment of strong factorial invariance (scalar invariance) encompassed the scrutiny of indicator intercept uniformity across gender, age, and academic major. The scalar invariance model yielded significance ($p < .05$) for all three factors, with ΔCFI and $\Delta RMSEA$ values below the .01 and .015 thresholds, respectively. This observation

indicates the uniformity of item intercepts across gender, age, and academic major. Resonating with the results of scalar invariance, the results of residual invariance were consistent.

4.2. Between-network construct validation

To explore the between-network construct validity of the study, researchers performed correlational analyses involving three key variables: sociocultural adjustment, quality of life, and the international-friendly campus environment. The current results revealed significant connections among these variables. Specifically, sociocultural adjustment exhibited associations with both quality of life and the international-friendly campus, as indicated in Table 3. Notably, the link between sociocultural adjustment and quality of life displayed a stronger correlation than the other two associations. Conversely, the weakest correlation was observed between the international-friendly campus and sociocultural adjustment.

Table 2: Invariance of socio-cultural adjustment scale

| Model | χ^2 | df | χ^2/df | RMSEA | CFI | $\Delta \chi^2 (\Delta df)$ | P | ΔCFI | $\Delta RMSEA$ |
|----------------------------|----------|----|-------------|-------|------|-----------------------------|------|--------------|----------------|
| Gender | | | | | | | | | |
| Model 1: Configural | 192.737 | 58 | 3.323 | .076 | .939 | | | | |
| Model 2: Metric | 200.450 | 67 | 2.992 | .071 | .940 | 7.713 (9) | .563 | .001 | .005 |
| Model 3: Scalar | 218.227 | 77 | 2.834 | .071 | .936 | 25.490 (19) | .145 | .003 | .005 |
| Model 4: Residual variance | 242.243 | 94 | 2.577 | .065 | .933 | 49.506 (36) | .093 | .006 | .011 |
| Age | | | | | | | | | |
| Model 1: Configural | 190.797 | 58 | 3.290 | .076 | .940 | | | | |
| Model 2: Metric | 195.788 | 67 | 2.922 | .069 | .940 | 4.991 (9) | .835 | .000 | 0.007 |
| Model 3: Scalar | 211.495 | 77 | 2.747 | .066 | .940 | 20.698 (19) | .354 | .000 | 0.01 |
| Model 4: Residual variance | 240.385 | 94 | 2.557 | .062 | .934 | 49.588 (36) | .065 | .006 | 0.014 |
| Academic major | | | | | | | | | |
| Model 1: Configural | 174.356 | 58 | 3.006 | .071 | .947 | | | | |
| Model 2: Metric | 181.082 | 67 | 2.703 | .065 | .948 | 6.726 (9) | .666 | .001 | .006 |
| Model 3: Scalar | 187.075 | 77 | 2.430 | .060 | .950 | 12.719 (19) | .853 | .003 | .011 |
| Model 4: Residual variance | 215.952 | 94 | 2.297 | .057 | .944 | 41.597 (36) | .240 | .003 | .014 |

AIC: Akaike information criterion; TLI: Tucker–Lewis's index; RMSEA: Root mean square error approximation; CI: Confidence interval; CFI: Comparative fit index

Table 3: Correlational analyses among the constructs

| No. | Construct | α | M | SD | 1 | 2 | 3 |
|-----|-------------------------------|----------|------|------|---------|--------|---|
| 1 | Socio-cultural adjustment | 0.77 | 4.63 | 1.94 | 1 | | |
| 2 | Quality of life | 0.89 | 6.94 | 0.74 | 0.486** | 1 | |
| 3 | International friendly campus | 0.99 | 5.21 | 0.98 | 0.431** | 0.208* | 1 |

*: $p < .05$; **: $p < .001$

5. Discussion

This study aimed to understand how international students adapt to new cultural environments, particularly in Malaysia. It emphasized the need for reliable surveys that work well in diverse cultural settings. Our research focused on assessing the validity of the sociocultural adjustment scale among international students in a non-Western country. We also looked at how different groups of international students, based on gender, age, and academic major, responded to the scale. Additionally, the scale helped us measure how well international students in Malaysia had adapted to their new surroundings. Using CFA, we found that the one-dimensional model, in which all items were loaded onto a single factor, had adequate fit in respondents who completed the scale. The survey we used had 33 items and was tailored to fit the characteristics of the student group we studied. Previous research has shown that similar socio-cultural adjustment scales have been reliable for different international student groups from various cultural backgrounds (Chen et al., 2018; Keser et al., 2023; Polat and Arslan, 2022). Our study supported these findings, showing that the socio-cultural adjustment scale effectively measures international students' adaptation to new cultures.

However, the current study revealed that some items in the socio-cultural adjustment scale didn't align well with their intended concepts. Nine out of the 33 items didn't show significant relationships. These items, such as "Getting used to the local climate," "Adapting to the local accommodation," and others, may not accurately capture what they were meant to measure. This is consistent with existing research that highlights the complex nature of sociocultural adaptation, influenced by various cultural, psychological, and educational factors (Mwangi, 2016; Yeo et al., 2019). We also found positive connections between socio-cultural adjustment and quality of life as well as the

perception of an international-friendly campus environment (Almeida, 2020; Chaiyasat, 2020; Yilmaz and Temizkan, 2022; Zhang et al., 2022). This makes sense because when people adapt to new cultures, it significantly affects their overall well-being. Similarly, a welcoming and inclusive campus environment can make it easier for international students to adapt. This aligns with previous research showing the importance of a supportive campus atmosphere (Yerken and Luu, 2022).

Given the demonstrated effectiveness of the sociocultural adjustment scale in measuring adaptation among international students, educational institutions can consider incorporating such surveys into their support programs. These surveys can provide a nuanced understanding of the challenges faced by students from different demographic backgrounds, facilitating targeted interventions. Lastly, the authors looked at gender, age, and academic major invariance of the socio-cultural adjustment scale among international students in Malaysia. Our results showed that the scale's underlying structure remained consistent across these demographic factors. This means that the scale works similarly for different genders, age groups, and academic majors. This aligns with existing theories and models that suggest these demographic factors can influence how individuals adapt to new cultures (Rathakrishnan et al., 2021; Şafak-Ayvazoğlu et al., 2021; Yilmaz and Temizkan, 2022). Theoretical frameworks, including Berry's (1997) acculturation model, posit that distinct demographic variables can shape how individuals adapt to novel cultures. Gender, for instance, can influence social roles and expectations, potentially influencing one's approach to assimilating new cultural norms. Likewise, age can shape an individual's openness to change and capacity to grasp new cultural cues. Additionally, academic majors might influence the extent to which individuals interact with diverse cultural groups or encounter culture-related challenges. Overall, our

study provides valuable insights into how demographic factors shape the adaptation experiences of international students in diverse cultural contexts. Educational institutions can develop interventions and resources that consider the unique challenges faced by different demographic groups while ensuring the overall effectiveness of support structures. By incorporating these practical applications, educational settings can actively contribute to the successful sociocultural adaptation of international students in diverse cultural contexts.

6. Limitations and future directions

In acknowledging the limitations of our study, the overrepresentation of participants from China poses challenges in conducting confirmatory factor analyses across diverse country groups, limiting the generalizability of our findings. To address this, future research should involve a more diverse representation of international student groups sharing internal cultural elements but navigating distinct external environments. Researchers should also explore potential external factors, including local regulations, to comprehensively understand their impact on participants' responses to the questionnaire. Additionally, our study's cross-sectional design hinders drawing conclusions about the dynamic nature of socio-cultural adjustment over time. To overcome this limitation, future studies should adopt a longitudinal approach, enabling the tracking of socio-cultural adjustment evolution over an extended period. A more thorough exploration of external factors, such as local regulations and cultural practices, is crucial to elucidate their influence on socio-cultural adjustment, providing a nuanced understanding of international students' experiences. Addressing these limitations through future research avenues will significantly contribute to advancing the field's comprehension of socio-cultural adjustment in diverse cultural contexts.

7. Conclusions

In summary, our study aimed to explore the adaptation of international students to new cultural environments, with a focus on Malaysia. We highlighted the importance of reliable surveys that are adaptable to diverse cultural settings. We assessed the validity of the socio-cultural adjustment scale among international students in Malaysia, considering gender, age, and academic major differences. This scale served as a valuable tool to measure their adaptation. While the one-dimensional model showed a good fit, some items didn't align well with their intended concepts. Our findings confirmed the interconnectedness of socio-cultural adjustment, quality of life, and an international-friendly campus environment. Lastly, our study demonstrated the scale's consistency across demographic factors, contributing to our

understanding of how these factors influence international students' adaptation to multicultural contexts.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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