



The interplay between social support, acculturative stress, perceived stress and generalized anxiety among international students

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Abstract

Drawing from diversity science principles (Miller et al., *Journal of Social Issues*, 75, 1240–1261, 2019), this study examined how social support, acculturative stress and perceived stress influence generalized anxiety in a diverse sample of international students. Using an intersectional lens, the present study also tried to test Berry's (*Applied Psychology: An International Review*, 46, 5–34, 1997) acculturative stress model and assess the main effect hypothesis within a diverse cohort of international students. A sample of 190 international students (84 female, 105 male) enrolled at Kastamonu University was recruited for this study, with a mean age of 20.87 years ($SD = 2.79$). In addition to gathering demographic information, participants were administered the Acculturative Stress Scale for International Students, the Perceived Stress Scale, the Multidimensional Scale of Perceived Social Support, and the Generalized Anxiety Disorder Scale- 7. The analysis revealed that (i) demographic factors did not significantly influence generalized anxiety, (ii) social support from different sources did not significantly impact the acculturation process of the students, (iii) acculturative stress and perceived stress independently contributed to generalized anxiety, and (iv) perceived stress partially mediates the relationship between acculturative stress and generalized anxiety. These findings highlight the need for universities to prioritize mental health support and to develop targeted interventions aimed at promoting the well-being of international students, considering their specific challenges and requirements.

Keywords Acculturative stress · Social support · Perceived stress · Generalized anxiety

Introduction

The proportion of international tertiary students has been increasing worldwide over the past decade (OECD, 2023). While studying abroad offers unique opportunities and the chance to experience a new culture, it also presents significant challenges. Difficulties in adapting to a new culture (i.e., acculturative stress, anxiety) and finding adequate social support can impact adjustment to university life and overall mental health. This has led to global awareness and

research highlighting international students' susceptibility to distress, anxiety, and depression (Auerbach et al., 2018; Ibrahim et al., 2013; Neves & Hillman, 2017; Stallman, 2010). According to Zhou et al. (2021), international students in the U.S. reported prevalence rates of 27.4% for major depressive disorder, 20.0% for generalized anxiety disorder, 26.4% for eating disorders, and 8.8% for suicidal ideation. Furthermore, based on Miller et al.'s (2019) diversity science historical oppression principle, international students may navigate systemic inequities, including difficulties regarding language, mental health, social support, and institutional policies that may inadequately address their needs. To this end, we sought to explore how acculturative stress and social support interact to influence mental health outcomes in a diverse group of international students.

Acculturation and acculturative stress

Acculturation occurs when groups with different cultural backgrounds interact directly, leading to changes in the

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original culture patterns of one or both groups due to reciprocal influence (Berry, 1997). This multifaceted process may result in social, cultural, and psychological changes, often disproportionately affecting one group over the other, as highlighted by diversity science's focus on historical patterns of oppression and inequality (Miller et al., 2019). For international students, acculturation may involve navigating multiple identity dimensions, such as race, ethnicity, and language proficiency, which can intersect to shape their experiences of stress and adaptation (Crenshaw, 1991; Miller et al., 2019).

Acculturative stress is a response to life events originating from the acculturation process during which individuals may encounter attitudes and behaviors different from their original culture, leading to pressure for adaptation, changes in routine and avoidant behaviors towards discrimination. Acculturative stress may also have negative consequences on mental health issues, including anxiety, depression, and psychosomatic symptoms (Williams & Berry, 1991). Accordingly, Berry et al.'s (1987) acculturative stress model suggests that individuals face challenges and stressors during intercultural interactions that cannot be easily resolved through simple cultural adjustments. Recent studies have highlighted that acculturative stress can manifest in diverse ways depending on ethnic and racial backgrounds, emphasizing the importance of using intersectional approaches to understand the experiences of international students (Le & Huyen-Nguyen, 2024; Miller et al., 2019).

Similarly, the relationship between acculturation and stress was influenced by various demographic factors, including education, length of stay in the host culture, gender, prior work experience, marital status, age, socioeconomic status, and prior cross-cultural experiences (Bekteshi & Kang, 2020; Guzel & Glazer, 2019; Kristiana et al., 2022) as well as psychological constructs such as social support.

Social support, acculturation, acculturative stress, and mental health in international students

Social support, a multifaceted construct encompassing perceived comfort, caring, esteem, and assistance from individuals or groups, is a widely investigated protective factor against acculturative stress and mental health problems (Cobb, 1976; Hobfoll & Stokes, 1988). The main effect hypothesis suggests that social support benefits mental health regardless of an individual's stress levels (Cohen, 2004; Cohen & Wills, 1985). Social support has been crucial for international students, as it can reduce homesickness, facilitate adjustment, promote academic success, and help cope with life stressors (Bender et al., 2019; Alshammari et al., 2023; Hendrickson et al., 2011; Liu & Winder, 2014; Yeh & Inose, 2003).

Seeking assistance from various channels and having a strong social network while adapting to a new country have been associated with reduced stress levels related to cultural adjustment (Thomas & Sumathi, 2016). A comprehensive network of social support and an inclusive approach to cultural adaptation also play a role in reducing levels of acculturation-related stress (Sullivan & Kashubeck-West, 2015). The meta-analysis conducted by Bender et al. (2019) indicated a connection between social support and the psychological well-being of international students. Specifically, receiving support from various sources was associated with enhanced psychological adjustment during their transition to a new country.

Research has highlighted the importance of the quality and nature of social support, with studies indicating that its protective role in the relationship between perceived discrimination and mental health outcomes is not universally consistent (Hechanova-Alampay et al., 2002; Praharsa et al., 2017). Misra et al. (2003) presented a model for international students that suggests the significance of primary and secondary stressors and mediators like social support in determining stress outcomes. According to this model, more significant academic stressors, compounded by life stress and lower social support levels, predict stronger stress reactions.

Acculturative stress often presents itself through symptoms such as social withdrawal, feelings of loneliness, sadness, fear, confusion of cultural identity, and homesickness (Al-Krenawi et al., 2021). Kristiana et al. (2022) showed that students who receive broad-based social support and adopt an integration approach to acculturation tend to experience lower levels of acculturative stress. This suggests that having a diverse support network and actively engaging with the new culture may be beneficial. Singh et al. (2015) supported this by demonstrating that social support buffers the negative impact of acculturative stress on mental health, particularly for individuals highly acculturated to the host culture's language and interpersonal norms. Falavarjani et al. (2020) and Li and Peng (2019) also found a negative correlation between acculturative stress and perceived social support. Moreover, they showed that perceived social support influences the strength of the association between acculturative stress and mental health outcomes, especially for those experiencing heightened levels of stress. These studies highlight the critical role of social support in reducing the adverse effects of acculturative stress on the well-being of international students.

Acculturation and anxiety

Acculturative challenges, inherent in adjusting to a new environment, could result in distressing mental health problems

in international students (Ma et al., 2020; Minutillo et al., 2020). Indeed, research consistently indicated a positive association between acculturative stress and anxiety and depression (Driscoll & Torres, 2020; Gomez & Gudiño, 2023; Liu et al., 2022; Schlaudt et al., 2021).

Anxiety disorders encompass conditions characterized by emotional responses such as fear and anticipation of future threats (American Psychiatric Association, 2013). These symptoms often manifest as behavioral alternations and physical symptoms such as increased muscle tension and heart rate. Among these conditions, generalized anxiety disorder (GAD) has the highest prevalence rate among international students (Revollo et al., 2011). GAD, characterized by excessive anxiety and worry, may be particularly relevant to international students as uncertainty and the process of adjustment may lead to exacerbation of generalized anxiety. However, the mechanisms of generalized anxiety in relation to acculturative stress have been poorly understood, as most studies investigated the role of depression.

Present study

The rise in international students worldwide necessitates an in-depth exploration of their acculturation processes when transitioning to a new culture. As academic institutions become more diverse, understanding the underlying mechanisms of acculturation is crucial for fostering an inclusive and supportive environment for these students. Recent studies have emphasized the importance of social support in preventing acculturative stress and its impact on mental health (Kristiana et al., 2022; Falavarjani et al., 2020). Additionally, research has highlighted the role of perceived stress as a mediator in the relationship between acculturative stress and anxiety (Liu et al., 2022; Ma et al., 2020).

In this context, diversity science offers a valuable framework for understanding the psychological processes related to human differences and their implications for acculturation and mental health. By incorporating diversity science principles, we can better understand how systemic factors intersect with individual experiences of acculturation stress and mental health challenges. Furthermore, diversity science encourages the inclusion of diverse perspectives, which are essential for developing effective interventions to support international students.

Taken together, in this study, we aimed to examine the relationships between acculturative stress, social support, perceived stress, and generalized anxiety among international students, guided by Berry's (1997) acculturation model, Cohen's (2004) main effect hypothesis and Miller et al.'s (2019) principles of diversity science. Specifically, our objectives were to (1) investigate the role of demographic factors (e.g., sex, age, duration of stay) in predicting levels

of acculturation stress and generalized anxiety symptoms; (2) assess the buffering effect of perceived social support on the relationship between acculturation stress, perceived stress, and generalized anxiety symptoms; (3) explore the direct relationship between acculturation stress and generalized anxiety to understand how challenges in adjusting to a new culture contribute to anxiety symptoms; (4) test the mediating role of perceived stress in the relationship between acculturation stress and generalized anxiety, hypothesizing that higher perceived stress will strengthen the link between acculturation stress and anxiety.

These objectives were aimed at providing insights into the psychological adjustment of international students, with a particular focus on how social support and stress contribute to their mental health outcomes. Ultimately, the study sought to inform the development of targeted interventions to reduce acculturation-related stress and anxiety among this population.

Method

Participants and procedure

In this study, we employed a quantitative, cross-sectional design to examine the relationship between research variables. In order to determine the sample size for the hierarchical regression analysis with four predictor blocks, a power analysis was conducted using G*Power (Faul et al., 2009). With an expected medium effect size ($f^2 = 0.15$), a significance level of $\alpha = 0.05$, and a desired power of 0.95, the power analysis indicated that a minimum sample size of 153 participants would be required to detect the expected effects. To account for potential missing values, data was collected from 20% more participants. Participants in the current study comprised 190 international students (84 female, 105 male) enrolled at Kastamonu University. The mean age of the participants was 20.87 years ($SD = 2.79$), and they came from 32 different countries (Table 1). Only two students were married, while the rest were single; 14 were employed, and 19 were on scholarship. Further participant characteristics are summarized in Tables 1 and 2.

We employed a convenience sampling technique and contacted the participants through international student events, which facilitated peer networking. Based on the principles of diversity science outlined by Miller et al. (2019), our recruitment strategy ensures a representative sample of international students from various cultural backgrounds, allowing us to capture a broad spectrum of experiences. We prioritized inclusivity by considering intersectionality, recognizing that students' experiences are shaped by multiple

Table 1 Demographic characteristics of the sample

Demographics	<i>n</i>	%
Gender		
Female	84	44.2
Male	105	55.3
Missing	0.5	
Marital status		
Single	188	98.9
Married	1	
Country of origin		
Europe (Azerbaijan, Bulgaria, Germany, Russia, Ukraine)	23	12.1
North Africa (Mauritania, Morocco)	2	1.1
West Africa (Ghana, Ivory Coast, Mali, Nigeria)	5	2.6
East Africa (Djibouti, Ethiopia, Somalia, Sudan, Tanzania)	11	5.8
Central Africa (Chad)	7	3.7
Central Asia (Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, Uzbekistan)	47	24.7
South Asia (Afghanistan, Cambodia, Indonesia, Pakistan)	61	31.1
Middle East (Iran, Iraq, Jordan, Palestine, Syria, Yemen)	30	15.8
Missing	4	2.1
Discipline		
Aviation	2	1.1
Business and management	29	15.3
Education	12	6.3
Engineering	40	21.1
Fine arts	4	2.1
Health sciences	32	16.8
Humanities and social sciences	30	15.8
Life Sciences	1	0.5
Media and communication	9	4.7
Sport sciences	1.6	
Theology	4	2.1
Tourism	12	6.3
Missing	12	6.3
Employment		
Yes	14	7.4
No	174	91.6
Missing	1	0.5
Scholarship		
Yes	19	10
No	168	88.4
Missing	2	1.1
Level of education		
Undergraduate	186	97.9
Masters	4	2.1

factors such as age, gender, language proficiency, duration of stay at the host culture and acculturative stress.

During the event, we informed potential participants about the study and invited them to take part if they met the inclusion criteria. Participants were required to complete the

TÖMER (Turkish Language Teaching Center) or pass the language proficiency exam to be able to study at undergraduate or graduate levels, which allows them to understand the questionnaires. Those who did not meet this criterion or who did not know the mother tongue of the country where the data were collected were excluded from participation.

Informed consent was obtained from all participants prior to participation, and eligible participants filled out the scales in a group setting. All scales were administered using the pen-and-paper method, which took approximately 20 minutes. Ethical approval for this study was granted by the Kastamonu University Social Sciences and Humanities Scientific Research and Publication Ethics Committee. Data are available from the first author upon reasonable request.

Measures

All measures used in the current research were self-report instruments, administered in Turkish language, with validated adaptations. Since our sample differed from the original adaptation studies, for each measure we also checked the internal consistency of subscales and the total scales.

The Acculturative Stress Scale for International Students (ASSIS): The original ASSIS developed by Sandhu and Asrabadi (1998) is a 36-item scale that includes seven subscales: homesickness, discrimination, fear, perceived hate, guilt, stress due to change/culture shock, and miscellaneous. International students rate each item on a 5-point Likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). The cultural adaptation of the ASSIS was carried out by Torun and Bozkurt (2019). Following the psychometric analysis, the adapted version of the ASSIS consists of 29 items across six subscales: homesickness, discrimination, fear, perceived hate, guilt, and stress due to change/culture shock. The internal consistency for the adapted version of the ASSIS was good (Cronbach $\alpha = 0.92$). We used the total scores of 29 items, and internal consistency for the current sample was good (Cronbach $\alpha = 0.91$).

The Generalized Anxiety Disorder Scale-7 (GAD-7): The GAD-7 was used to measure generalized anxiety symptoms (Spitzer et al., 2006). The scale assesses individuals' experiences of GAD symptoms over the past two weeks on a 4-point Likert scale ranging from 0 (not at all) to 3 (nearly every day). The measure had a single factor construct and showed good internal consistency (Cronbach $\alpha = 0.92$) and test-retest reliability (ICC = 0.83). The adaptation of the scale was carried out by Konkan et al. (2013), and internal reliability for the current sample was good (Cronbach $\alpha = 0.86$).

The Perceived Stress Scale- 10 (PSS-10): The PSS-10 was used to measure the students' perception of stress levels (Cohen et al., 1983). The scale was designed to measure the

Table 2 Spearman's correlation coefficients for research variables

	1	2	3	4	5	6	7	8
1. Sex	-							
2. Language Competency	− 0.02	-						
3. Duration of Stay	0.19*	0.38**	-					
4. Age	0.26**	0.11	0.45**	-				
5. Social Support	− 0.27**	0.01	0.08	− 0.11	-			
6. Acculturative Stress	0.13	− 0.06	0.07	0.24**	− 0.01	-		
7. Perceived Stress	− 0.06	0.05	0.15	0.02	0.02	0.32***	-	
8. Generalised anxiety	− 0.06	− 0.02	0.06	0.02	0.11	0.46***	0.44***	-
Mean	-	-	3.41	20.87	49.70	62.12	27.44	12.34
SD	-	-	2.93	2.79	19.59	19.00	4.81	4.28

* $p < .05$, ** $p < .01$, *** $p < .001$

frequency of each item about perceived helplessness (items 1, 2, 3, 6, 9, 10) and self-efficacy (items 4, 5, 7, 8) on a 5-point Likert scale ranging from 1 (never) to 5 (always). Items 6, 7, 9, and 10 were reverse-scored due to their positive framing. The cultural adaptation of the PSS- 10 was carried out by Eskin et al. (2013), and the total score of this version was used in the current research. The adapted version of the PSS-10 showed good internal (Cronbach $\alpha = 0.82$) and test-retest reliability (ICC = 0.88). For the current sample, internal reliability was also good (Cronbach's $\alpha = 0.85$).

The Multidimensional Scale of Perceived Social Support (MSPSS): This scale measures perceived support from individuals' family, friends and significant others using a 7-point Likert scale (from 1 = strongly agree to 7 = strongly disagree) (Zimet et al., 1988). The MSPSS consists of 12 questions with total scores ranging from 12 to 84, with higher scores indicating higher perceived social support. The MSPSS measures social support from three sources: family, friends and significant other. The internal consistency of this measure ranges from 0.85 to 0.91, and test-retest reliability ranges from 0.73 to 0.85. The adaptation of the MSPSS, conducted by Eker and Arkar (2001), demonstrated internal consistency for the subscales and total scores ranging from 0.85 to 0.92, indicating good reliability. In the current sample, the internal consistency for the total score of the MSPSS was excellent (Cronbach's $\alpha = 0.80$ and 0.92).

Sociodemographic variables and covariates: The sociodemographic variables included in this research were age, gender, country of origin, faculty of education, duration of stay in the host culture, language competency (dummy coded as good and fair), marital status, income, employment status and scholarship status. Based on Berry's (1997) acculturation model, age, gender, marital status, duration of stay in the host country and language competency were included as covariates in the model.

Data analysis

All analyses were carried out using IBM SPSS 23. The data were initially screened for missing values, which were handled using mean imputation. Assumptions of normality were assessed using the Kolmogorov-Smirnov test and by examining skewness and kurtosis. Univariate and multivariate outliers were identified using Mahalanobis distances, and seven outliers were removed; however, normality was not fully confirmed. Spearman's correlation and the variance inflation factor (VIF) values were used to check multicollinearity between demographic and research variables. No collinearity was found (all $r \leq .503$; all VIFs ranged between 1.024 and 1.159). Additionally, linearity, homoscedasticity and independence of residuals were inspected, and no violations of these assumptions were detected.

Spearman's correlation coefficients were calculated prior to hierarchical regression analyses to explore the associations between acculturative stress, perceived multiple social support, perceived stress, and generalized anxiety symptoms.

Hierarchical multiple regression was used to investigate the unique and combined contributions of acculturative stress and perceived stress on generalized anxiety after controlling for background characteristics (age, gender, language competency, and duration of stay). Step 1 of the model included the background characteristics as control variables; step 2 included social support; step 3 included acculturative stress; and step 4 included perceived stress.

Finally, we conducted an exploratory mediation analysis following the Hayes (2017) Macro Process via bootstrapping. We considered a mediation effect if (i) the indirect effect of acculturative stress on generalized anxiety via perceived stress was significant and (ii) the bias-corrected 95% CI around the indirect effect from 5000 bootstrap resamples. We accepted the indirect effect as statistically significant if its bias-corrected 95% CI excluded zero.

By implementing these analytical strategies, we ensured that our findings accurately reflect the unique challenges

faced by international students while avoiding overgeneralizations. This approach aligns with diversity science's emphasis on contextualized, inclusive, and methodologically rigorous research practices (Miller et al., 2019).

Results

Associations between research variables

As Table 2 indicates, higher scores of acculturative stress were significantly correlated with higher levels of perceived stress and generalized anxiety. Similarly, higher levels of stress were related to higher levels of generalized anxiety. Multiple social support was not related to acculturative stress, perceived stress and generalized anxiety. As for the control variables, acculturative stress was only associated with the age of the participants. While multiple social support was only significantly higher in female students, perceived stress and generalized anxiety were not associated with the control variables.

Table 3 A hierarchical multiple regression analysis predicting generalized anxiety

	B	SE B	β	R^2	ΔR^2
Step 1					
Sex	− 0.27	0.65	− 0.03	0.02	0.02
Language proficiency	− 1.76	1.00	− 0.14		
Age	− 0.05	0.12	− 0.03		
Duration of stay	0.15	0.12	0.10		
Step 2				0.02	0.00
Sex	− 0.16	0.67	− 0.02		
Language proficiency	− 1.75	1.00	− 0.14		
Age	− 0.04	0.12	− 0.03		
Duration of stay	0.15	0.12	0.10		
Social Support	0.01	0.02	0.05		
Step 3				0.30	0.27***
Sex	− 0.66	0.58	− 0.08		
Language proficiency	− 1.05	0.86	− 0.08		
Age	− 0.23	0.11	− 0.15*		
Duration of stay	0.17	0.10	0.12		
Social Support	0.01	0.01	0.03		
Acculturation Stress	0.12	0.02	0.54***		
Step 4				0.37	0.07***
Sex	− 0.41	0.55	− 0.05		
Language proficiency	− 1.19	0.81	− 0.09		
Age	− 0.18	0.10	− 0.12		
Duration of stay	0.10	0.10	0.07		
Social Support	0.01	0.01	0.05		
Acculturation Stress	0.10	0.02	0.44***		
Perceived Stress	0.26	0.06	0.29***		

* $p < .05$, ** $p < .01$, *** $p < .001$

Hierarchical multiple regression

Hierarchical regression analysis was conducted to explore the impact of social support, acculturative stress and stress on participants' generalized anxiety levels. The control and independent variables were entered into the models, as summarized in the data analyses section. Step 1 was not significant [$F(4, 178) = 0.98, p = .420$]. Step 2 did not improve the model [$F(5, 177) = 0.86, p = .510$], indicating that the predictive value of perceived social support on generalized anxiety was weak. Step 3 was significant [$F(6, 176) = 12.37, p \leq .001$] and the acculturative stress was identified as a unique significant predictor of generalized anxiety, explaining the 30% of the variances. Additionally, age was a significant predictor at this step, indicating younger students were prone to difficulties around acculturation. The final step involves the perceived stress. The overall model continued to predict generalized anxiety [$F(7, 175) = 14.57, p \leq .001$]. In addition to acculturative stress, perceived stress predicted generalized anxiety, and none of the background characteristics was significant (Table 3). The results highlight that acculturative stress and perceived stress were unique predictors of generalized anxiety.

In addition to these, we re-run the regression analysis taking into account the social support from three different sources: family, friends and significant others. The pattern of association between the variables remained the same. The details of these analyses were reported in Supplementary Material 1.

Exploratory mediation analysis

We further investigated the mediating role of perceived stress on the relationship between acculturative stress and generalized anxiety. The result of the analysis showed that there was a significant total effect between acculturative stress and generalized anxiety ($B = 0.11, p < .001$). When perceived stress entered the relationship between acculturative stress and generalized anxiety, the direct effect was significant ($B = 0.08, p < .001$). The association between acculturative stress and perceived stress ($B = 0.09, p < .001$) and the association between perceived stress and generalized anxiety ($B = 0.28, p < .001$) were both significant. The bias-corrected 95% CI [0.01, 0.04] excluded zero. This analysis showed a significant total effect between acculturative stress and generalized anxiety, with perceived stress accounting for a partial mediation of this relationship. In other words, acculturative stress contributes to anxiety both directly and indirectly through its impact on perceived stress. The direct effect of acculturative stress on anxiety remained significant even after controlling for perceived stress, suggesting that

acculturation challenges themselves were a major source of psychological strain for international students (Fig. 1).

Discussion

In this study, starting from the diversity science principles (Miller et al., 2019) we sought to test Berry's (1997) acculturative stress model and examine the main effect hypothesis: social support is a beneficial factor in mental health problems regardless of the individual's experienced stress levels (Cohen, 2004; Cohen & Wills, 1985), within a diverse group of international students. Our findings provide important insights into the complex interplay between acculturative stress, perceived stress, and generalized anxiety in this sample. The results indicated that (i) background information does not influence generalized anxiety, (ii) social support from various sources does not influence the acculturation process of the students, (iii) acculturative stress and perceived stress are unique contributors to generalized anxiety, and (iv) perceived stress partially mediates the association between acculturative stress and generalized anxiety.

Firstly, our analyses showed a significant positive association between acculturative stress and generalized anxiety symptoms. This finding suggests that the challenges associated with adapting to a new cultural environment may significantly impact mental health of international students. This aligns with studies by Driscoll and Torres (2020), Gomez and Gudiño (2023), Liu et al. (2022) and Schlaudt et al. (2021) and Revollo et al. (2011) which document the detrimental impact of acculturative stress on mental health, including its role as a contributing factor to the development of anxiety. Consistent with our findings, prior research has demonstrated that higher acculturative stress was associated with increased anxiety symptoms among international students. For example, Su et al. (2021) found that Chinese international students in the United States who experienced greater acculturative stress also reported higher levels of anxiety and depressive symptoms. Poyrazli et al. (2001) observed that Turkish international students with elevated

acculturative stress exhibited greater anxiety. These findings highlight how the uncertainty and pressures of adapting to a new cultural environment may exacerbate mental health challenges. The pattern of association between acculturative stress and anxiety in our sample also highlights the urgent need for targeted mental health interventions for international students.

The hierarchical regression analysis showed that acculturative stress uniquely predicted anxiety, explaining a substantial portion of the variance. Our result aligns with the acculturation model proposed by Berry (1997) suggesting difficulties around integrating into a new culture may lead to heightened stress and mental health issues. According to this model, psychological challenges individuals face when adapting to a new cultural environment are affected by cultural distance, language barriers and perceived discrimination all of which were relevant to our findings. Our results align with existing literature demonstrating the significant impact of acculturative stress on anxiety levels of international students. For instance, Yeh and Inose (2003) found that international students experiencing higher levels of acculturative stress reported increased anxiety and depressive symptoms, while Poyrazli et al. (2010) identified acculturative stress as a significant predictor of psychological distress among international students, further corroborating the findings of the present study. These findings also align with the diversity science framework, which emphasizes the importance of understanding how systemic inequalities and cultural contexts shape individual experiences (Miller et al., 2019). We might also argue that the unique contribution of acculturative stress to anxiety stresses the need for targeted interventions.

With regard to the analysis based on background characteristics, the present study identified a significant correlation between age and acculturative stress. While the results showed that younger students experience higher levels of acculturative stress, this finding may be better understood through the lens of developmental transitions and intersectionality. Younger students often face dual challenges of identity formation and cultural adaptation, which may

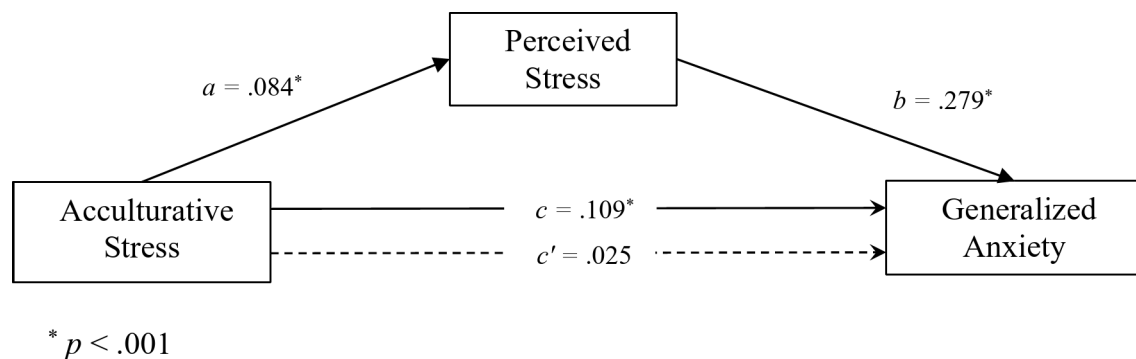


Fig. 1 Mediation model

Table 4 Path coefficients of the model

						95% CI	
Model		Estimate (B)	SE	<i>t</i>	<i>p</i>	Lower	Upper
Model without mediator							
Path <i>c</i>	AS→GA	0.109	0.01	7.10	< 0.001	0.078	0.139
Model with perceived stress as the mediator							
Path <i>a</i>	AS→PS	0.084	0.01	5.50	< 0.001	0.054	0.114
Path <i>b</i>	PS→GA	0.279	0.05	4.87	< 0.001	0.166	0.392
Path <i>c</i> ′	AS→GA	0.084	0.02	5.51	< 0.001	0.054	0.114
	Indirect effect of PS	0.025	0.01			0.012	0.040

AS Acculturative Stress (independent variable); GA Generalized Anxiety (dependent variable); PS Perceived Stress (mediator)

exacerbate stress levels (Berry et al., 2006; Crenshaw, 1991). Several studies have indicated that younger individuals may experience higher levels of acculturative stress compared to their older counterparts (Soufi Amlashi et al., 2024; Wu et al., 2020). Younger students often face significant developmental transitions, such as establishing their identities and achieving academic and social independence, concurrently with adapting to a new cultural environment (Berry et al., 2006). This dual adjustment process can exacerbate feelings of stress and anxiety (Table 4).

On the other hand, we found no significant correlation between anxiety and gender, language proficiency, and duration of stay among international students. Alharbi and Smith (2018) found no significant gender differences in anxiety levels among international students, suggesting that both male and female students experience similar levels of stress related to acculturation. Our study also showed no significant correlation between language proficiency and anxiety levels. This finding aligns with research by Zhang and Goodson (2011), which showed that language proficiency is important for academic success and social integration but does not necessarily predict anxiety levels. This suggests that other factors, such as personal resilience, might play more critical roles in determining anxiety among international students. In terms of duration of stay, our study did not find a significant correlation between duration of stay and anxiety. This result is consistent with research by Poyrazli et al. (2010), who found that the length of time spent in the host country did not significantly affect psychological well-being among international students. This may indicate that adaptation is not solely a function of time but is influenced by a complex relationship of individual and environmental factors. Indeed, adaptation may be influenced by a complex interplay of individual and environmental factors, rather than demographic variables alone.

Contrary to our hypotheses and the prevailing literature (Cobb, 1976; Zimet et al., 1988), the results of the current research failed to support the main effect hypothesis; the perceived social support was not significantly associated with acculturative stress, perceived stress (based on correlation analysis) and generalized anxiety (based on hierarchical

regression). Social support is generally considered a protective factor against acculturative stress, making this finding unexpected. One possible explanation is rooted in the diversity science principle, which emphasizes the importance of multiple identity groups and their intersections (Miller et al., 2019). The quality and type of social support available may vary depending on an individual's cultural and social identity. Hechanova-Alampay et al. (2002) and Praharsa et al. (2017) suggest that social identity is a more effective protective factor during life transitions, such as going abroad to study, rather than social support.

Students may receive social support, but this may be more effective when underpinned by social identification (Cruwys et al., 2014). According to the social identity approach, social support does not simply arise from social relationships but develops from group memberships. Social support may be more available once social identity is established between the provider and recipient of support (Praharsa et al., 2017). Therefore, one possible explanation for this result is that students may feel detached from their social identity because they are geographically distant from their own culture. Consequently, they may not perceive social support from various sources, which might explain why social support does not act as a buffer against stress and generalized anxiety problems.

A novel contribution of our study is the identification of perceived stress as a partial mediator in the relationship between acculturative stress and generalized anxiety. This finding suggests that while acculturative stress directly influences anxiety levels, its impact is intensified by higher perceived stress. This extends the work of Hovey and Magaña (2000) and Mukminin (2012) and highlights the crucial role of psychological constructs in the acculturation process. This also aligns with the diversity science principle of translating research findings into actionable interventions (Miller et al., 2019). Interventions targeting perceived stress, such as mindfulness-based stress reduction programs or culturally tailored counseling services, may help mitigate the compounded effects of acculturative and perceived stress. The exploratory mediation analysis reinforces the importance of addressing perceived stress in interventions.

There might be several reasons for this finding. Firstly, when individuals experience acculturative stress, the addition of high-perceived stress can create a compounded effect. The combined stress from both sources may overwhelm an individual's coping mechanisms, leading to increased anxiety levels. Secondly, might be that high levels of perceived stress might interfere with the process of cultural adaptation. When individuals are preoccupied with stress, they may find it harder to engage with the new culture, form social connections, or develop effective coping strategies, all of which can increase anxiety. Finally, high perceived stress and acculturative stress may create a negative feedback loop: acculturative stress increases perceived stress, which in turn raises anxiety levels, making individuals more sensitive to further stressors, including those related to acculturation.

Limitations

The results of this study should be interpreted considering several limitations. Firstly, the pen-and-paper nature of the data collection process may lead results to be due to single-method variance between the predictor and the outcome measures. Secondly, the sample was drawn from a single university; on the one hand, this may be a strength of the study as it enables a diverse sample on the other hand, this may limit the external validity of the findings. Future research should aim to include participants from a broader range of universities, regions, and cultural contexts to better understand the generalizability of these findings. Additionally, while the sample included participants from 32 countries, it was predominantly composed of students from South and Central Asia. This regional concentration may limit the applicability of the findings to other cultural contexts. Future studies should strive for a more balanced regional distribution to explore potential differences in acculturation processes across diverse cultural groups.

Another limitation is the cross-sectional nature of the study. Data, in this study, were collected at a single point in time. This design limits the ability to draw causal inferences about the relationships between acculturative stress, perceived stress, and generalized anxiety. Longitudinal studies are needed to examine how these relationships evolve over time and to identify potential causal pathways. Furthermore, the use of self-report measures may introduce biases such as social desirability or recall bias. Future research could incorporate objective measures or multi-method approaches to validate the findings. More insights may be gained through experimental studies regarding the factors affecting acculturative stress, anxiety, and social support. This would also help to overcome the cross-sectional nature of the mediation analysis.

Finally, the assessment of individuals with different languages and cultural backgrounds using measurement tools validated in a foreign language may be a limitation of this study. Even if participants are fluent in the language of the host country, cultural differences in interpreting survey items may affect the results.

Conclusion and implications

Our results highlight the critical role of acculturative stress and perceived stress in relation to generalized anxiety problems among international students. The process of adapting to a new cultural environment and navigating the uncertainties of life abroad places these students at heightened risk for mental health challenges, including excessive anxiety and worry. While social support did not show a significant protective effect, the experienced stress on top of stress stemming from acculturation amplifies the risk of anxiety problems.

These findings emphasize the importance of addressing acculturative stress and perceived stress in interventions aimed at improving international students' mental health. Universities should prioritize developing culturally sensitive mental health programs that address the unique challenges international students face. For example, providing culturally tailored counselling services, peer support groups, and workshops on stress management and cultural adaptation could help alleviate the negative effects of acculturative stress.

Additionally, universities should consider implementing orientation programs that focus on fostering a sense of belonging and social identity among international students. These programs could include activities that promote cross-cultural understanding and integration, as well as opportunities for international students to connect with peers from similar cultural backgrounds.

The results also emphasise the need for academic institutions to develop comprehensive support mechanisms that address both acculturation stress and perceived stress to enhance international students' mental health. Collaborations with community organizations to provide services like language training, career counselling, and legal assistance for visa-related issues could further enhance the well-being of international students.

The findings also have implications for policy development. Policymakers should consider allocating resources to support international students' mental health, recognizing their contributions to the academic and cultural diversity of host countries. Policies that promote inclusivity and reduce barriers to accessing mental health services, such as offering services in multiple languages or providing financial

assistance for therapy, could significantly improve the well-being of international students.

Finally, future research should explore the multidimensionality of social support, including its sources (e.g., family, friends, significant others) and its interaction with social identity, to better understand its role in reducing acculturative stress. Additionally, investigating other potential mediators, such as coping strategies or individual resilience, could provide a more comprehensive understanding of the factors influencing international students' mental health.

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Author contributions ME conceptualized and designed the study; collected and analyzed the data; interpreted the results; outlined, drafted, revised, and approved the manuscript. MOA collected the data, interpreted the results and drafted, revised, and approved the manuscript.

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Data availability The data that support the findings of this study are available from the corresponding author upon reasonable request.

Declarations

Conflict of interest The authors declared no conflict of interest.

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