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Revisiting Social Support and Academic Adjustment among International Students: A Systematic Review and Meta-Analysis

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ABSTRACT: *International students face substantial challenges in adapting to academic environments, with academic adjustment playing a critical role in their educational outcomes. Social support has been widely recognized as a potential facilitator of this process; however, empirical evidence regarding its effectiveness remains inconsistent. This meta-analysis synthesizes existing evidence on the relationship between social support and academic adjustment among international students, following the PRISMA (2020) guidelines. Thirteen peer-reviewed quantitative studies (N = 6,233) identified through systematic searches of Scopus, Web of Science, ScienceDirect, ERIC, and ProQuest were included. Using a random-effects model with the Hunter–Schmidt estimator, the pooled analysis revealed a significant positive association (r = 0.365, 95% CI [0.295, 0.435], p < .001). Nevertheless, substantial heterogeneity was observed (I^2 = 84.9%). Subgroup analyses and meta-regression indicated that gender, host country, and measurement instruments did not adequately explain this heterogeneity. Further research is therefore warranted to examine contextual and psychological moderators that may influence this relationship.*

Keywords: Social Support, Academic Adjustment, International Students, Meta-Analysis

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INTRODUCTION

The number of students pursuing higher education abroad has steadily increased each year. According to the latest data from the UNESCO Institute for Statistics, there are now more than 6.9 million international students worldwide, approximately three times higher than the figure reported two decades earlier (UNESCO, 2025). This significant growth reflects intensified efforts by many countries to internationalize their higher education systems. Such efforts form part of broader strategic responses to the challenges and opportunities of globalization while simultaneously enhancing global competitiveness in both education and the economy (Xiaoying et al., 2023).

Despite the rise in international student mobility, adapting to new academic and cultural environments remains a complex challenge (Singh & Jack, 2022). International students are often required to adjust to unfamiliar academic systems and cultural expectations in their host countries (Lashari et al., 2018). Barriers to academic adjustment include language difficulties, differences in teaching and learning approaches, and misalignment with grading and assessment systems within host institutions (Yu & Wright, 2017).

Academic adjustment is a critical factor in the success of international students. Previous studies have demonstrated that academic adjustment is a significant predictor of academic performance (Homklin et al., 2024; Páramo et al., 2015; Rienties et al., 2012). Failure to adjust may negatively affect not only academic outcomes but also students' psychological well-being (Shafqat et al., 2024), motivation to persist (Van Rooij et al., 2018), and risk of academic burnout (Özhan & Boyaci, 2022). Therefore, understanding the dynamics of academic adjustment and its key influencing factors is essential for promoting international student retention and success in higher education.

Academic adjustment among international students refers to the ability to cope with academic challenges and transitions within a new educational environment abroad. It encompasses satisfaction with academic progress and achievement, enjoyment of the student role, and motivation to persist in and complete studies (Anderson et al., 2016).

This adjustment is influenced by both internal and external factors. The internal factors include acculturative stress (Al Juboori et al., 2025; Atteraya, 2021; Cura & Negiş Işık, 2016), emotional adjustment (Mittelmeier et al., 2019), cultural intelligence (Malay et al., 2023; Tang et al., 2024; Xiaoying et al., 2023), language proficiency (Lashari et al., 2023; Lou, 2021; Yu, 2010), academic self-efficacy (Xiaoying et al., 2024), and learning goal orientation (Gong, 2003). External factors include cultural distance (Bastien et al., 2018; Malay et al., 2023; Tang et al., 2024), length of stay (Bastien et al., 2018), classroom communication

(Zhu et al., 2022), sense of university belonging (Yildirim et al., 2021), intercultural sensitivity (Takyi Mensah et al., 2024), peer and family support (Cura & Negiş Işık, 2016; Lashari et al., 2018; Ning et al., 2023; San & Guo, 2023), and institutional support (San & Guo, 2023).

Among these factors, social support is one of the most frequently studied predictors of academic adjustment. It functions as an external resource that enables international students to manage academic stress by providing emotional and informational support (Ong & Ward, 2005). Supportive relationships with peers and family members play an important role in reducing stress (San & Guo, 2023) and enhancing mental health (Singh & Jack, 2022), which indirectly facilitates academic adjustment. In addition to peer and family support, institutional support from faculty members, academic staff, and student services also plays a crucial role in helping students adapt (Mao, 2024; San & Guo, 2023). Institutional support has been associated with greater engagement, feelings of belonging, acceptance, and faster adjustment to the host country's academic and educational culture (Yildirim et al., 2021).

From a theoretical perspective, this study is grounded in intercultural adjustment theory (Ward & Kennedy, 1999) and the stress-buffering model of social support (Cohen & Wills, 1985). Intercultural adjustment theory emphasizes that individuals studying abroad must navigate multiple domains of adaptation in response to the cultural distance and demands of the host environment. Moreover, the stress-buffering model explains how social support mitigates the negative effects of stress by providing emotional, informational, and instrumental resources. Together, these frameworks offer insight into how various forms of social support may contribute to academic adjustment among international students, both by reducing acculturative stress and by enhancing coping capacities.

However, despite their conceptual relevance, empirical findings on this relationship remain inconsistent. Although numerous studies have examined the association between social support and academic adjustment, the results vary considerably. Some studies report strong positive associations, whereas others reveal weak or nonsignificant relationships (Bastien et al., 2018; Mao, 2024; San & Guo, 2023; Shafqat et al., 2024). This variability underscores the need for a systematic synthesis of the existing evidence. Therefore, a meta-analytic approach is warranted to quantitatively estimate the strength of the association between social support and academic adjustment among international students.

To date, no meta-analysis has specifically focused on this relationship. Existing meta-analyses have focused primarily on the link between social support and psychological adjustment (Bender et al., 2019), despite the conceptual and empirical distinction between social support and psychological adjustment. Therefore, there is a pressing need to synthesize the available evidence on the magnitude of social support's effect on academic adjustment. These findings can provide a foundation for institutional interventions and policies to promote international student success by enhancing social support systems.

Specifically, this meta-analysis aims to investigate two primary research questions. First, it seeks to determine the overall association between social

support and academic adjustment among international students, providing a broader understanding of how social support facilitates adaptation within culturally unfamiliar academic environments. Second, it explores the specific contributions of different sources of social support, namely, family, peers, and institutions, in relation to academic adjustment. By disentangling these sources, this study aims to provide nuanced insights into which types of social support are most influential in promoting international students' academic adaptation.

METHOD

This study employed a meta-analytic approach, a quantitative technique situated within the broader framework of a systematic review. Meta-analysis aims to synthesize results from multiple studies that share a similar research focus. The systematic review procedure followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2020) guidelines. The study protocol was preregistered in the Open Science Framework (OSF) and is accessible at https://doi.org/10.17605/OSF.IO/KF9MP.

Eligibility Criteria

The focus of this review was formulated via the PI(E)CO framework (population, intervention/exposure, outcome), with the comparator component excluded**,** as the study did not aim to compare groups but rather aimed to assess the strength of the association between social support (exposure) and academic adjustment (outcome) among international students (population).

The inclusion criteria for this meta-analysis were as follows: (1) studies had to be quantitative empirical research articles; (2) published between 2015 and 2025; (3) written in English; (4) focused on international students in higher education (at either the undergraduate or graduate level); and (5) reported a statistical correlation between social support and academic adjustment. Studies were excluded if they were nonquantitative in nature (e.g., qualitative studies, literature reviews, or theoretical papers), were published outside the specified time frame, written in a language other than English, did not involve international student populations, or did not examine the association between social support and academic adjustment.

Information Sources and Search Strategy

Literature searches were conducted across six electronic databases: Scopus, Web of Science, ERIC, ScienceDirect, ProQuest, and ProQuest Dissertations and Theses (for gray literature). The search was conducted between April 10 and April 24, 2025. The authors first identified relevant English-language synonyms and search terms, which were then used to construct database-specific search queries.

A combination of the following search terms was used across all the databases, with slight modifications tailored to the specific search functionalities of each database: ("social support" OR "family support" OR "university support" OR "institutional support" OR "peer support") AND ("academic adjustment" OR "academic adaptation" OR "academic acculturation" OR "college adjustment") AND ("international student*" OR "foreign student*" OR "overseas student*") Advanced search features were used in each database to increase accuracy and to refine the results on the basis of article type, publication date, and language.

Study Selection and Data Extraction

After all the search results were retrieved, a multistep screening process was conducted. Two reviewers (CA and FA) independently screened the studies, beginning with the removal of duplicates via Rayyan (rayyan.ai). The titles and abstracts were then screened, followed by full-text screening on the basis of the predefined eligibility criteria. Any discrepancies between reviewers were resolved through discussion until a consensus was reached.

This meta-analysis included studies that reported the association between social support and academic adjustment among international students. In cases where a study reported separate correlation coefficients for multiple subscales (e.g., subtypes of social support or academic adjustment), the study authors were contacted via email to request the total correlation value. If no response was received, a weighted average of the available subscale correlations was computed. Additional information extracted from each study included author names and year of publication, country of study, measurement instruments and their reliability coefficients, total sample size, mean age, and gender proportion of participants. If any information was unavailable, it was recorded as N.A. (not available).

Risk of Bias Assessment

The risk of bias in the included studies was assessed via the Appraisal Tool for Cross-Sectional Studies (AXIS) (Downes et al., 2016), which was specifically developed to evaluate the methodological quality of cross-sectional designs. The AXIS tool comprises 20 items, with a maximum possible score of 20 if all items are answered "yes". On the basis of the total score, studies were classified into three categories to enhance interpretative clarity: low risk of bias (scores 16–20), moderate risk (scores 10–15), and high risk (scores below 10). Two independent reviewers (CA and FA) conducted the assessments. Any discrepancies were resolved through discussion until a consensus was reached.

Effect Size and Data Synthesis

The effect size used in this meta-analysis was the Pearson correlation coefficient (r). When studies reported alternative effect sizes (e.g., standardized beta coefficients), values were converted to correlation coefficients via the online tool provided by Psychometrica. The analysis included only studies that explicitly

reported a correlation between social support and academic adjustment among international students. For studies that provided correlation coefficients for subscales only (e.g., different sources of social support), a weighted average of the subscale correlations was calculated to represent the overall effect size (Hunter & Schmidt, 2004).

Data synthesis was conducted using a random-effects model, which assumes that true effect sizes may vary across studies due to differences in populations, contexts, and measurement instruments (Borenstein et al., 2010). Heterogeneity was assessed via Cochran's Q and I^2 statistics to determine the proportion of variability attributable to true heterogeneity rather than sampling error (Higgins, 2003). All analyses were performed via Jamovi software with the *MAJOR* module.

To further examine how specific sources of social support relate to academic adjustment, subgroup analyses were conducted for support from family, peers, and institutional sources. These subgroup analyses also explored potential sources of heterogeneity. In addition, meta-regression was used to test whether study-level moderators such as gender distribution, host country cultural context, and measurement instruments contributed to variability in effect sizes.

Reporting Bias Assessment

To assess potential reporting bias**,** a funnel plot was visually inspected, and Rosenthal's fail-safe N was calculated. Two reviewers (CA and FA) independently examined the funnel plot to detect potential signs of publication bias. Statistical tests such as Egger's regression and the trim-and-fill method were not employed because of the relatively small number of included studies, which may limit the reliability and validity of these methods (Sterne et al., 2011).

RESULT

Study Selection

A total of 437 records were initially identified through database searches. After removing duplicates via Rayyan.ai, 331 records remained for title and abstract screening. Subsequently, 31 full-text journal articles were assessed for eligibility. Two of these articles were excluded because they were written in languages other than English. An additional 23 studies did not meet the inclusion criteria for the following reasons: three studies did not report correlation coefficients between the relevant variables; 10 did not examine the relationship between social support and academic adjustment; six involved populations other than international students; and four employed study designs other than cross-sectional designs. As a result, 13 studies were included in the final systematic review and meta-analysis. An overview of the study selection process is provided in the flowchart in Figure 1.

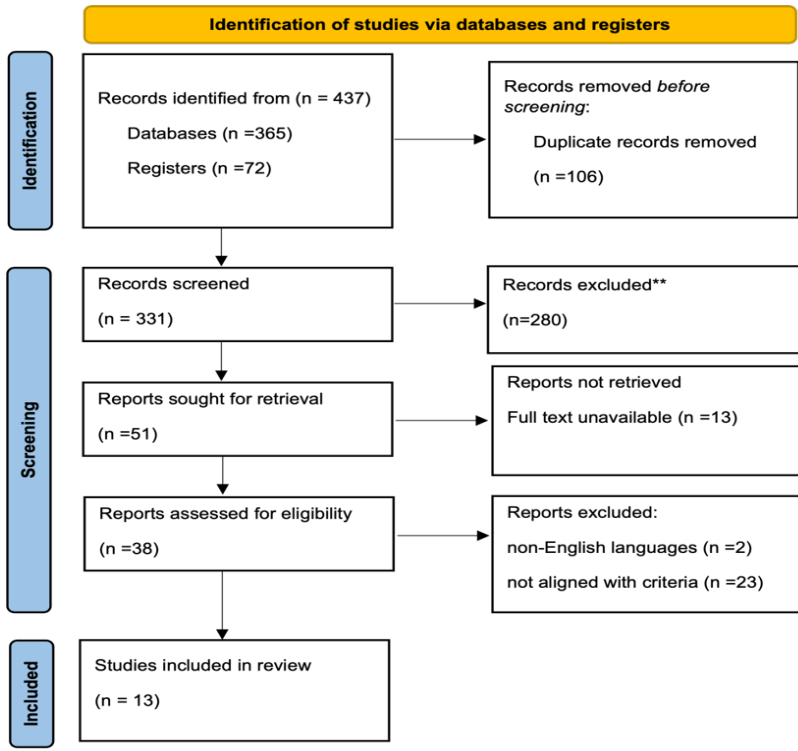

Figure 1
PRISMA flowchart study selection

Characteristics of the Included Studies

All studies included in this meta-analysis (k = 13) were peer-reviewed journal articles. Three studies were conducted in China, four in the United States, and one each in Hong Kong, South Korea, Malaysia, Hungary, Turkey, and Belgium. The total number of participants across studies was 6,233, with individual sample sizes ranging from 141 to 2,201 participants. The years of publication ranged from 2016 to 2025.

Most studies have employed the *Multidimensional Scale of Perceived Social Support* (MSPSS) to measure social support (n = 8). Other instruments included the *Social Support Scale* (SSS), *Social Support Satisfaction*, *Social Support from a Variety of Sources*, and *Perceived Social Support*, each used in one study.

To assess academic adjustment, five studies utilized the *Student Adaptation to College Questionnaire* (SACQ). One study used the *Student Academic Adaptation Questionnaire*, two studies used the *Academic Adaptation Scale* developed by Cemalcilar, and each of the following instruments was used

in one study: the *General Adaptation Scale for International Students*, *School Related Adjustment Scale*, *Academic Adjustment Scale*, *Adjustment Inventory*, and *International Student Adjustment to College Scale* (ISACS).

To provide a comprehensive overview of the included studies, the authors compiled a summary table listing the authors, country of study, measurement instruments and their reliability coefficients, gender distribution, mean age, sample size, and correlation values expressed as Pearson's r. For further details, the characteristics of the studies included in the meta-analysis are presented in Table 1.

Risk of Bias Assessment

The risk of bias was assessed via the *Appraisal Tool for Cross-Sectional Studies* (AXIS). The risk of bias assessment revealed that of the thirteen studies included in this meta-analysis, five were rated as having a low risk of bias: Mao (2024), San & Guo (2022), Cao & Meng (2017), Al Juboori (2025), and Lee et al. (2020), with scores ranging from 16--18. These studies consistently demonstrated strong methodological quality, characterized by clearly stated objectives, well-defined target populations, the use of validated and reliable measurement instruments, and comprehensive and transparent reporting of statistical procedures.

In contrast, the remaining eight studies were categorized as having a moderate risk of bias: Lashari et al. (2022), Shu et al. (2017), Lee et al. (2017), Shafqat et al. (2024), Cura & Isik (2016), Li & Middlemiss (2022), Yu et al. (2019), and Mao et al. (2023), with scores ranging from 13--15. Common methodological limitations among these studies included limited reporting on the handling of nonrespondents**,** insufficient justification of sample size, and inadequate detail regarding recruitment procedures and statistical methods. Nevertheless, all studies met the minimum inclusion criteria and reported the required correlation data for the meta-analysis.

Meta-Analysis

This meta-analysis included 13 studies examining the association between social support and academic adjustment among international students. The analysis employed a random-effects model using correlation coefficients transformed through Fisher's r-to-z transformation. All included studies reported positive associations, with correlation coefficients (r) ranging from 0.130 to 0.725. The estimated average correlation, based on the model, was $r = 0.365$, with a 95% confidence interval ranging from 0.295 to 0.435 ($z = 10.23$, $p < .001$). These findings indicate a statistically significant and positive association between social support and academic adjustment.

Table 1

Description of study characteristics in the meta-analysis

No	Study Label	Country	Social Support Scale	α	Academic Adjustment Scale	α	Gender	MA	n	r
1	Mao (2024)	China	Social Support Scale (SSS)	0.97	Student Academic Adaptation Questionnaire	0.95.	M 285 (54,2%) F 240 (45,8%)	N.A.	525	0.43
2	Lashari et al. (2022)	Malaysia	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.71	Student Adaptation to College Questionnaire (SACQ)	0.77	M 448 (66%) F 227 (34%)	33.5	675	0.37
3	San & Guo (2022)	China	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.89	Academic Adaptation Scale developed by Cemalcilar et al. (2005)	0.86	M 52% F 48%	N.A.	410	0.42
4	Cao &Meng (2017)	Belgia	Social Support Satisfaction	0.89	Student Adaptation to College Questionnaire (SACQ)	0.90	M 84 (41,5%) F 118 (58,5%)	25.45	202	0.357
5	Al Juboori (2025)	USA	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.86	General Adaptation Scale for International Students	0.87	M 54.6% F 45.4%	29,4	141	0.62
6	Lee et al. (2017)	USA	The Multidimensional Scale of Perceived Social Support (MSPSS)	0,89	Student Adaptation to College Questionnaire (SACQ)	0,92	M 58.9% F 41,1%	27	190	0.505

7	Shu et al. (2017)	USA	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.83	School related adjustment scale	0.86	M 56% F 44%	22.63	276	0.18
8	Shafqat et al. (2024)	Hungary	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.85	Academic Adjustment Scale	0.72	M 74(48.4%) F 78 (51%)	N.A.	153	0.13
9	Cura & Isik (2016)	Turkey	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.94	Adjustment Inventory	0.91	M 225 (75,5%) F 73 (24,5%)	21.5	298	0.209
10	Li & Middlemiss (2022)	USA	Social support from a variety of sources	0.59	International Student Adjustment to College Scale (ISACS)	0.89	M 137(44,7%) F 169 (55,3%)	25.8	306	0.17
11	Lee et al. (2020)	Korea	The Multidimensional Scale of Perceived Social Support (MSPSS)	0.86	Student Adaptation to College Questionnaire (SACQ)	0.91	M 102 (47.7%) F 109 (50.9%)	30.12	214	0.226
12	Yu et al. (2019)	Hongkong	Perceived social support	0.82	Adapted version of Cemalcilar and Falbo's (2008)	0.89	M 569 (25,8%) F 1.632 (74,2%)	N.A.	2201	0.45
13	Mao et al. (2023)	China	Multi-Dimensional Support Scale (MDSS)	0.93	Student Adaptation to College Questionnaire (SACQ)	0.94	M 346 (53.9%) F 296 (46.1%)	21,82	642	0.36

However, the heterogeneity test indicated substantial between-study variability ($Q(12) = 94.34$, $p < .001$; $I^2 = 84.9\%$, $\tau^2 = 0.0131$), suggesting that the observed effects were not entirely uniform and may be influenced by contextual or methodological differences among the included studies. Nevertheless, the 95% prediction interval (0.130--0.600) suggests that the direction of the effect remains consistently positive across most studies, although the magnitude of the association varies.

Despite the high heterogeneity, the meta-analysis demonstrated that social support is consistently and positively associated with academic adjustment among international students. The residual diagnostics showed no statistically significant outliers (studentized residuals < ±2.89), and Cook's distance analysis identified no influential studies that disproportionately affected the overall results.

As shown in the forest plot (Figure 2), the pooled effect size was 0.36. However, this estimate should be interpreted with caution because of the high I^2 value, which indicates considerable heterogeneity across studies. Therefore, further exploration of potential sources of heterogeneity through moderator analyses or meta-regression is warranted.

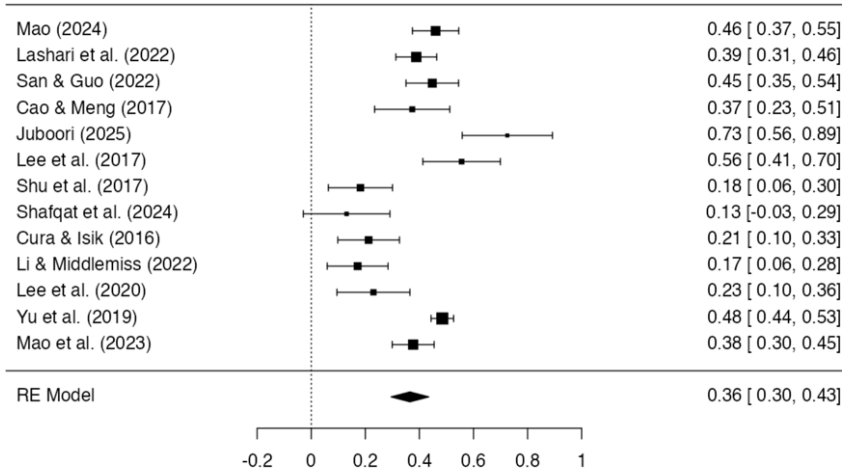

Figure 2
Forest plot

Publication Bias

Given the relatively small number of studies included in this meta-analysis ($k = 13$), the interpretation of potential publication bias must be approached with caution. Visual inspection of the funnel plot revealed slight asymmetry. Although Egger's regression test was not statistically significant ($p = 0.540$), it is important to note that this test has limited sensitivity when applied to a small number of

studies. Therefore, the results should not be considered conclusive evidence of the absence of publication bias.

The Fail-Safe N value was 3,525, indicating that 3,525 additional unpublished studies with null results would be required to reduce the overall effect size to nonsignificance. This suggests that the findings of the current meta-analysis are relatively robust and unlikely to be substantially affected by potential publication bias.

Moderator Analysis

Given the high degree of heterogeneity across studies (I^2 = 84.9%), moderator analyses were conducted to explore factors that may contribute to the observed variability in effect sizes. Several variables were tested as potential moderators, including the cultural context of the host country, the proportion of male participants, and the measurement instruments used in the studies.

Cultural context was coded into two categories on the basis of general cultural characteristics: collectivistic cultures (coded as 1) and individualistic cultures (coded as 0). For the gender variable, a continuous measure was used, represented by the proportion of male participants expressed as a decimal (e.g., 48% = 0.48).

Additionally, moderator tests were conducted for the most frequently used instruments in the included studies. For the social support variable, the use of the *Multidimensional Scale of Perceived Social Support* (MSPSS) was coded as a binary variable, whereas for academic adjustment, the use of the *Student Adaptation to College Questionnaire* (SACQ) was coded in the same manner. These analyses aimed to assess whether the use of particular instruments influenced the strength of the association between social support and academic adjustment.

The results of the moderator analysis revealed that none of the examined variables significantly moderated the relationship between social support and academic adjustment. The cultural context yielded a regression coefficient of β = 0.033 (SE = 0.068, p = 0.625; 95% CI: -0.101--0.167), with a modest reduction in heterogeneity (I^2 = 82.91%) and an explained variance of R^2 = 13.56%. Similarly, the proportion of male participants was not a significant moderator (β = -0.169, SE = 0.269, p = 0.531; 95% CI: -0.697 to 0.359), although it slightly reduced heterogeneity to I^2 = 78.09%, with R^2 = 20.64%.

In terms of measurement instruments, neither the use of the Multidimensional Scale of Perceived Social Support (MSPSS; β = -0.025, p = 0.715) nor the Student Adaptation to College Questionnaire (SACQ; β = 0.030, p = 0.677) significantly moderated the effect. Substantial heterogeneity remained high in both cases (I^2 = 82.2% and 83.74%, respectively).

Taken together, these findings suggest that the four tested moderators did not significantly explain the between-study heterogeneity. Therefore, it is likely that other unmeasured contextual, methodological, or psychological factors contribute more substantially to the variability in effect sizes regarding the

relationship between social support and academic adjustment among international students.

Subgroup Analysis

A subgroup analysis was conducted to examine whether the type of social support source influenced the strength of the association with international students' academic adjustment. This analysis also aimed to evaluate whether differences across support sources could account for the heterogeneity observed across studies. Only studies that explicitly reported correlation coefficients between specific sources of social support (family, peer, and institutional support) and academic adjustment were included in this analysis.

Table 2

Subgroup meta-analysis results

Source of support	k	r	95% CI	Z	p value	Q-test (p)	I^2 (%)	Heterogenity
Family	4	0.118	[0.073, 0.162]	5.34	0.004	3.11 (p = 0.383)	3.1%	low
Peers	6	0.260	[0.159, 0.361]	5.13	0.001	15.70 (p = 0.009)	68.1 %	moderate
Institu tional	6	0.386	[0.215, 0.557]	4.36	0.002	52.06 (p < 0.001)	90.4 %	high

k = number of studies; r = effect size

The subgroup meta-analysis revealed that all sources of social support were positively and significantly associated with academic adjustment among international students.

Family support had a small yet statistically significant effect size of r = 0.118 (95% CI: 0.073–0.162; p = .004), with low between-study heterogeneity (I^2 = 3.1%), indicating highly consistent findings across studies.

Peer support exhibited a moderate correlation, r = 0.260 (95% CI: 0.159–0.361; p = .001), although it was accompanied by moderate heterogeneity (I^2 = 68.1%), suggesting some variability across studies.

Institutional support demonstrated the strongest association with academic adjustment, with an effect size of r = 0.386 (95% CI: 0.215–0.557; p = .002). However, this category also exhibited substantial heterogeneity (I^2 = 90.4%), indicating considerable variability in effect sizes among the included studies.

Overall, the meta-analytic synthesis reveals a consistent, positive, and statistically significant relationship between social support and academic adjustment. Most included studies were rated as having a low risk of bias. The high fail-safe N value further supports the robustness and stability of the findings.

Nevertheless, the substantial heterogeneity observed across studies (I^2 = 84.9%) limits the generalizability of the pooled average effect size. This underscores the importance of interpreting the results with caution, considering the possibility of variation in study characteristics and contextual factors that may

influence the strength of the relationship between social support and academic adjustment.

DISCUSSION

This study examined the association between social support and academic adjustment among international students. The meta-analytic findings revealed substantial heterogeneity across the included studies (I^2 = 84.9%), indicating considerable variation in effect sizes. This level of heterogeneity suggests that the pooled effect size may not fully capture the complexity of the relationship between social support and academic adjustment in this population. As such, the analysis highlights the importance of exploring potential moderators.

Four moderators were tested: the host country's cultural orientation, gender composition, the use of the Multidimensional Scale of Perceived Social Support (MSPSS), and the use of the Student Adaptation to College Questionnaire (SACQ). None of these moderators were statistically significant, suggesting that differences in culture, gender distribution, or measurement instruments were insufficient to account for the observed variation in effect sizes. This implies that heterogeneity may be driven by other factors not captured in the present analysis, such as level of study (undergraduate vs. graduate) (Oyeniyi et al., 2021), participants' country of origin (Bastien et al., 2018), or marital status (Poyrazli & Kavanaugh, 2006). However, owing to incomplete reporting in many of the included studies (k=13), these variables could not be included in the moderator analysis. Therefore, a qualitative synthesis was performed.

The qualitative review revealed that 12 of the 13 included studies reported a statistically significant positive association between social support and academic adjustment, although the strength of the correlation varied. Only one study reported a nonsignificant association. These findings support the presence of a generally consistent relationship between social support and academic adjustment among international students, aligning with prior research suggesting that social support helps alleviate acculturative stress commonly experienced during adaptation to a new academic environment (Atteraya, 2021; Cura & Negiş Işık, 2016; Lashari et al., 2023). Support from peers, family, or institutions can help reduce psychological strain, functioning as a protective resource that facilitates students' adaptation to academic demands (Lashari et al., 2018).

With respect to participants' cultural backgrounds, only three of the included studies involved students from a single national background (China and South Korea), whereas the remaining ten studies included participants from multiple nationalities. Interestingly, the three single-nationality studies reported more consistent effect sizes, ranging from r = 0.357 to r = 0.505 (Cao & Meng, 2019; C. Lee et al., 2018; Yu et al., 2019). This consistency may be attributed to shared cultural values, similar perceptions of social support, and comparable adjustment experiences, which could lead to more uniform responses to measurement instruments. This is consistent with the literature emphasizing the role of cultural context in acculturation and student adjustment (Smith & Khawaja, 2011).

Analysis of study characteristics revealed substantial variability in the instruments used to assess social support and academic adjustment. Although separate meta-regressions for the use of MSPSS and SACQ did not yield statistically significant moderation effects, only three studies used both instruments concurrently. These three studies tended to report more stable and consistent correlations ($r = 0.226$ to $r = 0.5050$) (Lashari et al., 2023; C. Lee et al., 2018; G. Lee et al., 2020). This suggests that the use of standardized measurement instruments may contribute to greater consistency in effect sizes, even though the moderation effect was not statistically significant. These findings provide important contextual insight into how measurement tools may shape observed outcomes.

Another potential source of heterogeneity is variation in methodological quality. Using the AXIS tool (Appraisal Tool for Cross-Sectional Studies), many studies were found to lack key methodological details, such as sample size justification or information on nonrespondents. While most studies were rated as having generally acceptable methodological quality, differences in sampling strategies, instrument validity, and handling of nonrespondents likely contributed to variability in the reported results.

Subgroup analyses further explored whether the source of social support influenced the strength of the relationship with academic adjustment. All three sources (family, peers, and institutional support) showed significant positive associations, although the magnitude and consistency of these relationships varied across subgroups.

Institutional support had the strongest association ($r = 0.386$), followed by peer support ($r = 0.260$) and family support ($r = 0.118$). Although family support had the smallest effect size, it remained statistically significant, and heterogeneity within this subgroup was minimal ($I^2 = 3.1\%$) after removing one outlier. The peer support subgroup showed moderate heterogeneity ($I^2 = 68.1\%$), whereas the institutional support subgroup exhibited the highest heterogeneity ($I^2 = 90.4\%$), indicating considerable between-study variability.

A qualitative review of the institutional support subgroup suggested that this heterogeneity may stem from differences in the operationalization of institutional support. Two studies defined it narrowly as support from faculty members (Mao, 2024; Mao et al., 2024), whereas four studies adopted broader conceptualizations, encompassing university facilities, academic staff, and student support services (Cura & Negiş Işık, 2016; Li & Middlemiss, 2022; San & Guo, 2023; Shu et al., 2020). These conceptual differences may have contributed to inconsistencies in effect sizes across studies within this subgroup.

In summary, the results indicate that all three sources of social support play a beneficial role in facilitating academic adjustment among international students. Institutional support appears to exert the greatest influence, underscoring the critical role of higher education institutions in providing academic and structural resources (San & Guo, 2023). Peer support also plays a central role in helping students cope with challenges such as language barriers, cultural differences, and academic stress (Bender et al., 2019). Although smaller in magnitude, family

support remains a meaningful contributor to students' adjustment in unfamiliar academic environments (Chai et al., 2020).

CONCLUSION AND IMPLICATIONS

The findings of this meta-analysis and systematic review indicate a statistically significant positive association between social support and academic adjustment among international students. Furthermore, multiple sources of support, including family, peers, and institutions, were found to contribute positively to students' academic adjustment. However, owing to substantial heterogeneity across studies, the magnitude of the pooled association should be interpreted with caution. This heterogeneity may be attributed to variations in participant characteristics, measurement instruments, and the methodological quality of the included studies.

High between-study heterogeneity represents a key limitation of this meta-analysis. Other limitations include potential selection bias arising from the inclusion of only English-language publications and the exclusion of studies lacking sufficient statistical data for quantitative synthesis.

These findings have important practical implications for higher education institutions that host international students. Implementing structured support systems such as mentoring programs, student-led communities, and accessible counseling services may facilitate smoother academic adjustment. For future research, potential moderating variables, including students' cultural backgrounds, specific forms of social support, and the use of standardized measurement instruments, should be systematically examined to increase the comparability and generalizability of findings across studies.

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