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Comparing the Mental Health and Wellbeing of Domestic and International Tertiary Students: A Systematic Review and Meta-Analysis

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ABSTRACT

University study is a period of psychological vulnerability for many individuals. International college students may be particularly vulnerable to experiencing distress and developing a mental illness due to challenges of relocation and acculturation. The aim of this meta-analytic review was to synthesize the literature on the mental health correlates and outcomes of domestic and international tertiary students. A total of 35 studies were identified via search PsycINFO, PubMed, CINAHL, and Scopus databases. Results showed that, among 283,412 participants, very small but non-significant effects were found between domestic and international students on anxiety: r = .04; depression: r = -.01; psychological distress: r = -.01; and wellbeing: r = -.01. Most studies were of relatively poor quality. Among high-quality studies, international students reported fewer symptoms of anxiety, depression, and stress than domestic students. On the other hand, domestic students declared higher wellbeing scores on quality-of-life measures. Despite these mixed findings, many students in the included studies reported poor mental health and wellbeing. Further research

examining the mental health and wellbeing of domestic and international students is needed, with particular attention to the underlying needs and stressors that affect each subgroup to develop effective supports and countermeasures.

Keywords: College students, mental health, meta-analysis, systematic review, wellbeing

Many college students experience high levels of distress and are vulnerable to developing mental illness (Auerbach et al., 2018; Buizza et al., 2022). The World Health Organization World Mental Health Surveys estimates that one-fifth (20.3%) of college students experienced a mental illness within the last 12 months (Auerbach et al., 2018). While some studies suggest that college students are amongst the most vulnerable groups for experiencing mental illness (Buizza et al., 2022; Cvetkovski et al., 2012), a recent study reported no evidence that college students are at greater risk for poor mental health outcomes compared to age-adjusted non-students (Burns & Crisp, 2020). Nevertheless, it has been proposed that there are particularly vulnerable groups within college student cohorts, such as international students, due to additional stressors placed upon them due to demands for cultural adjustments, such as language barriers, lack of social support, adjustment to new educational systems, and financial difficulties (Mesidor & Sly, 2016; Mori, 2000). The aim of this review is to evaluate the mental health status of domestic versus international tertiary students.

LITERATURE REVIEW

Mental Health of Domestic and International Students

Although previous systematic reviews have examined the effectiveness of interventions to improve the mental health and well-being of college students (Halladay et al., 2018; Harith et al., 2022), little research has compared the mental health of international students and domestic students. Several systematic reviews have examined potential factors influencing the mental health status of college students. One systematic review conducted in 2010 (Storrie et al., 2010) has identified different types of mental health problems (e.g., depression, eating disorders, obsessive compulsive disorder) reported by college students worldwide and potential predictors for mental health issues, such as academic performance, social isolation, and avoidance of seeking help due to stigma surrounding mental illness. Another systematic review conducted in the U.S. has examined predictors of psychosocial adjustments for international tertiary students and identified these frequently reported predictors, which include stress, social support, English language proficiency, and acculturation (Zhang & Goodson, 2011). Additionally, a recent systematic review (Campbell et al., 2022) has examined factors which influence the mental health of tertiary students in the United Kingdom: factors which contribute to poor mental health outcomes include childhood trauma, identifications of LGBTQ and autism, and lack of mental health literacy, while

factors which promote mental wellbeing include social support and engagement with learning activities. These studies have primarily focused on identifying and exploring factors that influence the mental health status of tertiary students, but do not distinguish between domestic and international students or make direct comparisons between these two groups on mental health outcomes. Examining the mental health outcomes of these two groups is important because it is essential to understand the psychological needs of at-risk students to support their wellbeing and enhance learning outcomes. Understanding the mental health status of international tertiary students may also have economic implications, as they make significant contributions to the economy of many Western countries including Australia, Canada, New Zealand, United Kingdom, and the United States (Nguyen & Balakrishnan, 2020). Additionally, as more students from rapidly advancing developing countries (e.g., China) gain access to primary and secondary education, universities in these countries may be less capable of accommodating students due to lack of resources, which further increases students' motivation and need to study abroad (Naidoo, 2007). In addition to providing additional revenue in education sectors, international students foster knowledge transfer and cultural exchange between foreign and domestic institutions (Naidoo, 2007).

The literature on the mental health status of domestic and international tertiary students is mixed: while some studies report international students experience higher levels of mental illnesses in comparison to their domestic peers (e.g., Lian & Wallace, 2018; Han et al., 2013), others find no differences between these two groups (e.g., Yeung et al., 2022) or report poorer mental health of domestic students (e.g., Farrer et al., 2016). A study conducted in the Netherlands found that international students reported more depressive symptoms, anxiety, and suicidal ideation than domestic students (Kivelä et al., 2022). In one Australian study conducted during the COVID-19 pandemic, international students reported significantly higher levels of psychological distress in comparison to domestic students (Mihrshahi et al., 2022), which may have been due to the negative impact of the COVID-19 international border closure in Australia (Ali et al., 2022). In contrast, other studies conducted in Australia and the United Kingdom reported higher psychological distress for domestic students (Farrer et al., 2016; Jones et al., 2018; Sanci et al., 2022; van Agteren et al., 2019). In a study examining psychosocial risk factors for major depression and Generalized Anxiety Disorder (GAD) in an Australian sample of university students, domestic students were found to be at higher risk for depression and/or GAD than international students (Farrer et al., 2016). Similarly, in another Australian study, it was found that domestic students experienced higher levels of psychological distress and had lower scores on self-rated health than international students (Skromanis et al., 2018). A study conducted in the UK reported that international students had better general mental health and higher life satisfaction than domestic students (Jones et al., 2018).

Taken together, whilst some studies report that international students have worse mental health outcomes than domestic students, others report no differences between these two groups or find that domestic students are worse off in terms of

mental health. These inconsistent results may be due to variations in studies' recruitment strategies, the use of mental health surveys, and the location where studies take place, which limit our ability to state whether there are differences in mental health outcomes across these two groups. To our knowledge, no published systematic reviews or meta-analyses have directly compared the mental health status of international versus domestic tertiary students. One systematic review investigated the prevalence of depression among international college students (Saravanan & Subhashini, 2021); however, the review only focused on depression and did not examine specific differences between domestic and international students, nor did it examine positive mental health outcomes such as levels of wellbeing.

Study Aims

Despite the evidence suggesting that college students, and specifically international students may be more prone to mental illness and report worse negative mental health outcomes, no research has compared the positive and negative mental health outcomes of domestic and international students. Therefore, we aimed to conduct a systematic review and meta-analysis of relevant studies to examine the mental health outcomes of domestic and international tertiary students and investigate any potential differences.

Cross-sectional and longitudinal studies included in the review will be evaluated for their quality using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross Sectional Studies and Cohort Studies (JBI, 2020), respectively. Studies with scores of 100 or meet all criteria on the JBI Critical Appraisal Checklist will be rated as "high-quality"; studies which do not meet all criteria on each checklist will be considered as "poor quality".

METHOD

Search Strategy

The protocol for this systematic review (PROSPERO: CRD42022336898) was registered, and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed (Page et al., 2021). A comprehensive literature search was performed (6 June 2022) using the PsycINFO, PubMed, CINAHL, and Scopus databases. Search terms were adapted from a previously published bibliometric review on international student's mental health (Cao et al., 2021). An updated search was conducted (7 February 2023), and after full-text screening, six additional studies were included. The following search terms were used in the title and abstract: ((“international student*” OR “overseas student*” OR “mobile student*” OR “offshore student*” OR “outbound student*” OR “inbound student*” OR “exchange student*” OR “student exchange” OR “cross border student*” OR “student mobility” OR “international pedagog*” OR “study abroad” OR “international exchange

program*" OR "cross border education") AND ("social*" OR "emotion*" OR "psych*" OR "mental") AND (medical OR health OR problem)).

Eligibility Criteria and Study Selection

Eligible studies examined the mental health and wellbeing of tertiary students and had to meet the following inclusion criteria: published in English, quantitative, empirical or applied studies, inclusion of an international student sample and comparison group of domestic students, studies conducted at one or more universities, inclusion of standardized and validated measures of mental health and/or wellbeing (i.e., psychological distress, depression, anxiety, stress, wellbeing). Exclusion criteria were: theoretical studies or systematic reviews, studies using secondary and/or qualitative data, and studies published prior to 2000, as we were primarily interested in the mental health and wellbeing of international tertiary students in the last two decades, due to the spike in the number of international students studying abroad (OECD, 2019).

Figure 1 shows the PRISMA flow diagram for study identification and selection. Following removal of duplicates, two authors (WX, MR) independently screened titles and abstracts to determine eligibility. Agreement rate was high between the two authors, with 90% agreement (Cohen's $k = 0.77$) at title and abstract and 88% agreement at full text (Cohen's $k = 0.71$). All included full-text articles were assessed by the same two authors (WX, MR) for inclusion. Disagreements were resolved by reaching a consensus between the two authors.

Data Extraction

Data regarding methodology and outcome measures were extracted from all included studies: authors, publication year, country, sample characteristics (i.e., sample size, mean age at baseline, sex), mental health and wellbeing measures, and descriptive statistics for the international and domestic samples for each included study. When this information was not reported, the first author (WX) requested necessary data from 20 corresponding authors: seven authors responded and provided data (Collins, 2021; Dingle et al., 2022; Dowling et al., 2020; Moore et al., 2012; Nadareishvili et al., 2022; Sanci et al., 2022; Zhou et al., 2022). Corresponding authors of thirteen studies did not reply to two attempts at correspondence or responded that they did not have the information required or could not retrieve data due to limited time; therefore, those studies could not be included.

Quality Assessment

Quality of included studies was assessed using eight items adapted from the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Analytical Cross Sectional Studies and eleven items adapted from the JBI Critical Appraisal Checklist for Cohort Studies (Moola et al., 2015). Assessment was

conducted independently by two authors (WX, MR) and discrepancies were resolved through discussion. See Table 2 and Table 3 for further details of the quality assessment.

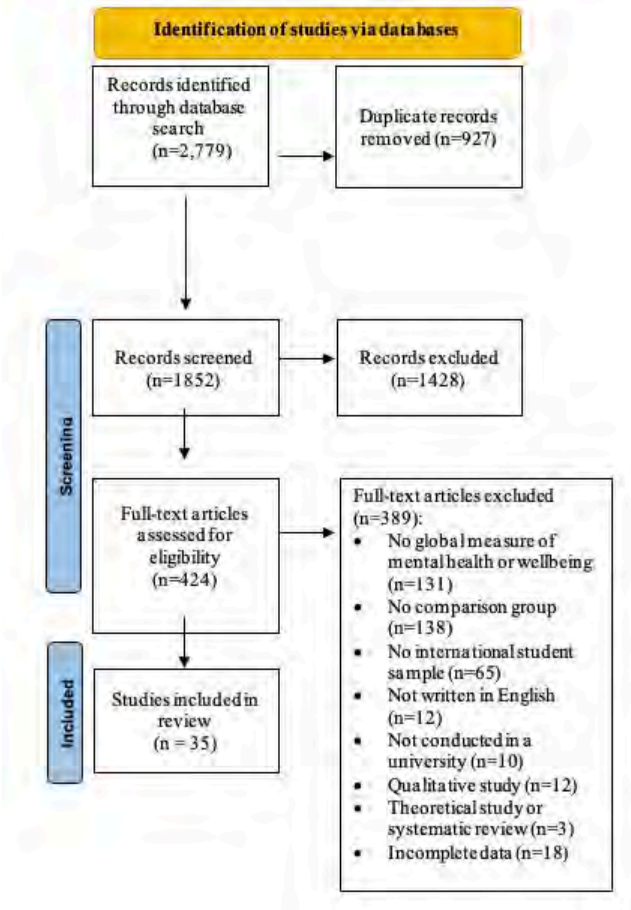

Figure 1: PRISMA flow chart

Statistical Analyses

Calculation of effect sizes

Effect sizes were calculated, and coefficient *r* was generated from means and standard deviations or t values for studies in which means and standard deviations were not given. The effect size measure of Cohen's d was used: $d=(M_2-M_1)/SD_{pooled}$, in which $SD_{pooled}=\sqrt{((SD_1^2+SD_2^2)/2)}$. In this formula, M_1 and M_2 are the sample means for group 1 and group 2 respectively; SD_1 and SD_2 are the standard deviations for group 1 and group 2 respectively. Correlation coefficients

and 95% confidence intervals (CI) were calculated for included studies using the online Campbell Collaboration tool (Wilson, 2022). A negative sign indicates higher levels of wellbeing, psychological distress, depression or anxiety for domestic students, and a positive sign indicates higher levels of the same outcomes for international students in comparison to domestic students.

Meta-analyses

To obtain an overall effect size for each of the identified studies, multilevel random effects meta-analyses were conducted, taking into consideration non-independence in effect sizes. Analyses were conducted with R (R Core Team, 2020), using the approach outlined by Harrer et al. (2021). In total, eight meta-analyses were conducted, each for different mental health outcomes or different countries with sufficient studies, (a) poor mental health: (1) anxiety, (2) depression, (3) psychological distress (e.g., distress, perceived stress, psychological distress, and stress); (b) positive mental health: (4) wellbeing/quality of life; and (c) country of origin: (5) Australia-New Zealand, (6) USA, (7) Germany and (8) countries in Asia. In addition, a subgroup meta-analysis including only high-quality studies (studies that received scores of '100' and met all criteria on the JBI Critical Appraisal Checklist) was conducted. Items were scored as "Yes" when in line with criteria, "No" when not in line with criteria, "Unclear" when it was unclear whether they were in line with the criteria, and "Not applicable" when the item did not apply to the criteria. Items 3, 5 and 6 were excluded from the rating as they were not applicable to the included studies. Heterogeneity of effect sizes was examined using Q and I^2 statistics, which were obtained using the metafor package (Viechtbauer, 2010) and dmetar package (Harrer et al., 2021), respectively. The I^2 statistic was used to estimate the percentage of variability in effect sizes across studies not attributable to random sample error alone. A value of 0% indicates no heterogeneity, while values of 75% or greater indicate high heterogeneity (Higgins et al., 2003). Egger's regression test was applied to detect publication bias (Egger et al., 1997). In this method, standardized effect sizes are plotted against their precisions, and a regression intercept of zero indicates the absence of publication bias, with a significant result suggesting that there is publication bias. Following Viechtbauer et al. (2015), this test was modified for multilevel meta-analyses by incorporating sample variance as a moderator, and a significant moderation indicates possible publication bias. This approach has been used in previous multilevel meta-analyses (de Jong et al., 2021; Radunz et al., 2022).

RESULTS

A total of 2,779 articles were identified, from which 927 duplicates were removed. Following screening of the remaining titles and abstracts (n=1,852), 424 full-text articles were assessed for eligibility. Of these, 35 articles met the inclusion criteria. See Appendix A for an overview of the characteristics of included studies. Most studies were conducted in Australia (n=10, 28.6%), followed by the U.S. (n=7,

20.0%). Sample size of studies ranged from 37 (Huhn et al., 2018) to 228,421 participants (Zhou et al., 2022), with most studies (*n*=25, 71.4%) reporting a greater proportion of female participants. Studies consisted of a total of 283,412 participants, including 34,309 international students (12.1%) and 249,103 domestic students. The ratio of international to domestic students was almost 1:7 (13.8%). Only five studies provided information on the educational level of participants; two of those studies only included undergraduate students (Ahorsu et al., 2021; Chu et al., 2015), one mixed sample consisted mainly of undergraduate and a small percentage of postgraduate students (van Agteren et al., 2019); while one study included a predominant number of undergraduate students (Jiang et al., 2022), another consisted of a greater number of postgraduate students (Mihrshahi et al., 2022). Most of the included studies were cross-sectional (*n*=32, 91.4%), and the remainder were longitudinal studies (*n*=3, 8.6%).

Outcome Measures

Twelve studies (34.3%) assessed anxiety, mostly measured with the anxiety subscale of the Depression Anxiety Stress Scales (DASS-21) (*n*=5, 41.7%). In total, 18 studies (51.4%) measured depression, mostly with the Patient Health Questionnaire-9 (PHQ-9) (*n*=6, 33.3%). Seventeen studies (48.6%) measured psychological distress, most with the Perceived Stress Scale (PSS) (*n*=4, 23.5%). Finally, 8 studies (22.9%) measured wellbeing, for which the World Health Organization Quality of Life Assessment (WHOQOL-BREF) (*n*=3, 37.5%) and Satisfaction with Life Scale (SWLS) (*n*=3, 37.5%) were the most frequently used measures.

Meta-analyses (1-4): Anxiety, Depression, Psychological Distress and Quality of Life

Outcomes were grouped according to the validated measures used in the studies; see Table 2. While the amount of heterogeneity was moderate for the meta-analyses for (1) anxiety, (3) psychological distress, and (4) wellbeing/quality of life, respectively; for (2) depression the amount of heterogeneity between studies was substantial. We found no significant associations between any of the four mental health outcomes and student status (r ranging from - .013 to .037), indicating that the mental health outcomes of domestic vs international students are comparable. In the following, we examined the mental health outcomes from individual studies which used the same outcome measures to provide a more comprehensive overview about trends in students' mental health, see Table 1. For anxiety, there was a trend that international students reported less anxiety symptoms compared to domestic students on all measures (DASS anxiety subscale, GAD-7, Becks Anxiety Inventory [BAI], State-Trait Anxiety Inventory [STAI]), with overall mild to moderate levels of anxiety reported. Four studies identified moderate to high levels of anxiety (Dowling et al., 2020; Kivelä et al., 2022; Nadareishvili et al., 2022; van Agteren et al., 2019). For depression, a similar trend was observed, that international

students reported fewer depressive symptoms compared to domestic students (PHQ-9, DASS depression subscale, Center for Epidemiological Studies Depression Scale [CES-D]), with overall moderate to severe levels of depression reported. Results for psychological distress were less conclusive with no obvious trends observed in the various measures of distress (PSS-14, Kessler Psychological Distress Scale [K-10], DASS-Stress, GHQ-12, Outcome Questionnaire 45 [OQ-45]). However, seven studies identified overall moderate to severe levels of stress (Chu et al., 2015; Gardner et al., 2014; Jones et al., 2018; Lippke et al., 2021; Mihrshahi et al., 2022; Stokes et al., 2019; Vivekananda et al., 2011). Finally, results for quality of life/wellbeing (WHOQOL-BREF, SWLS) provided mixed outcomes comparing international vs domestic students.

Meta-analyses (5-9): Country of Study, High-Quality Studies

The location of the university in which the study took place was noted and four groups were established based on the proximity of these countries in terms of culture and location: Australia and New Zealand (n=24), USA (n=9), Germany (n=6), and countries in Asia (n=8). For the meta-analyses of included studies from (5) Australia and New Zealand and (7) Germany, respectively, the amount of within-studies heterogeneity was large; while for studies conducted in the (6) USA and (8) countries in Asia, the amount of between-studies heterogeneity was significant. No significant differences were found between domestic and international students based on the country in which the study took place.

Publication Bias and Quality Assessment

For the eight meta-analyses, publication bias was indicated by Egger's regression intercept for only the analysis including the studies from the USA (n=9, Q=7.00, $p<.05$); see funnel plot in Figure 2. For included studies, the JBI Critical Appraisal Checklist was scored by two authors (WX, MR). The authors had 94% agreement in ratings and conflicts were discussed until a consensus was reached regarding the scoring of each item. Results of the quality ratings are presented in Appendix B and Appendix C. The overall quality of the studies was poor, with only eight studies meeting all JBI criteria (Chai et al., 2011; Collins, 2021; Fritz et al., 2008; Hsien-Chuan Hsu et al., 2009; Sanci et al., 2022; Stokes et al., 2019; Vatansever et al., 2021; Zhou et al., 2022). All cross-sectional studies provided detailed description of domestic and international students' demographics, used validated measure of mental health outcomes, and used appropriate statistical analysis. The item with the lowest quality rating was the standard criteria for measurement, as most studies failed to provide a clear definition of how international students were classified (n=23, 71.9%). Twelve studies (37.5%) received a score of 80, with most of them failing to meet criteria 4 of "objective, standard criteria for measurement of condition" (e.g., participants were included in the study based on a specified definition of "international students"), while 12 studies (37.5%) received a score of 60, failing to meet two of the five listed criteria. With regards to the three longitudinal studies, the JBI Critical Appraisal

Checklist for Cohort Studies was used. Only one study (Lee & Im, 2016) received a score above 80. The item with the lowest quality rating was "strategies to deal with confounding factors", as no studies used statistical analyses to address confounding factors.

A subgroup analysis for high-quality studies (n=12) was conducted. A substantial within-study heterogeneity variance was observed, while there was no between-study heterogeneity variance. We found a small (r=-.06, 95% CI=-.10, -.01) but significant effect, p=.017, suggesting that international students reported better mental health outcomes compared to domestic students: overall, international students reported less symptoms of anxiety, depression, and stress while domestic students reported higher quality of life.

DISCUSSION

The present systematic review and meta-analysis is the first to examine the differences in mental health correlates of domestic and international tertiary students. Overall, 35 studies were included in the review. No differences between international and domestic students in terms of mental health or wellbeing outcomes were found. The hypothesis that domestic students would have better mental health outcomes than international students was not supported. In terms of effect sizes, the strength of the relationship between domestic and international students was not significant, with rs ranging from -.010 for depression and wellbeing studies to .04 and .05 for anxiety studies and for studies grouped by country, respectively (e.g., Germany). A significant difference between domestic and international students was found in the subgroup analysis of high-quality mental health studies, in which international students reported *less* symptoms of anxiety, depression, distress, but *worse* wellbeing in comparison to domestic students.

Whilst a few studies lent support for the proposed hypothesis that domestic students fare better in terms of mental health outcomes (Han et al., 2013; Kivelä et al., 2022; Lian & Wallace, 2018), results from the meta-analyses suggest that findings are inconclusive. Across the 35 studies involving 283,412 participants, our findings show that non-significant differences exist between domestic and international tertiary students in terms of mental health and wellbeing: international students, on average, had more anxiety symptoms and worse quality of life than domestic students, although the results were not significant.

The lack of significant differences in the meta-analysis may be the lack of high-quality studies examining mental health outcomes across domestic and international student groups, which precluded a capacity to obtain robust data. This could be seen through our attainment of a significant result in the mental health outcomes between domestic and international students in high-quality studies. Another problem is that studies included did not differentiate between the types of stressors on international students and simply measured their mental health outcomes at certain time points.

Table 1: Mental Health Outcomes of University Students

Outcome measure	# studies	Cut off	$M_{overall}$	$M_{domestic}$	$M_{international}$	Studies
Anxiety						
DASS-Anxiety	5	≥ 6 moderate anxiety	6.07	6.33	5.31	Collins (2021); Dowling et al. (2020); Moore et al. (2013); Shek et al. (2022); van Agteren et al. (2019)
GAD-7	2	≥ 10 moderate anxiety	6.66	6.78	5.68	Sanci et al. (2022); Zhou et al. (2022)
BAI	2	≥16 moderate to severe anxiety	14.48	13.14	15.87	Kivelä et al. (2022); Tochkov et al. (2010)
STAI	2	≥ 38 moderate to high anxiety	30.42	32.86	24.48	Ahorsu et al. (2021); Nadareishvili et al. (2022)
Depression						
PHQ-9	6	≥ 10 moderate depression	7.81	7.88	7.25	Huhn et al. (2018); Jiang et al. (2022); Lee and Im (2017); Nguyen et al. (2019); Sanci et al. (2022); Zhou et al. (2022)
DASS-Depression	5	≥ 7 moderate depressive symptoms	7.05	7.41	5.99	Collins (2021); Dowling et al. (2020); Moore et al. (2013); Shek et al. (2022); van Agteren et al. (2019)
CES-D	3	≥ 16 risk for clinical depression	19.31	19.42	19.03	Acharya et al. (2018); Nadareishvili et al. (2022); Shim et al. (2014)
Psychological distress						
PSS-14	4	14-26 moderate stress	16.61	16.75	16.19	Chu et al. (2015); Garbóczy et al. (2021); Gardner et al. (2014); Lippke et al. (2021)
K-10	3	20-24 mild distress	20.82	20.94	20.58	Clough et al. (2019); Mihrshahi et al. (2022); Skromanis et al. (2018)
DASS-Stress	3	≤ 8 mild stress	6.37	6.46	6.17	Collins (2021); Moore et al. (2013); Shek et al. (2022)
GHQ-12	2	≥ 15 moderate distress	7.99	6.62	10.40	Jones et al. (2018); Shrestha (2017)
OQ-45	2	64-105 moderate distress	73.78	73.19	86.42	Stokes et al. (2021); Vivekananda et al. (2011)
Quality of life						
WHOQOL-BREF	4	≥ 55 good quality of life	59.61	61.46	55.81	Chai et al. (2012); Gardner et al. (2014); Hsien-Chuan Hsu et al. (2009); Lippke et al. (2021)
SWLS	3	≤ 15 low satisfaction of life	7.61	5.83	10.92	Jones et al. (2018); Lippke et al. (2021); Skromanis et al. (2018)

Note: Outcome measures – BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, CES-D = Center for Epidemiological Studies Depression Scale, DASS = Depression Anxiety Stress Scales, GAD-7: Generalized Anxiety Disorder 7, GHQ-12 = General Health Questionnaire 12, K-10 = Kessler Psychological Distress Scale, OQ-45 = Outcome Questionnaire 45, PCL-5 = PTSD Checklist for DSM-5, PHQ-9 = Patient Health Questionnaire-9, PSS = Perceived Stress Scale, STAI = State-Trait Anxiety Inventory, SWLS = Satisfaction with Life Scale, WHOQOL-BREF = World Health Organization Quality of Life Assessment.

Table 2: Multilevel meta-analysis results for mental health outcomes (1-4), country (5-8), and high-quality studies

Outcome	# studies	r (95% CI)	SE	*p*	I^2 within study	I^2 between study	Cochran's *Q*, *p*	Publication Bias (Q, *p*)
1. Anxiety	12	.037 (-.04, .11)	.035	.319	48.00	48.00	134.95, *p*<.001	.55, *p*=.457
2. Depression	19	-.010 (-.07, .05)	.029	.739	0	93.69	123.57, *p*<.001	1.43, *p*=.233
3. Psych. Distress	17	-.013 (-.09, .06)	.037	.726	47.95	47.95	138.31, *p*<.001	2.30, *p*=.130
4. Wellbeing/Quality of Life	8	-.010 (-.11, .09)	.041	.816	41.70	41.70	40.04, *p*<.001	1.08, *p*=.300
5. Australia, NZ	24	-.007 (-.06, .05)	.025	.785	72.67	20.83	190.52, *p*<.001	2.77, *p*=.096
6. USA	9	-.014 (-.13, .11)	.052	.796	1.97	95.93	83.96, *p*<.001	7.00, *p*=.008
7. Germany	6	.045 (-.15, .24)	.076	.577	73.94	0	17.20, *p*=.004	.066, *p*=.797
8. Countries in Asia	8	.007 (-.12, .14)	.055	.908	0	94.63	71.53, p < .001	.054, p = .816
9. High-quality studies	12	-.055 (-.10, -.01)	.019	.017	92.96	0	95.85, *p*<.001	1.45, *p*=.229

Note. Anxiety included the following outcome measures: Beck Anxiety Inventory (BAI), Depression Anxiety Stress Scales (DASS) anxiety subscale, Generalized Anxiety Disorder 7 (GAD-7), Short Health Anxiety (SHAI), State-Trait Anxiety Inventory (STAI); Anxiety estimates were calculated based on the following studies: Ahorsu et al. (2021); Collins (2021); Dowling et al. (2020); Garbóczy et al. (2021); Kivelä et al. (2022); Moore et al. (2013); Nadareishvili et al. (2022); (Sanci et al., 2022); Shek et al. (2022); Tochkov et al. (2010); van Agteren et al. (2019); (Zhou et al., 2022); Depression included to following outcome measures: Beck Depression Inventory (BDI), Beck Scale for Suicidal Ideation (BSSI), Center for Epidemiological Studies Depression Scale (CES-D), DASS depression subscale, Patient Health Questionnaire 9 (PHQ-9), Zung Self-Rating Depression Scale (SDS); estimates for Depression were calculated based on the following studies: Acharya et al. (2018); Collins (2021); Dowling et al. (2020); Huhn et al. (2018); Jiang et al. (2022); Kivelä et al. (2022); Lee and Im (2017); Moore et al. (2013); Nadareishvili et al. (2022); Nguyen et al. (2019); Sanci et al. (2022); Sapranaviciute et al. (2012); Shek et al. (2022); Shim et al. (2014); Tochkov et al. (2010); van Agteren et al. (2019); Vatansever et al. (2021); Zhou et al. (2022); Psychological distress included the following outcome measures: DASS stress subscale, General Health Questionnaire 12 (GHQ-12), Kessler Psychological Distress Scale (K-10), Outcome Questionnaire 45 (OQ-45), Perceived Stress Scale (PSS), Symptom Checklist-90 (SCL-90), PTSD Checklist for DSM-5 (PCL-5); estimates for Psychological distress were calculated based on the following studies: Chu et al. (2015); Clough et al. (2019); Collins (2021); Dingle et al. (2022); Fritz et al. (2008); Garbóczy et al. (2021); Gardner et al. (2014); Herrmann-Werner et al. (2018); Jones et al. (2018); Lippke et al. (2021); Mihrshahi et al. (2022); Moore et al. (2013); Shek et al. (2022); Shrestha (2017); Skromanis et al. (2018); Stokes et al. (2021); Vivekananda et al. (2011); Wellbeing/Quality of Life including the following outcome measures: Mental Health Continuum Short Form (MHC-SF), Short Warwick Edinburgh Mental Wellbeing Scale SWEMWBS), Satisfaction with Life Scale (SWLS), World Health Organization Quality of Life Assessment (WHOQOL-BREF); estimates for Wellbeing/Quality of Life were calculated based on the following studies: Chai et al. (2012); Dingle et al. (2022); Gardner et al. (2014); Hsien-Chuan Hsu et al. (2009); Jones et al. (2019); Lippke et al. (2021); van Agteren et al. (2019); estimates for studies with first authors from Australia or New Zealand were calculated based on the following studies: Chai et al. (2012); Clough et al. (2019); Collins (2021); Dingle et al. (2022); Dowling et al. (2020); Gardner et al. (2014); Hsien-Chuan Hsu et al. (2009); Mihrshahi et al. (2022); Moore et al. (2013); Sanci et al. (2022); Skromanis et al. (2018); van Agteren et al. (2019); estimates for studies with first authors from USA were calculated based on the following studies: Acharya et al. (2018); Lee and Im (2017); Shrestha (2017); Stokes et al. (2021); Tochkov et al. (2010); Zhou et al. (2022); estimates for studies with first authors from Germany were based on the following studies: Herrmann-Werner et al. (2018); Huhn et al. (2018); Lippke et al. (2021); Shim et al. (2014); estimates for high-quality studies were based on the following studies: Chai et al. (2012); Collins (2021); Fritz et al. (2008); Hsien-Chuan Hsu et al. (2009); Sanci et al. (2022); (Stokes et al., 2021); Vatansever et al. (2021); Zhou et al. (2022); CI = confidence interval, SE = standard error, I^2 = heterogeneity statistic

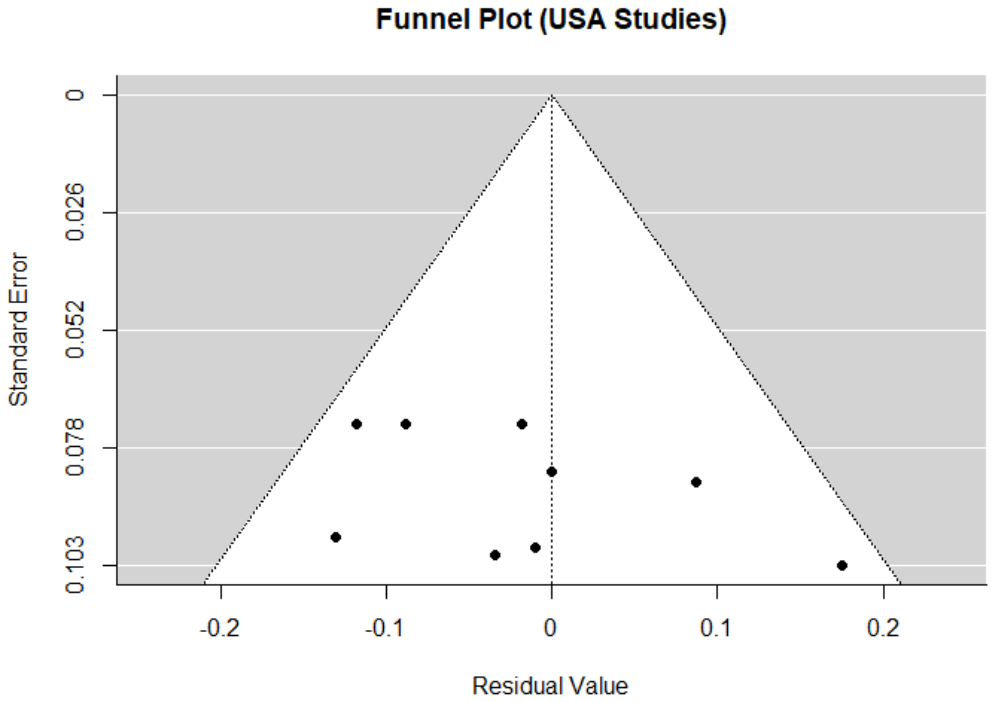

Figure 2. Funnel plot of USA studies

Various types of stressors may exist through one's university journey, such as acculturative stress, academic stress, family expectations and life stress (Buizza et al., 2022), that may contribute to mental health disorders and may be buffered by different factors (e.g., social support, trait resilience), depending on the severity of one's symptoms of illness and life experiences (Hu et al., 2015; Lee et al., 2004). Overall study quality was poor; for example, the quality assessment rating revealed only nine studies (28.1%) that clearly defined international students. The variability in definitions of international students is problematic because participants with diverse cultural backgrounds could be selected, such as Asian students with permanent residencies in Australia or the U.S., preventing us from discovering differences between true international students and domestic students to draw more valid conclusions. Future studies should improve the quality of research in this area by providing a clear definition of international students included in samples and having transparent inclusion and exclusion criteria for participants' selection to the study.

Previous studies suggest that many college students including international students do not seek help for mental health problems and a variety of barriers to help-seeking have been identified in the past, including financial constraints, privacy concerns, self-sufficiency and lack of emotional openness (Forbes-Mewett & Sawyer, 2016; Hunt & Eisenberg, 2010; Komiya et al., 2000). For instance, in an internet survey conducted in Australia, it was found that 54% of Chinese international students reported high psychological distress, but only 9% sought mental health support (Lu et al., 2013). Additionally, the stigma surrounding mental illness in many Asian countries is an enormous challenge, which may deter help-seeking for mental health problems (Forbes-Mewett & Sawyer, 2016). This could be problematic because delaying help-seeking can often lead to the deterioration of students' mental health problems, making their symptoms dysfunctional and uncontrollable (Forbes-Mewett & Sawyer, 2016). For instance, in a recent study conducted in New Zealand examining the psychological distress and help-seeking behavior of Chinese international students, it was found that only 12% of Chinese international tertiary students had used on-campus counseling services, with most of them reporting that they do not need to use student counseling services or that they would only consider using counseling services when they become extremely unwell (Atherton & Cornwall, 2022). The low rates of help-seeking amongst international tertiary students suggest that many are unwilling to reveal potential mental health problems and may indeed not respond truthfully on mental health surveys. In Asian cultures, especially Chinese culture, people are concerned about "losing face". Face represents a person's social position or prestige gained through performing specific social roles that are recognized and accepted by others (Mak & Chen, 2006). Individuals who are concerned about losing face may be willing to put their wellbeing in jeopardy to reduce conflict and maintain their self-image (Mak et al., 2008). Additionally, past studies showed a positive correlation between face-concern and psychological distress (Ma et al., 2021; Mak et al., 2008). This indicates that students who have high levels of distress and need urgent help for

mental health issues may refrain themselves from seeking help: indeed, international students from East Asian countries may avoid seeking help for mental health treatment in order to hide private and undesirable information to avoid losing face (Zhai, 2011).

The results of the current meta-analysis indicate that international students experience lower wellbeing than domestic students. While past studies have focused primarily on ameliorating international students' help-seeking behaviors for problems related to mental illness, there is an important distinction between mental illness and wellbeing, which suggests that intervention strategies aiming to improve individuals' wellbeing and reduce their mental illness need to be different. One future avenue might be that university mental health and counseling services also invest in developing strategies to improve students' wellbeing instead of solely targeting mental health problems such as anxiety and depression. From our review, it appears that this might be especially important for international students as they may be more likely to participate in a wellbeing intervention due to the stigma surrounding mental illness (Chen & Mak, 2008; Maeshima & Parent, 2020).

Findings from this systematic review and meta-analysis indicate that domestic students do not fare better than international students in terms of mental health as some previous studies suggested (Han et al., 2013; Lian & Wallace, 2018). However, we were unable to rule out the possible differences between these groups, particularly given the variability in the definition of "international students", the variability between students (e.g., rich vs. poor, high vs. low socioeconomic status, living at home vs. lacking family support), the different mental health measures utilized in studies, and that the sampling of international students may have happened after they were fully acculturated with the host environment. For instance, variability in students' characteristics can play a significant role in their mental health outcomes: studies in Australia and the UK showed that university students from low socioeconomic backgrounds and those with financial difficulties were more likely to experience anxiety, depression, and stress (Mori, 2000; Said et al., 2012). Family support is another important factor that may buffer the severity of an individual's mental illness, as previous studies suggested that college students with higher levels of family support reported fewer mental health problems compared to those with less adequate family support (Lee et al., 2004; Merianos et al., 2013). This evidence is particularly important because most college students who experience mental health problems turn to important individuals in their lives instead of seeking professional help (Lenz, 2004). This indicates that college students who study out of state may be more vulnerable to mental health disorders than those who attend in-state institutions and live close to home. All in all, college students with different characteristics may have drastically different mental health outcomes, as those with financial stability and adequate family support may be better equipped at handling the pressure of university (e.g., academic stress) and therefore, may be less susceptible to mental health disorders. Therefore, studies in the future should investigate the mental health correlates of domestic and international tertiary students by taking into account the variability in students' economic status, social

and family upbringings to better identify predictors of psychological illness and detect individuals who may be more at risk for mental health disorders.

Limitations

The main limitation of the present study was the small pool of high-quality quantitative studies available for review and analysis. Thus, the non-significant differences in mental health outcomes between domestic and international tertiary students could be due to the poor quality of studies available. Therefore, future studies should be mindful of the lack of clarity in the inclusion and exclusion criteria for participants' recruitment and incorporate a clear definition of "international students" to ameliorate the quality of study in the field of international students' mental health and wellbeing. With regards to longitudinal studies, confounding factors should be clearly identified and strategies to deal with confounding factors need to be reflected in statistical analyses to ensure studies' quality. Additionally, outcome measures used in the examined articles varied, and most of the mental health measures are self-reports (i.e., BDI, K10, PHQ-9). These psychological inventories have been designed for clinical populations and may not be suitable for the broader experiences of college students, therefore limiting the study's external validity. Moreover, self-report questionnaires used in those studies may be subject to response bias. Most studies included mixed international student samples, including students from various ethnicities. However, the reporting method failed to distinguish how different subgroups of international students fare in terms of mental health. For instance, international students from Western European countries may have different mental health outcomes than those from East Asian countries while studying in the U.S. or UK due to their cultures' close proximity with that of the host culture. Future studies would benefit from categorizing international students to more specific subgroups to reveal differences between each subgroup and the domestic student sample.

Another limitation is that studies included in this review consisted predominantly of cross-sectional studies. Developmental course of the mental health correlates of domestic and international students need to be examined using longitudinal studies. Perhaps college students who come from different cultural backgrounds respond to university life and academic experiences differently (Akhtar & Kroener-Herwig, 2017; Wang et al., 2018), resulting in differing mental health outcomes as they progress with their studies. For instance, international students may initially feel overly enthusiastic about their new environment and are eager to explore their surroundings after arriving in a new country; a few months later, however, they may feel overwhelmed and anxious due to academic pressure and language barriers that prevent them from comprehending lecture materials and doing well on exams or in their social life (Mesidor & Sly, 2016; Poyrazli & Kavanaugh, 2006; Smith & Khawaja, 2011). Moreover, their fear of failure in class could be compounded by homesickness and lack of social support (Sawir et al., 2008; Sherry et al., 2009). Therefore, it would be pivotal for future studies to examine the mental health of domestic and international tertiary

students longitudinally to understand whether international students' mental health and wellbeing deteriorate after a certain period of time of arriving in a foreign country.

Conclusion

This review demonstrates the importance of understanding the mental health outcomes of domestic and international tertiary students. By understanding the mental health outcomes of college students worldwide, interventions can be designed to meet those students' needs and better target those who may be more at risk for mental health problems. For instance, higher education institutions worldwide should allocate specific funds to create scholarships (merit-based) and provide financial aid (need-based) opportunities to international students, and not just restrict these funds to domestic students, as adequate financial support is often limited for international students and contributes to their stress (Mori, 2000). Additionally, peer learning groups should be established, in which students who have earned excellent course grades in the past can serve as learning facilitators to help current students who may be struggling with course materials. Moreover, academic departments and residential halls should hold more social networking events for students to connect international students with domestic students, providing additional support for international students and helping them assimilate to the host environment. Furthermore, academic counseling centers and peer counseling groups in universities should assist students in choosing classes that are relevant to their majors and helping them plan courses that are suitable to their needs and career aspirations. Given international students reported lower quality of life and wellbeing compared to domestic students, university programs in the future could target wellbeing and quality of life by aiming to improve this among international students instead of targeting psychological distress. Perhaps quality of life measures are more relevant to measuring international students' wellbeing given the stigma attached to mental health, as self-disclosure of personal problems may be regarded as disgrace and considered a sign of weakness in some international students' cultures (Misra & Castilo, 2004). Past research showed that several wellbeing interventions have been proven effective in ameliorating the mental wellbeing in the general population, which include multi-component positive psychology interventions (PPIs, multi-component) and reminiscence interventions (van Agteren et al., 2021). Therefore, we recommend that in the future, counseling services in higher education institutions hold group activities for international students, allowing them to focus on their strengths, show their gratitude to their friends and loved ones, and reflect on past experiences to help them retrieve specific positive memories (van Agteren et al., 2021).

The current review identified no differences in mental health and wellbeing outcomes between domestic and international students, with results demonstrating high levels of anxiety, depression, psychological distress and low mental wellbeing among all students. Therefore, it is of utmost urgency to address the significant issue of poor mental health and wellbeing among university students by embedding evidence-based resources, intervention programs and

appropriate help-seeking pathways into the current university healthcare system in order to allow student success. Further longitudinal studies are needed to examine the critical period of international students' study abroad process before robust conclusions can be made regarding whether domestic and international students' mental health outcomes are truly different.

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Appendix A. Summary of 35 included studies.

Author/Year	Study Design	*N* Total Sample; *n* domestic; *n* international	Demographics	Length of Stay	Outcome Measures	Domestic Student Outcome	International Student Outcome	r coefficient (95%, CI)
Acharya et al., (2018) (USA)	Cross-sectional	*N* = 631; domestic = 450 (71.3%); international = 181 (28.7%)	M^{age} = 21.10, *SD* = 2.57; 60.9% female; domestic sample = 100% American; international sample = mixed	NR	Depression: CES-D	*M* = 15.83, *SD* = 10.29	*M* = 18.30, *SD* = 11.27	*r* = .11 (.03., .18)
Ahorsu et al., (2021) (Taiwan)	Cross-sectional	*N* = 529; domestic = 313 (59.2%); international = 216 (40.8%)	M^{age} = 25.70, *SD* = 6.00; 59.1% female; 58.4% undergraduate domestic sample = 100% Taiwanese; international sample = mixed	NR	Anxiety: STAI	*M* = 2.08, *SD* = 0.42	*M* = 2.24, *SD* = 0.43	*r* = .18 (.10, .26)
Chai et al., (2012) (New Zealand)	Cross-sectional	*N* = 679; domestic = 515 (75.8%); international = 151 (22.2%)	M^{age} = 22.83, *SD* = 6.88; 72% female; domestic sample = 100% New Zealander; international sample = mixed	M = 1.85 years, *SD* = 3.12	Wellbeing: WHOQOL-BREF	*M* = 64.22, *SD* = 15.60	*M* = 62.39, *SD* = 15.70	*r* = .05 (-.03, .13)
Chu et al., (2015) (China)	Cross-sectional	*N* = 1843; domestic = 1543 (83.7%); international = 300 (16.3%)	M^{age} = 21.00, *SD* = 1.50; 47.9% female; 100% undergraduate; domestic sample = 100% Chinese; international sample = mixed	NR	Stress: PSS-14	*M* = 25.00, *SD* = 5.50	*M* = 26.00, *SD* = 3.50	*r* = .07 (.03, .12)
Clough et al., (2019) (Australia)	Cross-sectional	N = 357; domestic = 148 (41.5%),	M^{age} = 24.036, *SD* = 7.39; domestic M^{age} = 25.5, *SD* = 9.46; international M^{age} =	<3 months = 28.5%, 3-6 months = 19%, 6-12	Stress: K-10	*M* = 20.71, *SD* = 9.03	*M* = 19.33, *SD* = 6.91	*r* = -.09 (-.19, .02)

		international = 209 (58.5%)	23.0, *SD* = 5.47; 70.6% female; domestic sample = 100% Australian; international sample = mixed	months = 16.5%; 1-3 years = 25%; > 3 years = 11%				
Collins (2021) (Australia)	Cross-sectional	N = 413; domestic = 154 (37.3%), international = 259 (62.7%)	Domestic M^{age} = 25.45, *SD* = 9.04; Indian M^{age} = 24.16, *SD* = 3.22; Nepali M^{age} = 23.48, *SD* = 3.80; domestic 64% female; Indian 57% female, Nepali 64 % female; domestic sample = 100% Australian; international sample = Asian	NR	DASS-Depression, DASS-Anxiety, DASS- Stress	DASS-Depression: *M* = 7.73, SD = 5.95; DASS-Anxiety: *M* = 4.39, *SD* = 3.94; DASS-Stress: *M* = 8.14, *SD* = 5.10	DASS-Depression: *M* = 6.01, *SD* = 4.98; DASS-Anxiety: *M* = 4.61, *SD* = 4.24; DASS-Stress: *M* = 6.54, *SD* = 4.96	DASS-Depression: *r* = -.15 (-.25, -.06); DASS-Anxiety: *r* = .026 (-.07, .12); DASS-Stress: *r* = -.15 (-.25, -.06)
Dingle et al., (2022) (Australia)	Cross-sectional	N = 475; domestic = 294; international = 181	M_{age} = 19.9, *SD* = 3.54; 69.3% female; domestic sample = 100% Australian; international sample = mixed		Wellbeing: SWEMWBS, Stress: PsyCheck	SWEMWBS: *M* = 21.44, *SD* = 4.03; PsyCheck: *M* = 8.47, *SD* = 5.44	SWEMWBS: *M* = 21.57, *SD* = 4.06; PsyCheck: *M* = 5.57, *SD* = 4.74	SWEMWBS: *r* = .02 (-.07, .11) PsyCheck: *r* = -.26 (-.35, -.18)
Dowling et al., (2020) (Australia)	Cross-sectional	*N* = 173; domestic = 127 (73.4%); international = 44 (25.4%)	M^{age} = 22.5, *SD* = 5.5; 66.9% female; 91.8 % fulltime; domestic sample = 100% Australian; international sample = mixed ethnicity	20.8 months, SD = 18.1	DASS-Depression, DASS-Anxiety	DASS-Depression: *M* = 8.06, *SD* = 9.63; DASS-Anxiety: *M* = 5.04, *SD* = 5.68	DASS-Depression: M = 9.95, *SD* = 10.79; DASS-Anxiety: M = 9.20, *SD* = 8.85	DASS-Depression: *r* = .08 (-.07, .23); DASS-Anxiety: *r* = .26 (.12, .40)
Fritz et al., (2008) (USA)	Cross-sectional	*N* = 230; domestic = 128 (55.7%); international = 102 (44.3%)	Domestic sample = 100% American; International sample = mixed	NR	SCL-90	*M* = 22.6, *SD* = 8.5	*M* = 21.7, SD = 7.8	r = -.05 (-.18, .07)

Garbóczy et al., (2021) (Hungary)	Cross-sectional	*N* = 1289; domestic = 948 (73.5%); international = 341 (26.5%)	M^{age} = 22.00, *SD* = 5.0; 71.4% female; domestic sample = 100% Hungarian; international sample = mixed ethnicity	NR	Stress: PSS, Anxiety: SHAI	PSS: *M* = 2.15, *SD* = 0.83; SHAI: *M* = 34.65, *SD* = 7.48	PSS: *M* = 2.35, *SD* = 0.83; SHAI: *M* = 35.41, *SD* = 7.87	PSS: *r* = .11 (.05, .16); SHAI: *r* = .04 (-.01, .10)
Gardner et al., (2014) (New Zealand)	Cross-sectional	*N* total = 110; domestic = 45 (40.9%); international = 65 (59.1%)	M^{age} = 25.89, *SD* = 7.72; 28.1% female; domestic sample = 100% New Zealanders; international sample = mixed	*M* = 2.67 years, *SD* = 3.19	Wellbeing: WHOQOL-BREF, Stress: PSS	Psychological wellbeing: *M* = 22.34, *SD* = 4.09; PSS: *M* = 38.84, *SD* = 8.58	Psychological wellbeing: *M* = 23.45, *SD* = 3.50; PSS: *M* = 36.7, *SD* = 6.96	Psychological wellbeing: *r* = .14 (-.04, .32); PSS: *r* = -.14 (-.31, .05)
Hermann-Werner et al., (2018) (Germany)	Longitudinal	*N* = 69; domestic = 33 (47.8%), international = 36 (52.2%)	M^{age} = 21.90, *SD* = 4.02; 59.70% female; domestic sample = 100% German; international sample = mixed	NR	Stress: PSQ-20	*M* = 39.33 , *SD* = 7.95	*M* = 48.14, *SD* = 11.52	*r* = .40 (.18, .59)
Hsu et al., (2009) (New Zealand)	Cross-sectional	*N* = 382; domestic = 218 (57.1%); international = 164 (42.9%)	M^{age} = 23.78, *SD* = 6.48; gender = NR; domestic sample = 100% New Zealander; international sample = mixed	NR	Wellbeing: WHOQOL-BREF	*M* = 63.03, *SD* = 14.51	*M* = 62.58, *SD* = 15.11	*r* = -.015 (-.11, .08)
Huhn et al., (2018) (Germany)	Longitudinal	*N* = 37; domestic = 20 (54.1%); international = 17 (45.9%)	M^{age} = 20.21, *SD* = 3.10; 62% female; domestic sample = 100% German; international sample = mixed ethnicity	NR	Depression: PHQ-9	*M* = 4.65, *SD* = 3.54	*M* = 4.19, *SD* = 3.02	*r* = -.07 (-.37, .24)
Jiang et al., (2022) (South Korea)	Cross-sectional	*N* = 533; domestic = 362; international = 171	M^{age} = 22.74, SD = 3.58; 60.4% female; 81.1% undergraduate;	NR	Depression: PHQ-9	*M* = 5.99, *SD* = 5.46	*M* = 7.19, *SD* = 5.34	*r* = .10 (.02, .19)

			domestic sample = 100% Korean; international sample = 100% Chinese					
Jones et al., (2018) (United Kingdom)	Cross-sectional	*N* = 222; domestic = 88 (39.6%); international = 134 (60.4%)	M^{age} = 30.27, *SD* = NR; 69.8% female; domestic sample = 100% British; international sample = mixed	NR	Wellbeing: SWLS, Stress: GHQ	SWLS: *M* = 22.02, *SD* = 6.83; GHQ: *M* = 26.61, *SD* = 7.80	SWLS: *M* = 24.48, *SD* = 5.75 GHQ: *M* = 21.66, *SD* = 5.78	SWLS: *r* = .19 (.06, .31); GHQ: *r* = -.34 (-.46, -.22)
Kivelä et al., (2022) (Netherlands)	Cross-sectional	N = 349; domestic = 180 (51.6%); international = 169 (48.4%)	M^{age} = 20.30; *SD* = 2.19; 82% female; domestic sample = 100% Dutch; international sample = mixed	NR	Depression: BDI-I, Depression: BSSI; Anxiety: BAI; PTSD: PCL-5	BDI-I: *M* = 9.73, *SD* = 8.26; BSSI: *M* = 1.23, *SD* = 3.54; BAI: *M* = 12.6, *SD* = 9.77; PCL-5: *M* = 15.90, *SD* = 13.9	BDI-I: *M* = 14.10, *SD* = 10.0; BSSI: *M* = 3.11, *SD* = 5.86; BAI: *M* = 17.40, *SD* = 12.7; PCL-5: *M* = 24.60, *SD* = 18.0	BDI-I: *r* = .23 (.13, .33); BSSI: *r* = .19 (.09, .29); BAI: *r* = .21 (.10, .31); PCL-5: *r* = .26 (.16, .36)
Lee & Im (2016) (USA)	Longitudinal	*N* = 187; domestic = 89 (47.6%); international = 98 (52.4%)	M^{age} = 24.43, *SD* = 3.89; 100% female; domestic sample = 100% Korean (Korean domestic students studying in Korea); international sample = 100% Korean (Korean international students studying in the U.S.)	NR	Depression: PHQ-9	*M* = 5.94, *SD* = 3.70	*M* = 6.87, *SD* = 4.61	*r* = .11 (-.03, .25) V = .0054
Lippke et al. (2021) (Germany)	Cross-sectional	*N* = 156; domestic = 51 (32.7%); international = 105 (67.3%)	M^{age} = 20.45, *SD* = 2.06; 54.5% female; domestic sample = 100% German; international sample = mixed	NR	Wellbeing: SWLS, Stress: PSS, Wellbeing: WHOQOL-BREF	SWLS: *M* = 24.22, *SD* = 6.36; PSS: *M* = 18.86, *SD* = 7.16;	SWLS: *M* = 21.71, *SD* = 6.83; PSS: *M* = 20.38, *SD* = 6.74	SWLS: *r* = -.17 (-.32, -.02); PSS: r = .10 (-.05, .25);

Mihrshahi et al., (2022) (Australia)	Cross-sectional	*N* = 105; domestic = 66; international = 39	M^{age} = 24.95, SD = 6.61; 84.6% female; 41.9% undergraduate; 91.4% full-time; domestic sample = 100% Australian; international sample = mixed	NR	Stress: K10	Overall wellbeing: *M* = 2.96, *SD* = 0.86 *M* = 22.08, *SD* = 7.85	Overall wellbeing: *M* = 3.15, *SD* = 0.97 *M* = 27.13, *SD* = 9.71	Overall wellbeing: *r* = .09 (-.06, .25) *r* = .27 (.09, .44)
Moore et al., (2012) (Australia)	Cross-sectional	*N* = 1600; domestic = 836 (52.2%); international = 764 (47.8%)	M^{age} = 23.58; *SD* = 6.37; 59.0% female; domestic sample = 100% Australian; international sample = mixed	<1 year: 49%; 1-4 years = 45.8%; 5-9 years = 5.1%	DASS-Depression, DASS-Anxiety, DASS-Stress	DASS-Depression: *M* = 4.35, *SD* = 4.54; DASS-Anxiety: *M* = 3.43, *SD* = 3.69; DASS-Stress: *M* = 6.43, *SD* = 4.71	DASS-Depression: *M* = 5.10, *SD* = 4.61; DASS-Anxiety: *M* = 4.49, *SD* = 4.28; DASS-Stress: *M* = 6.12, *SD* = 4.60	DASS-Depression: *r* = .082 (.03, .13); DASS-Anxiety: *r* = .13 (.08, .18); DASS-Stress: *r* = -.03 (-.08, .02)
Nadareishvili et al., (2022) (Georgia)	Cross-sectional	*N* = 984; domestic = 760 (77.2%); international = 224 (22.8%)	M^{age} = 20.80, *SD* = 2.40; 70.9% female; domestic sample = 100% Georgian; international sample = mixed	NR	Depression: CES-D, Anxiety: STAI	CES-D: *M* = 21.84, *SD* = 10.98; STAI: *M* = 45.54, *SD* = 7.31	CES-D: *M* = 21.42, *SD* = 10.02; STAI: *M* = 45.92, *SD* = 7.00	CES-D: r = -.016 (-.08, .05); STAI: *r* = .02 (-.04, .08)
Nguyen et al., (2019) (Japan)	Cross-sectional	*N* = 268; domestic = 67 (25%); international = 201 (75%)	$M^{age\ (domestic)}$ = 20.40, *SD* = 1.66; $M^{age\ (international)}$ = 21.03; *SD* = 3.03; 63.4% female; domestic sample = 100% Japanese; international sample = mixed	1 year = 47.3%; 2-3 years = 42.3%; > 3 years = 10.5%	Depression: PHQ-9	*M* = 8.61, *SD* = 5.12	*M* = 8.04, *SD* = 4.90	r = -.05 (-.17, .07)

Sanci et al., (2022) (Australia)	Cross-sectional	*N* = 14,880; domestic = 9,398; international = 5,482	M_{age} = 24.19, *SD* = 6.88; 63.9% female; domestic sample = 100% Australian; international sample = mixed	NR	Depression: PHQ-9, Anxiety: GAD-7	PHQ-9: *M* = 7.68, *SD* = 5.95; GAD-7: *M* = 6.62, *SD* = 5.40	PHQ-9: *M* = 7.30, *SD* = 5.29; GAD-7: *M* = 5.91, *SD* = 4.91	PHQ-9: r = -.03 (-.05, -.01) GAD-7: r = -.06 (-.08, -.05)
Sapranaviciute et al, (2012) (Lithuania)	Cross-sectional	*N* = 356; domestic = 258 (72.5%); international = 98 (27.5%)	$M^{age\ (domestic)}$ = 20.40, *SD* = 1.40; $M^{age\ (international)}$ = 22.40, *SD* = 2.60; domestic: 90.3% female; international: 29.6% female; domestic sample = 100% Lithuanian; international sample = mixed	NR	Depression: Zung SDS	*M* = 37.00, *SD* = 7.90	*M* = 38.20, *SD* = 8.10	*r* = .07 (-.04, .17)
Shek et al., (2022) (Hong Kong)	Cross-sectional	*N* = 1,648; domestic = 1613, international = 35	M^{age}= 20.09, SD = 1.37; domestic sample = 100% Hong Kongese; international sample = mixed	NR	DASS-Depression, DASS-Anxiety, DASS-Stress	DASS-Depression: *M* = 5.95, *SD* = 4.46; DASS-Anxiety: *M* = 5.43, *SD* = 4.18; DASS-Stress: *M* = 6.31, *SD* = 4.48	DASS-Depression: *M* = 3.74, *SD* = 2.21; DASS-Anxiety: *M* = 3.60, *SD* = 2.03; DASS-Stress: *M* = 4.40, *SD* = 2.52	DASS-Depression: *r* = -.07 (-.12, -.02); DASS-Anxiety: *r* = -.06 (-.11, -.02); DASS-Stress: *r* = -.06 (-.11, -.01)
Shim et al., (2014) (Germany)	Cross-sectional	*N* = 161; domestic = 61 (37.9%); international = 100 (62.1%)	M^{age} = 25.6, *SD* = 4.2; 58% female; domestic sample = 100% German; international sample = Asian	NR	Depression: CES-D	*M* = 15.7, *SD* = 9.0	*M* = 15.0, *SD* = 8.4	*r* = -.04 (-.19, .11)
Shrestha (2017) (USA)	Cross-sectional	*N* = 752; domestic = 533 (70.9%); international = 219 (29.1%)	M^{age} = 23.28, *SD* = 4.75; 37.9% female; domestic sample = 100% American; international sample = mixed	*M* = 193.4 months, *SD* = 108.99	Stress: GHQ-12	*M* = 3.32, *SD* = 3.01	*M* = 3.51, *SD* = 3.08	*r* = .03 (-.04, .10)

Skromanis et al., (2018) (Australia)	Cross-sectional	*N* = 1395; domestic = 1013 (72.6%); international = 382 (27.4%)	M^{age} = 26.58, *SD* = 9.72; 59.1% female; domestic sample = 100% Australian; international sample = mixed	NR	Stress: K-10, Wellbeing: SWLS	K-10: *M* = 20.9, *SD* = 8.3; SWLS: *M* = 3.5, *SD* = 0.9	K-10: *M* = 20.6, *SD* = 8.7; SWLS: *M* = 3.2, *SD* = 0.8	K-10: *r* = -.02 (-.07, .04); SWLS: *r* = -.15 (-.20, -.10)
Stokes et al., (2019) (USA)	Cross-sectional	*N* = 18987; domestic = 18767 (98.8%); international = 220 (1.2%)	Asian American M^{age} = 21.9, *SD* = NR; International Asian M^{age} = 25.7, *SD* = NR; Asian American = 61.6% female; international Asian = 62.5% female; domestic sample = 100% Asian American; international sample = 100% Asian	NR	Stress: OQ-45	*M* = 72.0, *SD* = 23.5	*M* = 81.40, *SD* = 25.80	*r* = .04 (.03, .06)
Tochkov et al., (2010) (USA)	Cross-sectional	*N* = 75; domestic = 35 (46.7%); international = 40 (53.3%)	M^{age} = 22, *SD* = NR; 41% female; domestic sample = 100% American; international sample = 100% Indian	NR	Depression: BDI-II, Anxiety: BAI	BDI-II: *M* = 15.91, *SD* = 8.44; BAI: *M* = 15.91, *SD* = 11.87	BDI-II: *M* = 8.03, *SD* = 8.35; BAI: *M* = 9.38, *SD* = 9.24	BDI-II: *r* = -.42 (-.60, -.21); BAI: r = -.30 (-.49, -.07)
van Agteren et al. (2019) (Australia)	Cross-sectional	*N* = 905; domestic = 791 (87.4%); international = 112 (12.4%)	M^{age} = NR; 83.9% female; 66.8% undergraduate; 33% postgraduate; domestic sample = 100% Australian; international sample = mixed ethnicity	NR	Wellbeing: MHC-SF, DASS-Depression, DASS-Anxiety	MHC-SF: *M* = 40.91, *SD* = 13.05; DASS-Depression: *M* = 13.47, *SD* = 10.47; DASS-Anxiety: *M* = 11.82, *SD* = 9.56	MHC-SF: *M* = 41.72, *SD* = 13.71; DASS-Depression: *M* = 11.15, *SD* = 9.29; DASS-Anxiety: *M* = 11.5, *SD* = 8.03	MHC-SF: *r* = .02 (-.04, .09); DASS-Depression: *r* = -.07 (-.14, -.009); DASS-Anxiety: *r* = -.01 (-.08, .05)
Vatansever et al., (2021) (Turkey)	Cross-sectional	*N* = 546; domestic = 270 (49.5%);	$M^{age\ (domestic)}$ = 21.07, *SD* = 1.99; $M^{age\ (international)}$ = 20.89, SD = 2.65;	NR	Depression: BDI	*M* = 15.26, *SD* = 8.71	*M* = 11.61, *SD* = 9.52	*r* = -.20 (-.28, -.11)

		international = 276 (50.5%)	domestic: 62.2% female; international: 57.2% female; domestic sample = 100% Turkish; international sample = mixed					
Vivekananda et al., (2011) (Australia)	Cross-sectional	*N* = 3682; domestic = 2893 (78.6%); international = 789 (21.4%)	M^{age} = NR; 61.4% female; domestic sample = 100% Australian; international sample = NR	NR	Stress: OQ-45	NR	NR	*r* = .05 (.02., .09)
Zhou et al., (2022) (USA)	Cross-sectional	*N* = 228,421; domestic = 206,036 international = 22,385	M^{age} = NR; 65% female	NR	Depression: PHQ-9, Anxiety: GAD-7	PHQ-9: *M* = 7.89, *SD* = 6.17; GAD-7: *M* = 6.79, *SD* = 5.64	PHQ-9: *M* = 7.24, *SD* = 5.62; GAD-7: *M* = 5.63, *SD* = 5.06	PHQ-9: r = -.03 (-.04, -.03) GAD-7: r = -.06 (-.07, -.06)

Note. M^{age} = Mean age; SD = standard deviation; NR = not reported; M = mean; Outcome measures – BAI = Beck Anxiety Inventory, BDI = Beck Depression Inventory, BSSI = Beck Scale for Suicidal Ideation, CES-D = Center for Epidemiological Studies Depression Scale, DASS = Depression Anxiety Stress Scales, GAD-7: Generalized Anxiety Disorder 7, GHQ-12 = General Health Questionnaire 12, K-10 = Kessler Psychological Distress Scale, MHC-SF = Mental Health Continuum Short Form, OQ-45 = Outcome Questionnaire 45, PCL-5 = PTSD Checklist for DSM-5, PHQ-9 = Patient Health Questionnaire-9, PSQ = Perceived Stress Questionnaire, PSS = Perceived Stress Scale, SCL-90 = Symptom Checklist-90, SDS = Zung Self-Rating Depression Scale, SHAI = Short Health Anxiety Inventory, STAI = State-Trait Anxiety Inventory, SWEMWBS = Short Warwick Edinburgh Mental Wellbeing Scale, SWLS = Satisfaction with Life Scale, WHOQOL-BREF = The World Health Organization Quality of Life Assessment. *p* = significance at .05.

Appendix B: Quality Assessment of studies using the JBI Critical Appraisal Checklist for Analytic Cross Sectional Studies

Checklist item #	1	2	4	7	8	
Included studies	**Clearly defined inclusion and exclusion criteria**	**Detailed description of study subjects and setting**	**Objective, standard criteria for measurement of condition**	**Valid, and reliable measurement of outcomes**	**Appropriate statistical analysis**	**Overall Appraisal**
Acharya et al., (2018)	Unclear	Yes	Unclear	Yes	Yes	60
Ahorsu et al., (2021)	Yes	Yes	Unclear	Yes	Yes	80
Chai et al., (2012)	Yes	Yes	Yes	Yes	Yes	100
Chu et al., (2015)	Yes	Yes	Unclear	Yes	Yes	80
Clough et al., (2019)	Unclear	Yes	Unclear	Yes	Yes	60
Collins (2021)	Yes	Yes	Yes	Yes	Yes	100
Dingle et al., (2022)	Yes	Yes	Unclear	Yes	Yes	80
Dowling et al., (2020)	Unclear	Yes	Unclear	Yes	Yes	60
Fritz et al., (2008)	Yes	Yes	Yes	Yes	Yes	100
Garbóczy et al., (2021)	Yes	Yes	Unclear	Yes	Yes	80
Gardner et al., (2014)	Yes	Yes	Unclear	Yes	Yes	80
Hsu et al., (2009)	Yes	Yes	Yes	Yes	Yes	100
Jiang et al., (2022)	Yes	Yes	Unclear	Yes	Yes	80
Jones et al., (2019)	Yes	Yes	Unclear	Yes	Yes	80
Kivelä et al., (2022)	Yes	Yes	Unclear	Yes	Yes	80
Lippke et al., (2021)	Unclear	Yes	Unclear	Yes	Yes	60
Mihrshahi et al., (2022)	Yes	Yes	Unclear	Yes	Yes	80
Moore et al., (2013)	Unclear	Yes	Unclear	Yes	Yes	60
Nadareishvili et al., (2022)	No	Yes	Unclear	Yes	Yes	60
Nguyen et al., (2019)	Unclear	Yes	Unclear	Yes	Yes	60

Sanci et al., (2022)	Yes	Yes	Yes	Yes	Yes	100
Sapranaviciute et al, (2012)	Unclear	Yes	Unclear	Yes	Yes	60
Shek et al., (2022)	Yes	Yes	Unclear	Yes	Yes	80
Shim et al., (2014)	Unclear	Yes	Yes	Yes	Yes	80
Shrestha (2017)	Yes	Yes	Unclear	Yes	Yes	80
Skromanis et al., (2018)	Yes	Yes	Unclear	Yes	Yes	80
Stokes et al., (2021)	Yes	Yes	Yes	Yes	Yes	100
Tochkov et al., (2010)	Unclear	Yes	Unclear	Yes	Yes	60
van Agteren et al., (2019)	Yes	Yes	Unclear	Yes	Yes	80
Vatansever et al., (2021)	Yes	Yes	Yes	Yes	Yes	100
Vivekananda et al., (2011)	Unclear	Yes	Unclear	Yes	Yes	60
Zhou et al., (2022)	Yes	Yes	Yes	Yes	Yes	100

Appendix C: Quality Assessment of studies using the JBI Critical Appraisal Checklist for Cohort Studies

Checklist item #	1	2	3	4	5	6	7	8	9	10	11	Overall Appraisal
Included Studies	**Similar groups from the same population**	**Similarly measured exposures for assignment of participants**	**Valid and reliable measurement of exposure**	**Identification of confounding factors**	**Strategies to deal with confounding factors**	**Free of outcomes of interest for participants**	**Valid and reliable measurement of outcomes**	**Sufficient follow up time for occurrence of outcomes**	**Completion of follow ups**	**strategies to address incomplete follow up**	**Appropriate statistical analysis**	
Hermann-Werner et al., (2018)	Yes	Yes	Yes	Yes	No	No	Yes	Unclear	Yes	No	Yes	64
Huhn et al., (2018)	Yes	Yes	Yes	No	No	No	Yes	Unclear	Yes	No	Yes	55
Lee & Im, (2016)	Yes	Yes	Yes	Yes	No	Unclear	Yes	Yes	Yes	Yes	Yes	82