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To cite this article: Timothy Leow, Wendy Wen Li, Dan J. Miller & Brett McDermott (2025) Prevalence of university non-continuation and mental health conditions, and effect of mental health conditions on non-continuation: a systematic review and meta-analysis, *Journal of Mental Health*, 34:2, 222-237, DOI: [10.1080/09638237.2024.2332812](https://doi.org/10.1080/09638237.2024.2332812)

To link to this article: <https://doi.org/10.1080/09638237.2024.2332812>



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Published online: 08 Apr 2024.



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## Prevalence of university non-continuation and mental health conditions, and effect of mental health conditions on non-continuation: a systematic review and meta-analysis

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### ABSTRACT

**Background:** University non-continuation, also termed as university dropout in literature, is a concern for institutions. Elevated stress levels, mental distress, and psychiatric issues affect academic performance and thus may contribute to non-continuation. There is a lack of systematic reviews exploring the link between mental health and university non-continuation.

**Aim:** This systematic review aims to bridge this gap, by investigating the prevalence of non-continuation and mental health conditions among university students, and the impact of mental health on university non-continuation.

**Methods:** Following PRISMA guidelines this review synthesized data from 67 studies, utilising both narrative synthesis and meta-analytic techniques.

**Results:** The results revealed that the included studies reported a range of university non-continuation rates (5.9% to 43.6%) with a pooled prevalence of 17.9%, 95% CI [14.2%, 22.3%]. The prevalence of mental health concerns among students varied widely (2.2% to 83.6%), with a pooled prevalence of 26.3%, 95% CI [16.0%, 40.0%]. Depression, OR = 1.143 (95% CI [1.086, 1.203] p<.001), stress, OR = 1.413 (95% CI [1.106, 1.805], p=.006), and other mental health conditions, OR = 1.266 (95% CI [1.133, 1.414], p<.001), were associated with higher non-continuation.

**Conclusion:** Some mental health conditions elevate non-continuation risks, and addressing mental health may enhance student retention in higher education.

### ARTICLE HISTORY

Received 11 October 2023

Revised 12 February 2024

Accepted 15 February 2024

### KEYWORDS

Tertiary education;  
university dropout;  
depression; anxiety; stress;  
mental health

## Introduction

University education is an important milestone for personal and professional growth, providing individuals with the opportunity to acquire specialized knowledge, develop important skills, meet new people, and achieve personal goals (Auerbach et al., 2016). Completion of university and attainment of a degree are part of the process of a university education. However, some students do not complete their university degree. *University non-continuation*, which is also termed as university dropout in literature, is defined as when a student commences study in higher education but leaves the university without achieving a degree (Norton et al., 2018). Researchers have pointed out that non-continuation is one of the greatest problems faced by universities (McCubbin, 2003a; Rotar, 2022; Tinto, 1975). In Australia, about 16% of students withdraw from university each year (Norton et al., 2018). In the UK, the non-continuation rate is approximately 14%. However, the non-continuation rate differs markedly between institutions

in the UK, ranging from 2.5% to 52% (Tamin, 2013). In the US, college non-continuation rates are estimated at 36% (NCES, 2022). University non-continuation can lead to economic consequences for both students and universities. Students may experience downward mobility in the labour market, while universities are likely to suffer from a loss of income (Hällsten, 2017).

It should be emphasized that university non-continuation is not inherently negative. For example, students may realize after a period of study that university is not for them or that they would like to pursue other avenues. For these students, withdrawing from university may be an entirely appropriate decision that they are happy to make. However, some students who withdraw from university do so reluctantly, e.g., to work in response to the cost of living crisis, due to illness, as a result of mental health conditions.

Tinto (1973) developed an influential theoretical dropout model to conceptualise the factors which contribute to non-continuation (Nicoletti, 2019). This model is built upon an interactionist perspective. Factors thought to influence

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/09638237.2024.2332812>.

**PRISMA/OSF:** Researchers have followed PRISMA guidance, and the review protocol was registered in PROSPERO (Reg: CRD42022330040) on the 3<sup>rd</sup> of May 2022.

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non-continuation as part of the model include personal factors, academic and social systems and integrations, and commitment to both one's university and to degree completion. Personal factors refer to individual attributes, pre-university experiences, and family background. Individuals who are more impulsive, unstable, and anxious or lack deep emotional commitment to education or flexibility when dealing with change are thought to be more likely to discontinue their university degrees. Pre-university experiences, such as past academic performance, appear to be negative predictors of non-continuation in higher education. Students from lower socioeconomic status (SES) backgrounds display greater rates of non-continuation than those from higher SES backgrounds (Boyraz et al., 2016; Witkow et al., 2015). In Tinto's model, academic and social systems and integrations are complex constructs encompassing students' grade performance; intellectual development; appraisals of their academic environment; interaction with, and support from, peer groups; interactions with administrators; and participation in extracurricular activities. The lower a student's integration into the social and academic systems of their institution, the lower their commitment to the university and the goal of degree completion (Tinto, 1973). Lower student commitment is associated with a higher probability of withdrawal from university (Tinto, 1975).

At the core of Tinto's model is the student's integration into the social and academic aspects of their university, and their commitment to their academic goals (e.g., the completion of their degree) and university (French, 2017; McCubbin, 2003b; Tinto, 1975). During the process of interaction and engagement in higher education, the student constantly adjusts his/her goals and institutional commitments based on his/her experiences in these systems, which leads to either completion or university non-continuation/withdrawal (Tinto, 1975). University withdrawal can be regarded as resulting from an unsuccessful interactional process between the individual student and the academic and social systems of the institution (Tinto, 1975). However, this is not to say that the responsibility for an unsuccessful interactional process rests solely with students (Norton, 2018). The responsibility of universities should not be ignored. Institutional structures, policies, and teaching and learning practices may contribute to unsuccessful interactional processes (Barefoot, 2004), contributing to student withdrawal from university. Rapid technological developments and the necessity for new working methods in response to the COVID-19 pandemic pose great challenges to universities (Brewster & Cox, 2023; Coelho & Menezes, 2021). To reduce non-continuation rates, universities must reconsider their teaching policies and practices, and how they engage with students.

Tinto's model also addresses the personal and psychological factors that contribute to non-continuation (Nicoletti, 2019; Samoila & Vrabie, 2023). For Tinto, psychological factors are the attributes/dispositions that the student brings with them to university. Tinto believes that these are predictive of the way that students interact with universities' academic and social systems, and that consistently negative interactions between students and universities will increase the likelihood of non-continuation. However, what is missed

in Tinto's model is the impact of student's mental health on their interactions with these academic and social systems.

The initial transition to studying at university can be particularly stressful (Samoila & Vrabie, 2023). First year students are commencing a new stage of life in an unfamiliar environment, while also adjusting to demanding academic programs, independently managing their finances, and engaging with a different and diverse social community. Simultaneously to this, they are also potentially moving away from their regular support structures (Hernández-Torran et al., 2020). Accordingly, for many students, the first year of university study is associated with increased loneliness, stress, depression, anxiety, and substance use, all of which are predictors for early non-continuation (Andersson et al., 2009; Arria et al., 2013; Dyson & Renk, 2006). *Prevalence* refers to the proportion of a population who have a disorder in a certain time period (National Institute of Mental Health, 2023). A WHO study found that the prevalence of mental disorders among university students is around 20.3% (Auerbach et al., 2016). A systematic review of 66 studies by Sheldon et al. (2021) found the prevalence of depression among university undergraduates is approximately 25% (Sheldon et al., 2021) compared to 12.5% in the general population (WHO, 2022). Mental distress has been identified as one of the most common drivers of university non-completion (Hjorth et al., 2016).

Mental health disorders (including substance use disorder) are understudied potential causes of university non-continuation. For example, the presence of mental health conditions may be associated with academic problems among college students, and such problems could make it more arduous for students to remain enrolled and complete their degrees on time (Arria et al., 2013). Further, stress related to academic struggles might exacerbate underlying mental health conditions such as depression or contribute to an escalation of substance use (Arria et al., 2013). Alternatively, psychiatric symptoms could negatively affect decisions to participate in both academic pursuits and extracurricular activities, thereby reducing a student's sense of connectedness to their university environment (Cruwys et al., 2021)—an important protective factor against non-continuation as outlined by Tinto. A student suffering from the onset of a new mental health condition during university might struggle to initially recognize the issue or want to talk about it, leading to social and academic disengagement (Auerbach et al., 2016; Hunt et al., 2010). Moreover, heavy drinking, problem gambling, and illicit drug use have also been linked to academic performance problems (Arria et al., 2013; Li et al., 2014; Li & Tse, 2015; Martinez et al., 2008). This could be attributable to addiction-related cognitive impairments that hinder the ability to retain information, as well as the tendency for academic pursuits to become less important relative to drug-seeking and drug-using as the severity of an addictive disorder increases (Arria et al., 2013).

There have not been systematic reviews and meta-analyses investigating the association between university non-continuation and mental health. A search by the authors in nine databases (MEDLINE (Ovid), EMCARE (Ovid), CINAHL, EMBASE (CKN), PsycInfo (ProQuest), ERIC (ProQuest), ERIC (EBSCO), PubMed, and SCOPUS) found that there have been systematic reviews on mental health

among university students (Sheldon et al., 2021), and literature reviews regarding non-continuation, but none relating students' mental health to university non-continuation (Behr et al., 2020; Guzmán et al., 2021; Liu et al., 2023).

This systematic review aims to address the research gap by exploring the relationship between various mental health disorders and university non-continuation. The current investigation is significant at several levels. First, it will add additional value to Tinto's model (which omits the effect of mental health on university non-continuation). Second, evidence about the relationship between student mental health and non-continuation may help universities develop policies and practices to better address student mental health. Third, this study looks at mental health conditions at the condition level, rather than just amalgamating everything under "mental distress" and thus can shed light on the impacts of different specific conditions.

To reach the aim of the current review, three research questions (RQs) are advanced:

1. What is the prevalence of university non-continuation?
2. What is the prevalence of mental health conditions among university students?
3. What is the impact of mental health on university non-continuation?

## Methods

This systematic review complies with the process established and recommended by the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Statement. This systematic review was registered in PROSPERO (Reg: CRD42022330040).

### Systematic search

The literature search was conducted between 28 September and 5 October 2021 by the first author and repeated by the second author to confirm the accuracy of the search. Nine

**Table 1.** PICO Search Strategy.

PICO	Search Strategy
Participation (University students)	MeSH term search: Universities, Education, Undergraduate, Graduate Keyword search: Universit* or Tertiary* or higher education or Medical education or University education or Undergraduate education or Graduate education or College student* or University student*
Intervention/Exposure (Mental Health)	MeSH term search: Mental health, Mental Disorders, Quality of Life Keyword search: mental illness or mental disorder* or mental ill health or mental health or suicid* or gambling or substance abuse or alcohol* or drug* or psychos? or depress* or anxi* or nervous or social anxi* or emotional regulat* or psychological distress or emotional distress
Comparison Outcome (Dropout)	N/A MeSH term search: Student dropouts, Return to school Keyword search: student dropout* or student drop-out* or student drop out* or student attrition* or student successful rate* or student return to school or student completion rate*

electronic databases were searched: MEDLINE (Ovid), EMCARE (Ovid), CINAHL, EMBASE (CKN), PsycInfo (ProQuest), ERIC (ProQuest), ERIC (EBSCO), PubMed, and SCOPUS. The search provided 2,394 records. The search was repeated between 13 and 15<sup>th</sup> of March 2023 to include articles published between October 2021 and March 2023, providing an additional 891 records. Table 1 outlines the search strategy organised according to the Cochrane PICO (Participant, Interventions or exposure, Comparisons, Outcomes) search criteria (Higgins et al., 2021).

### Inclusion and exclusion criteria

The inclusion criteria for this review were quantitative and qualitative studies published in peer-reviewed journals that examined the mental health of students (including undergraduate and postgraduate students) and university non-continuation with empirical data. Studies were only included if they explored both mental health and non-continuation. Excluded were reviews, editorials, book chapters, thesis submissions, letters to the editor, and non-English publications.

### Study selection

Title and abstract screening was the first step of study selection, it was conducted against predetermined inclusion and exclusion criteria. The titles and abstracts of the retrieved articles were independently evaluated by two authors (TL and WL) using the codes of 'yes', 'no', or 'maybe' to ascertain adherence to the inclusion and exclusion criteria. The studies unanimously coded as 'yes' qualified for the second step of the study selection (Fisher et al., 2023; Li et al., 2021). Articles that were disputed were discussed to achieve consensus about inclusion in the second step: the methodological appraisal of the full-text articles employing the Mixed Methods Appraisal Tool (MMAT) Version 2018 (Hong et al., 2019).

The four authors independently conducted the MMAT assessment. Fleiss' kappa ( $k$ ) test was calculated to evaluate inter-rater agreement (Astridge et al., 2023). 'Poor', 'fair', 'moderate', 'substantial', and 'perfect' agreement was determined by the cut-off values of  $k=0.20, 0.40, 0.60, 0.80$ , and 1, respectively (Fleiss, 1971). A post-rating meeting was organised to discuss 20 studies with  $k$  lower than 0.40 to reach agreement regarding inclusion or exclusion (Astridge et al., 2023; Fisher et al., 2023).

### Data extraction

Data was extracted from the included papers and collated to a standardised data extraction form (including the following: authors, publication year, country of the study, sample size, data analysis method, measures, age of participants, gender of participants, prevalence of mental health outcomes, prevalence of non-continuation, and association between mental health and non-continuation). Authors (TL and WL) independently evaluated the extracted data from the included

studies to identify if the findings were supported using the codes of ‘unequivocal’, ‘credible’, or ‘unsupported’ (Astridge et al., 2023; Fisher et al., 2023; Li et al., 2021; Scholz et al., 2019). All included articles were rated unequivocal or credible by two raters.

### Data synthesis

Both narrative synthesis and meta-analysis were involved in the data synthesis. The two-step strategy for the narrative synthesis which was employed followed the guidelines developed by Ryan (2013). The first step was to conduct an initial synthesis of findings, guided by the RQs, grouping studies by the themes 1) prevalence of mental conditions, 2) prevalence of university non-continuation, and 3) relationship between mental health and non-continuation. The second step was to explore relationships in the data (within and between studies) and synthesise the characteristics of the studies that contributed to each theme.

The program, Comprehensive Meta-Analysis (CMA) V4, was utilised for the meta-analysis. The Random Effects Model was used to calculate the pooled prevalence of mental health conditions (RQ1) and non-continuation (RQ2), and the effect sizes for mental health on non-continuation (RQ3), across studies. In several included studies there were multiple effect sizes for mental health on non-continuation (e.g., effect sizes for first-, second- and third-year students; effect sizes for mild, moderate, and severe cannabis use). To obtain one effect size synthesised from multiple effect sizes within a single study, a two-step meta-analysis was employed (Astridge et al., 2023; Fisher et al., 2023). These synthesised effect sizes of multiple effect sizes were calculated using the Fixed Effect Model. The results of this step are accessible in Table S2 in the Online Only Supplemental Materials. Next, using the Random Effects Model, the synthesised effect sizes generated in the first step were inputted into the primary meta-analysis to estimate the effect sizes for mental health on non-continuation across studies (Borenstein et al., 2010).

In the analysis of RQ3, the pooled effect size was reported using odds ratio. Various effect size metrics were included in the analysis, including odds ratios (OR), log odds ratios (log OR), Chi-squared coefficients ( $\chi^2$ ), and Pearson correlation coefficients (r). In studies where beta coefficients ( $\beta$ ) were utilised to report effect size, an initial conversion to r was completed using the formula  $r = \beta + 0.05\lambda$ , where  $\lambda$  equals 1 when  $\beta$  is non-negative and 0 when  $\beta$  is negative (Peterson & Brown, 2005). In studies which reported ORs for the event of retention rather than non-continuation, the ORs were inverted using the equation: OR of non-continuation = 1/OR of retention (Montreuil et al., 2005).

$I^2$  was used to evaluate heterogeneity with  $I^2$  values of 25%, 50%, and 75% or over indicating low, moderate, and substantial heterogeneity, respectively (Borenstein, 2019). To assess publication bias, the Egger’s test with  $p < .05$  was employed. Publication bias occurs when studies are not published because their results are statistically insignificant

(Borenstein, 2019). Statistical significance tests are not considered in prevalence studies. Publication bias hence was not assessed in the analysis of RQ1 and RQ2, where pooled prevalence was computed.

### Assessing the risk of bias in included studies

The Risk of Bias in Non-Randomized Studies of Exposure (ROBINS-E) tool was used to assess the risk of bias in each included study. ROBINS-E provides a structured approach to examining the risk of bias in observational epidemiological studies and contributes to a thorough assessment of the risk of bias (ROBINS-E Development Group, 2023). TL and WL independently conducted the assessment, the results of which indicated that the risk of bias in each included study was low. Moreover, to minimise the risk of bias in the current review, robust processes using different forms of inter-rater agreement indexes were employed in the evaluations of title and abstract screening, full-text methodological appraisal, and data extraction in the current study. Publication bias was also tested to assess if the included studies were published based on statistically significant results (Rothstein et al., 2005).

## Results

### Summary of the included studies

Figure 1 presents the PRISMA flow diagram showing the included and excluded articles through the different phases of the systematic review (Page et al., 2021). Of the included 67 studies (in which the term dropout was used), 29 were conducted in the USA, 8 in the UK, and 5 studies were conducted in Australia. Two studies each were conducted in Canada, Denmark, Germany, Japan, and New Zealand. The remaining were single studies completed in Bangladesh, Chile, Egypt, Norway, Peru, Saudi Arabia, Sweden, and Thailand. There was a wide range of sample sizes between the individual included studies ( $n=7 - 652,139$ ), with 1,433,383 total participants. A summary of the included studies is found in Table 2.

### The test of RQ1: Prevalence of university non-continuation

Of the 67 included studies, 31 reported on the prevalence of university non-continuation (Aldahmashi et al., 2021; Arria et al., 2013; Boyraz et al., 2016; Cipher & Urban, 2022; Crawford et al., 2022; Cruwys et al., 2021; Cvetkovski et al., 2018; Dancot et al., 2021; DeBerard et al., 2004; Del Savio et al., 2022; Faas et al., 2018; Fergusson et al., 2003; Hunt et al., 2010; Kennett & Reed, 2009; Kilstrom et al., 2022; Liguori & Lonbaken, 2015; Lockard et al., 2019; Martinez et al., 2008; McAnulla et al., 2020; McMichael & Hetzel, 1975; Mortier et al., 2018; Okasha et al., 1985; Richardson, 2010, 2014; Ruban et al., 2013; Sujan et al., 2023; Tamin, 2013; Thomas et al., 2021; Vest et al., 2020; Wainipitapong

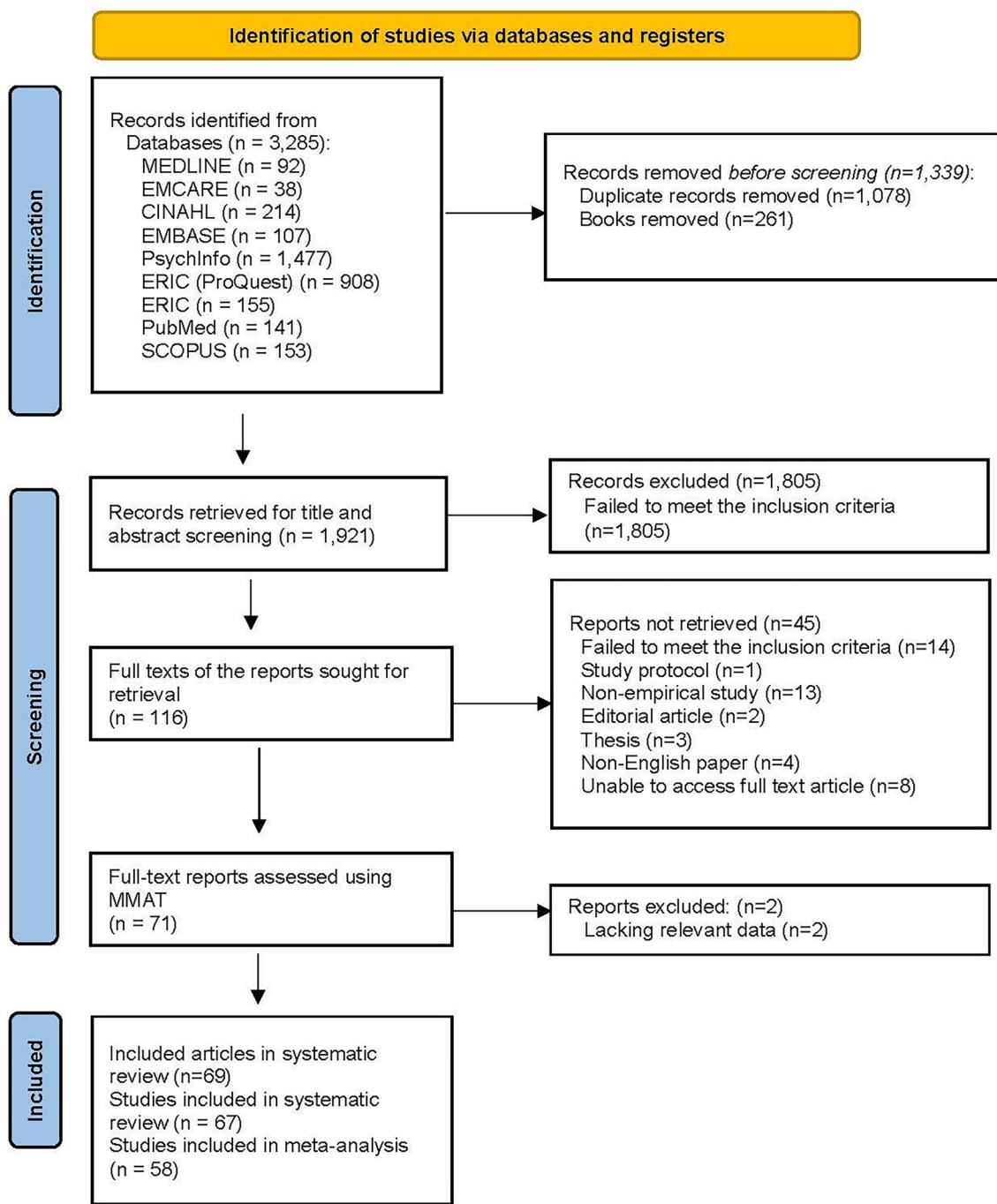


Figure 1. PRISMA Flow Diagram (Page et al., 2021).

& Chiddaycha, 2022; Zajac et al., 2023). Studies where participation was limited only to students who had already withdrawn from university were excluded from the analysis.

The overall prevalence of university non-continuation ranged from 5.9% to 43.6%. The pooled prevalence of non-continuation was 17.9%, 95%CI [14.2%, 22.3%]. The forest plot of the meta-analysis is shown in S3 in the Online Only Supplemental Materials. The heterogeneity test was significant,  $I^2 = 99.96$ ,  $p < .001$ , indicating considerable heterogeneity.

Moderator analysis using meta-regression was employed to further explore the factors that contributed to this

heterogeneity. The moderators entered into the model included country, non-continuation data source (e.g., data from university records vs self-report vs census data), sample size, scale type, undergraduate status, program of study, the highest level of education, student year of study, and publishing year. The moderators country ( $Q = 153.54$ ,  $df = 11$ ,  $p < .001$ ), non-continuation data source ( $Q = 84.93$ ,  $df = 2$ ,  $p < .001$ ), scale type ( $Q = 13.02$ ,  $df = 3$ ,  $p = .005$ ), undergraduate status ( $Q = 75.93$ ,  $df = 2$ ,  $p < .001$ ), program of study ( $Q = 19.3$ ,  $df = 6$ ,  $p = .004$ ), and the highest level of education ( $Q = 13.34$ ,  $df = 3$ ,  $p < .005$ ) were all found to be predictive of high levels of heterogeneity. In contrast, publication year

**Table 2.** Summary of the included articles.

Author and year	Country	MH Source	Dropout Record	Sample size	Age (M (SD))	Gender (%)	University level	Prevalence of MH (%)	Prevalence of Dropout (%)	
									Undergraduate:	Postgraduate:
Aldahmashi et al., 2021	Saudi Arabia	Self-report	University Record	723	18.7 (1.29)	Female: 49.1% Male: 48.5%	Undergraduate: 79.3% Postgraduate: 21.7%	33.1%	19.8%	Mental health diagnosis significantly associated with dropout
Alexander & Haldane, 1980	UK	Self-report	University Record	62	Range: 17-19	Female: 41.9% Male: 58.1%	Undergraduates	66.0%	—	39% of students who dropped out reported having 'a great deal' of mental distress and psychiatric conditions were a contributing factor to dropout
Alschuler & Yarab, 2018	USA	Self-report	University Record Self-report	7 >30	39 (SD unavailable)	Female: 28.6% Male: 71.4%	Undergraduate: Male: 63.6% Female: 18.2% Nonbinary: 18.2%	—	—	Mental health diagnosis, experience more perceived stress, resulting in drop out
Anderson et al. 2020	Australia	Self-report	University Record	11	—	Undergraduate: 46% Postgraduate: 54%	Undergraduates	—	—	Poor mental health associated with dropout
Andersson et al. 2009	Sweden	Self-report/Validated scale	University Record	2032	Range: 22-23	Female: 53.9% Male: 46.1%	Undergraduates	76.0%	29.7%	High levels of stress were associated with dropout with significance. Mental illness and alcohol use disorder was not significantly related
Aria et al. 2013	USA	Validated Scale	University Record Self-report	1145	Range: 17-20	Female: 53% Male: 47%	Undergraduates	76.0%	29.7%	Depression, increased frequency of cannabis use was associated with dropout
Auerbach et al. 2016	USA	Clinical interview	—	2274	Range: 18-22	—	Undergraduates	25.3%	—	Generalised anxiety disorder, PTSD and alcohol dependence were related to dropout, also likely to affect grades and subsequently lead to dropout
Bakker et al. 2021	USA	Validated Scale	Self-report	363	24.0 (6.2)	Female: 91.2% Male: 9.8%	—	—	—	Dropouts less likely to participate in study with significance, distress linked with intention to dropout
Boyraz & Granda, 2019	USA	Validated Scale	University Record	894	18.19 (0.45)	Female: 44.4% Male: 55.6%	Undergraduates	11.5%	—	Dropout associated with higher posttraumatic stress and depressive symptoms
Boyraz et al. 2013	USA	Validated Scale	University Record	423	18.42 (1.48)	Female: 65% Male: 35%	Undergraduates	20.6%	—	29.7% of the dropouts were diagnosed with PTSD
Boyraz et al. 2016	USA	Validated Scale	University Record Self-report	569	18.39 (1.31)	Female: 65% Male: 35%	Undergraduates	—	32.7%	Higher levels of depressive symptoms were predictive of dropout, however high GPA was protective
Cipher & Urban 2022	USA	Self-report	—	170	43.5 (11.4)	Female: 87.1% Male: 12.9%	—	—	30.6%	Dropout was associated with experience of stress
Cohen & Greenberg, 2011	USA	Self-report	Self-report	465	—	Female: 78.6% Male: 21.4%	Master's	—	—	Mental health diagnosis significantly associated with dropout, emotional supports were protective
Crawford et al. 2022	UK	Self-report	University Record	1152	24.1 (6.8)	Female: 91.1% Male: 8.9%	—	12.5%	12%	Mental health issues contribute to lowers grades and risk dropout unless academic supports are in place.
Cruwys et al. 2021	Australia	Validated Scale	University Record Self-report	237	18.73 (SD unavailable)	Female: 53.2% Male: 46.8%	Master's	—	11.4%	Better mental health protective against dropout, though not significant
Cvetkovski et al. 2018	Australia	Validated Scale	Self-report	1265	23.33 (9.25)	Female: 59.0% Male: 41.0%	Undergraduates	69.2%	32.9%	No significant relationship between mental health and dropout
Dancot et al. 2021	Belgium	Validated Scale	University Record Self-report	464	Range: 18-21	Female: 82.5% Male: 17.5%	Undergraduates	11.5%	21.5%	High levels of state anxiety associated with lower self-esteem, which is associated with dropout
Davis et al. 1971	USA	Clinical interview	—	220	Range: 21-23	Female: 40.45% Male: 59.55%	—	19.5%	—	MH associated with dropout, with only 23% of students with MH diagnosis persisting to completion
DeBerard et al. 2004	USA	Self-report/Validated scale	University Record	204	18.9 (0.95)	Female: 72.1% Male: 27.9%	Undergraduates	18.0%	15.2%	Poor mental health associated with dropout without significance. Increased binge drinking pattern associated with lower GPA, which is associated with dropout with significance
Del Savio et al. 2022	Peru	Self-report	University Record	641	Range: 17-24	Female: 20.75% Male: 79.25	—	—	1.6%	Symptoms of depression and anxiety contribute to dropout with significance

(Continued)

Table 2. Continued.

Author and year	Country	MH Source	Dropout Record	Sample size	Age (M (SD))	Gender (%)	University level	Prevalence of MH (%)	Prevalence of Dropout (%)	Relationship between MH and Dropout
Faas et al. 2018	USA	Self-report/Validated scale	University Record Self-report	3507	27.72 (0.14)	Female: 45.8% Male: 54.2%	Undergraduates	11.3%	43.6%	Poor mental health, particularly Depression and Stress more associated with dropout with significance.
Fergusson et al. 2003	NZ	Self-report	University Record Self-report	306	Range: 18–20	Female: 78.6% Male: 21.4%	—	56.2%	24.5%	Increased cannabis use associated with dropout
Fuse-Nagase et al. 2016	Japan	Self-report	University Record Self-report	305087	—	—	—	—	—	Schizophrenia less associated with dropout in 2013–2014 than in 1986–1987
Gaultney 2016	USA	Self-report/Validated scale	Self-report	900	18.58 (1.85)	Female: 66% Male: 34%	Undergraduates	—	—	Symptoms of depression and sleep disorder associated with a lower GPA, which was significantly associated with dropout
Hartl et al. 2022	Germany	Validated scale	Self-report	903	22.20 (3.29)	Female: 71.5% Male: 28.5%	—	—	—	Emotional problems and wellbeing may be related to performance problems which contribute to dropout.
Heinrichs et al. 2021	Germany	Self-report	Self-report	14	Range: 22–28	Female: 50% Male: 50%	—	—	—	Mental illness and emotional distress associated with doubts about continuing study, but unclear if direct cause of dropout
Hjorth et al. 2016	Denmark	Validated Scale	University Record Census	368	Range: 16–29	Female: 51.4% Male: 48.6%	Undergraduates	27.2%	—	Poor mental health is associated with increased frequency of dropout
Homel et al. 2014	Canada	Self-report	Self-report/Validated scale	319	Range: 15–25	Female: 49% Male: 51%	Undergraduates	18.2%	—	Cannabis use disorder associated with dropout
Hunt et al. 2010	USA	Self-report/Validated scale	Census	15800	46 (15)	Female: 56.2% Male: 43.8%	—	50.0%	42.8%	Mania (bipolar I), Antisocial personality traits, alcohol use disorder and other substance use disorders associated with dropout with significance
Ishii et al. 2018	Japan	Clinical interview	University Record	370	18.35 (5D unavailable)	Female: 59.1% Male: 40.9%	Undergraduates	—	—	Duration and severity of mental health diagnoses associated with dropout (particularly, schizophrenia, neurotic disorders, and eating disorders)
Jennison 2004	USA	Self-report	Census	1885	Range: 19–27	Female: 49% Male: 51%	Undergraduates	47.5%	—	Increased frequency and level of alcohol consumption alcohol use and alcohol use disorder
Kahn & Kulick 1975	USA	Clinical interview	University Record	95	18.4 (SD unavailable)	Female: 47.4% Male: 52.6%	Undergraduates	63.2%	—	Heavy substance users are more likely to dropout than nonusers with significance
Kennett & Reed 2009	Canada	Validated Scale	University Record	61	18 (SD unavailable)	Female: 70% Male: 30%	Undergraduates	45.9%	19.7%	State anxiety and mental health is associated with dropout.
Kilstrom et al. 2022	USA	Self-report/Validated scale	Self-report	276	28.5 (6.7)	Female: 74.4% Male: 25.6%	Postgraduate	—	2.2%	Mental health concerns were cited for leaving 50% among dropouts, and major factor for 22.7% of those considering dropping out.
Koh et al., 2022	USA	Validated scale	University Record	3316	17.97 (0.41)	Female: 43% Male: 57%	Undergraduates	—	—	Emotional regulation contributed to GPA, which was negatively associated with dropout for first-generation university students.
Li & Tse 2015	NZ	Self-report	Self-report	15	25.7 (SD unavailable)	Female: 33.3% Male: 66.7%	—	—	—	Gambling addiction associated with dropout
Li et al. 2014	NZ	Self-report	Self-report	15	25.67 (4.79)	Female: 33.3% Male: 66.7%	—	—	—	Gambling addiction associated with poor self-esteem both associated with dropout
Liguori & Lohbaken 2015	USA	Self-report	Self-report	820	19.37 (2.99)	Female: 35.2% Male: 64.8%	Undergraduates	52.9%	19.0%	Binge pattern of alcohol intake associated with dropout in male students
Lockard et al. 2019	USA	Validated Scale	University Record	404	—	Female: 45.7% Male: 54.3%	Undergraduates	—	19.5%	Depression on its own was not associated with dropout, but depression with academic distress associated with dropout
Manze et al. 2022	USA	Self-report	Self-report	38	—	Female: 61% Male: 39%	—	—	18%	Mental health problems are suggested to affect academic achievements, which subsequently contributed to dropout

(Continued)

Table 2. Continued.

Author and year	Country	MH Source	Dropout Record	Sample size	Age (M (SD))	Gender (%)	University level	Prevalence of MH (%)	Prevalence of Dropout (%)	Relationship between MH and Dropout	
Martinez et al., 2009	USA	Self-report/Validated scale	University Record	3290	17.96 (0.37)	Female: 53.6% Male: 46.4%	Undergraduates	—	—	Drug use and psychological distress associated with dropout	
Martinez et al., 2008	USA	Self-report/Validated scale	University Record	3290	17.96 (0.37)	Female: 53.6% Male: 46.4%	Undergraduates	—	28.1%	Heavy drinking was not significantly associated with dropout	
McAnulla et al., 2020	UK	Self-report	University Record	579	Range: 18-31	Female: 71.6% Male: 28.4%	Undergraduates	9.0%	19.2%	Mentally ill health was associated with dropout	
McMichael & Hetzel, 1975	Australia	Self-report	University Record	1803	—	Female: 36.5% Male: 63.6%	Master's	29.3%	6.6%	Without significance	
Melman et al., 1992	USA	Clinical interview	University Record	77	—	Female: 58.4% Male: 41.6%	—	—	—	Serious mental health diagnosis associated with dropout	
Mortier et al., 2018	Belgium	Clinical interview	Census	2274	Range: 18-12	Female: 78.6% Male: 21.4%	Master's	11.4%	30.9%	Mental health and particularly depression was associated with dropout	
Okasha et al., 1985	Egypt	Clinical interview	University Record Self-report	79292	—	Female: 39.3% Male: 60.7%	Undergraduates	3.1%	5.9%	Suicidal thoughts and behaviours were associated with academic dropout	
Oseguera et al., 2022	USA	Validated scale	Self-report	129	—	Female: 58.9% Male: 41.1%	—	—	—	Mental health diagnosis associated with academic difficulties and dropout	
Pritchard & Wilson, 2003	USA	Self-report/Validated scale	Self-report	218	19.67 (2.09)	Female: 57.8% Male: 42.2%	Undergraduates	—	—	Higher levels of depressive symptoms are correlated with university dropout	
Ramsdal et al., 2018	Norway	Clinical interview	University Record	14	Range: 28-25	Female: 50% Male: 50%	Undergraduates	—	—	Emotional health associated with GPA, which was predictive of retention. No clear relationship with dropout	
Richardson, 2010	UK	Self-report	University Record	132588	—	Female: 56.7% Male: 43.3%	—	83.6%	36.5%	Students who dropped out were more likely to report mental health diagnoses	
Richardson, 2014	UK	Self-report	University Record	196405	—	Female: 60.5% Male: 39.5%	—	2.2%	35.3%	Those with mental health disability were more likely to dropout	
Ruban et al., 2013	Denmark	Self-report	Self-report	1056	21.45 (SD unavailable)	Female: 64.9% Male: 35.1%	Undergraduates	33.0%	19.7%	Those with mental health disability were more likely to dropout	
Samlian et al., 2021	USA	Validated Scale	University Record	297	Range: 18-19	Female: 66.6% Male: 33.4%	Undergraduates	—	—	No clear association between mental health and dropout	
Sujan et al., 2023	Bangladesh	Self-report	Self-report	436	23.41 (11.26)	Female: 55.3% Male: 64.7%	Undergraduates: 97.7% Postgraduates: 2.3%	54.9%	39.9%	Mental health diagnosis not associated with dropout, but academic distress associated with dropout	
Tamin, 2013	UK	Self-report	University Record	1319	—	Female: 80% Male: 20%	Undergraduates	21.1%	13.7%	Students who misuse psychoactive substances are more likely to have dropout from university.	
Thomas et al., 2021	USA	Self-report/Validated scale	University Record	9004	Range: 18-24	—	Undergraduates	34.3%	16.7%	No significance between mental health diagnosis and dropout	
Vest et al., 2020	USA	Self-report/Validated scale	Self-report	130	29.4 (5.7)	Female: 23.1% Male: 76.8%	—	36.2%	12.3%	Depressive symptoms associated with dropout and Anxiety symptoms protective from dropout, both with significance	
Wainipitapong & Chiddaycha, 2022	Thailand	Validated scale	University Record	914	18 (SD unavailable)	Female: 47.3% Male: 52.7%	Undergraduates	9.3%	1.5%	Anxiety, depression and PTSD associated with dropout with significance	
Willoughby et al., 2020	UK	Validated Scale	University Record	1017	19 (0.93)	Female: 71.1% Male: 28.9%	Undergraduates	26.3%	—	Mental health problems during university was significantly associated with dropout	
Yates, 2012	USA	Self-report	University Record	1188	—	—	Undergraduates	—	—	Struggling students more likely to dropout and to use substances, have depressive symptoms, and higher levels of stress	
Zajac et al., 2023	Australia	Medical Record	University Record	652139	—	—	—	—	13.1%	Late dropout associated with mental health	
									15%	Students receiving treatment for mental health are more likely to dropout	

( $Q=0.36$ ,  $df=1$ ,  $p = .547$ ), student year of study ( $Q=0.04$ ,  $df=1$ ,  $p = .845$ ) and sample size were not predictive of heterogeneity ( $Q=0.03$ ,  $df=1$ ,  $p = .854$ ).

### **Test of RQ2: Prevalence of mental health outcomes among university students**

Thirty-six studies reported on the prevalence of mental health outcomes among university students (Aldahmashi et al., 2021; Alexander et al., 2001; Arria et al., 2013; Auerbach et al., 2016; Boyraz et al., 2013; 2016; Boyraz & Granda, 2019; Crawford et al., 2022; Cvetkovski et al., 2018; Dancot et al., 2021; Davis et al., 1971; DeBerard et al., 2004; Faas et al., 2018; Fergusson et al., 2003; Hjorth et al., 2016; Homel et al., 2014; Hunt et al., 2010; Jennison, 2004; Kahn & Kulick, 1975; Kennett & Reed, 2009; Kilstrom et al., 2022; Liguori & Lonbaken, 2015; McAnulla et al., 2020; McMichael & Hetzel, 1975; Mortier et al., 2018; Okasha et al., 1985; Osegura et al., 2022; Richardson, 2010, 2014; Ruban et al., 2013; Sujan et al., 2023; Tamim, 2013; Thomas et al., 2021; Vest et al., 2020; Wainipitapong & Chiddaycha, 2022; Willoughby et al., 2020; Zajac et al., 2023). Studies where participation was limited only to students who had mental health concerns were excluded from the analysis. The prevalence of having a mental health condition among university students ranged from 2.2% to 83.6%. The pooled prevalence of mental health problems among university students was 26.3%, 95%CI [16.0%, 40.0%]. The forest plot of the meta-analysis can be seen in S4 in the Online Only Supplemental Materials. The heterogeneity test was significant,  $I^2 = 99.98$ ,  $p < .001$ , indicating substantial heterogeneity.

The results of the meta-regression found that program of study was predictive of heterogeneity ( $Q=16.72$ ,  $df=6$ ,  $p = .01$ ). Other moderators such as highest prior level of education ( $Q=2.19$ ,  $df=2$ ,  $p = .334$ ), country ( $Q=1.94$ ,  $df=10$ ,  $p = .997$ ), mental health condition (depression, anxiety, post-traumatic stress disorder [PTSD], substance use, or *other mental health conditions* [mental health conditions other than depression, anxiety, PTSD and substance use, i.e., attention-deficit/hyperactivity disorder (ADHD), autism spectrum disorder (ASD), schizophrenia, bipolar affective disorder];  $Q=2.39$ ,  $df=5$ ,  $p = .793$ ), data source (self-report vs validated scales vs clinical diagnosis;  $Q=0.60$ ,  $df=3$ ,  $p = .895$ ), sample size ( $Q=0.34$ ,  $df=1$ ,  $p = .557$ ), first-year student status ( $Q=0.72$ ,  $df=2$ ,  $p = .698$ ), undergraduate status ( $Q=0.48$ ,  $df=2$ ,  $p = .786$ ), and publishing year ( $Q=0.30$ ,  $df=1$ ,  $p = .586$ ) were not predictive of heterogeneity.

### **Test of RQ3: Relationship between mental health outcomes and university non-continuation**

Twenty-nine studies included effect sizes in relation to the association between mental health outcomes on university non-continuation. Eleven studies reported the relationship between substance abuse and non-continuation (Andersson et al., 2009; Arria et al., 2013; Auerbach et al., 2016; DeBerard et al., 2004; Fergusson et al., 2003; Homel et al.,

2014; Hunt et al., 2010; Jennison, 2004; Liguori & Lonbaken, 2015; Samlan et al., 2021; Sujan et al., 2023; Thomas et al., 2021). Ten studies reported the consequences of depression on non-continuation (Arria et al., 2013; Auerbach et al., 2016; Boyraz & Granda, 2019; Faas et al., 2018; Gaultney, 2016; Lockard et al., 2019; Meilman et al., 1992; Osegura et al., 2022; Samlan et al., 2021; Thomas et al., 2021; Vest et al., 2020). Nine studies reported the associations between stress and non-continuation (Andersson et al., 2009; Cvetkovski et al., 2018; Faas et al., 2018; Gaultney, 2016; Hjorth et al., 2016b; Koh et al., 2022; Lockard et al., 2019; Samlan et al., 2021; Thomas et al., 2021; Willoughby et al., 2020). Seven studies reported the impact of anxiety on non-continuation (Arria et al., 2013; Auerbach et al., 2016; Dancot et al., 2021; Hunt et al., 2010; Samlan et al., 2021; Thomas et al., 2021; Vest et al., 2020). Three (Boyraz et al., 2013; Boyraz & Granda, 2019; Vest et al., 2020) and two (Ishii et al., 2018; Mortier et al., 2018) studies reported the impact of PTSD and suicidal thoughts and behaviour on non-continuation, respectively. One outlier (OR = 67.97, 95% CI [14.926, 309.540]; Wainipitapong & Chiddaycha, 2022) was detected using the criterion for an outlier that is well separated from the rest of the data (Viechtbauer & Cheung, 2010) and excluded from the meta-analysis. Twelve studies reported the effect of other mental health conditions on university non-continuation (Andersson et al., 2009; Arria et al., 2013; Auerbach et al., 2016; Cruwys et al., 2021; Davis et al., 1971; DeBerard et al., 2004; Fuse-Nagase et al., 2016; Gaultney, 2016; Ishii et al., 2018; Martinez et al., 2008; Okasha et al., 1985; Samlan et al., 2021; Wainipitapong & Chiddaycha, 2022).

The pooled effect sizes were: anxiety OR = 1.018 (95%CI [0.963, 1.076],  $p = .536$ ); depression OR = 1.143 (95%CI [1.086, 1.203],  $p < .001$ ); PTSD OR = 1.160 (95%CI [0.835, 1.612],  $p = .377$ ); stress OR = 1.413 (95%CI [1.106, 1.805],  $p = .006$ ); substance abuse OR = 1.449 (95%CI [0.666, 3.154],  $p = .349$ ); suicidal thoughts and behaviours OR = 1.673 (95%CI [0.831, 3.368],  $p = .149$ ), and other mental health conditions OR = 1.266 (95%CI [1.133, 1.414],  $p < .001$ ). Figure 2 displays the forest plot of the results. Overall, the participants who experienced depression, other mental health conditions and stress had an increase of 14.3%, 26.6% and 41.3% in the odds of non-continuation compared to those who did not, respectively. Anxiety, PTSD, substance abuse and suicidal thoughts and behaviour were not significantly associated with non-continuation.

The results of  $I^2$  test showed that high levels of heterogeneity were indicated for anxiety ( $I^2 = 92.35$ ,  $p < .001$ ), depression ( $I^2 = 96.40$ ,  $p < .001$ ), PTSD ( $I^2 = 79.40$ ,  $p = .008$ ), stress ( $I^2 = 96.98$ ,  $p < 0.001$ ), substance use ( $I^2 = 99.99$ ,  $p < .001$ ), other mental health conditions ( $I^2 = 94.56$ ,  $p < .001$ ). Heterogeneity in suicidal thoughts and behaviours was moderate ( $I^2 = 57.64$ ,  $p = 0.124$ ). Meta-regression for moderator analysis showed that the data source for non-continuation was predictive of heterogeneity ( $Q=99.31$ ,  $df=2$ ,  $p < .001$ ). Country of study ( $Q=0.41$ ,  $df=9$ ,  $p = 1.000$ ), publishing year ( $Q=0.39$ ,  $df=1$ ,  $p = .530$ ), first-year status ( $Q=3.46$ ,  $df = 1$ ,  $p = .063$ ), undergraduate status ( $Q=0.02$ ,  $df=1$ ,  $p = .893$ ), age ( $Q=0.55$ ,  $df=1$ ,  $p = .458$ ) and sample size ( $Q=0.08$ ,

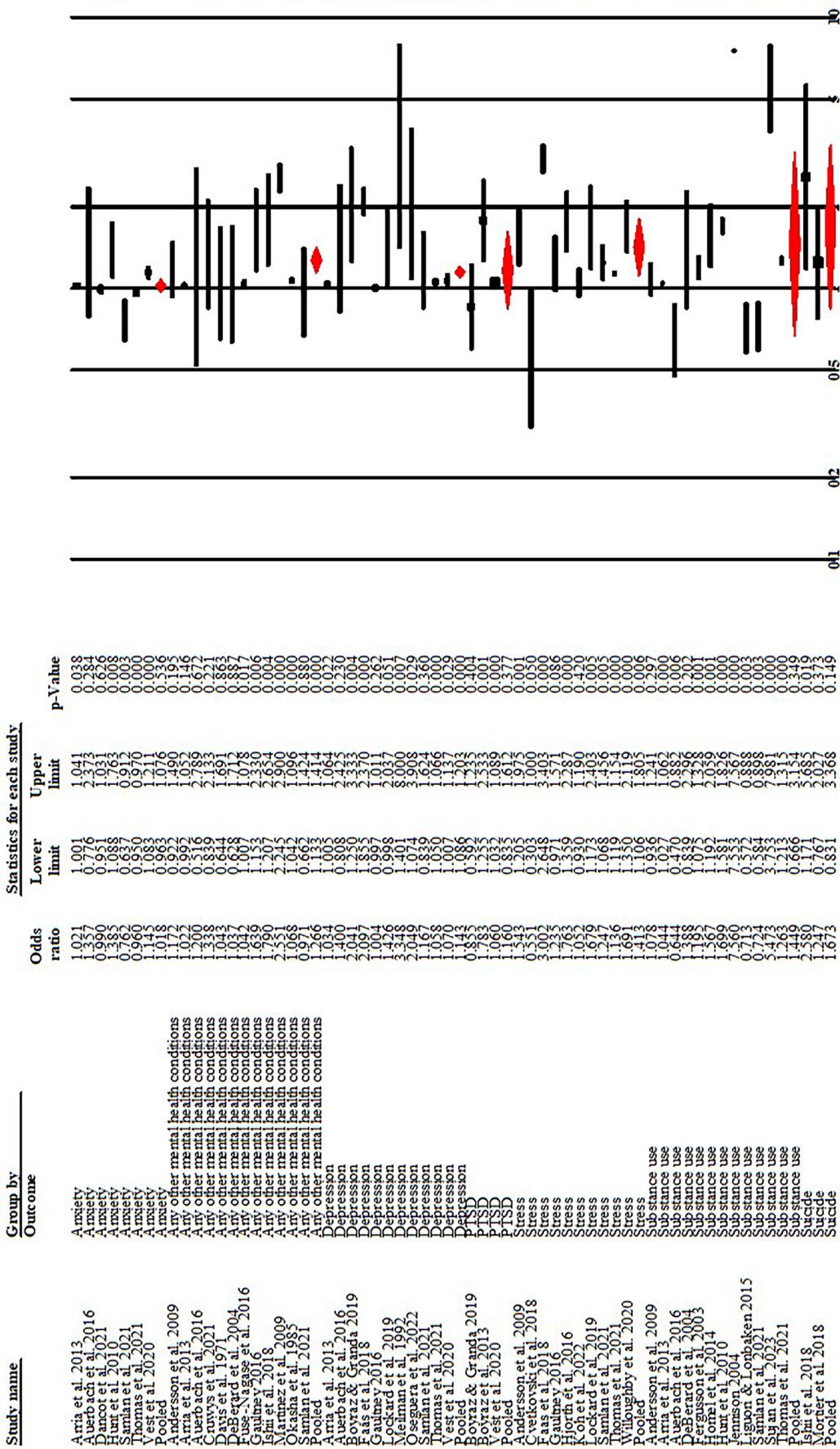


Figure 2. The forest plot of the effect sizes of mental health outcomes on dropout among university students.

$df=1$ ,  $p = .782$ ) were not predictive of heterogeneity. Egger's test ( $t=3.751$ ,  $df=55$ ,  $p < .001$ ), indicated significant publication bias.

Narrative synthesis was conducted for 13 qualitative reports (Alschuler & Yarab, 2018; Anderson et al., 2020; Bakker et al., 2021; Cohen & Greenberg, 2011; Hartl et al., 2022; Heinrichs et al., 2021; Ishii et al., 2018; Li et al., 2014; Li & Tse, 2015; Manze et al., 2022; Pritchard & Wilson, 2003; Ramsdal et al., 2018; Yates, 2012). Five studies identified that mental health conditions were related to non-continuation, with greater severity and duration associated with increased risk of non-continuation (Anderson et al., 2020; Cohen & Greenberg, 2011; Ishii et al., 2018; Ramsdal et al., 2018; Yates, 2012). Three studies found that high levels of perceived stress were likely to be linked to mental health concerns and subsequent non-continuation (Alschuler & Yarab, 2018; Bakker et al., 2021; Manze et al., 2022). Three papers of two studies reported that addictions such as gambling, addictions, and substance misuse were associated with non-continuation (Li et al., 2014; Li & Tse, 2015; Ramsdal et al., 2018). Two studies suggested that when students had mental health conditions and were not supported by their lecturers or perceived their support as inadequate, their levels of stress and dissatisfaction with their studies were likely to escalate, which may contribute to eventual non-continuation (Alschuler & Yarab, 2018; Anderson et al., 2020). Two studies reported that mental health-related distress was often linked with the intention to non-continuation (Bakker et al., 2021; Hartl et al., 2022).

## Discussion

This systematic review included 69 articles from 67 studies, 58 of which were included in the meta-analyses. The combined sample size was 1,433,383 participants. The analysis of RQ1 found that nearly one in five (17.9%) university students do not complete their university degree(s). The non-continuation rate in our study is similar to the average non-continuation rate of 17.5% (including non-continuation across undergraduate years) reported for OECD countries in 2020 (OECD, 2022). University non-continuation has significant consequences for individuals, universities, and the economy (Sosu & Pheunpha, 2019). For individuals, non-continuation may lead to greater isolation and negative labour market outcomes. Research has found that individuals who withdraw from university often spend about 3% more time in the low-income bracket during the first 8 years following their labour market entry compared to those who never entered university (Hällsten, 2017). Non-continuation also leads to the loss of income for tertiary institutions, which may also suffer reputational damage in response to non-continuation rates. University non-continuation imposes a great economic cost on countries, particularly countries which finance university education through public resources (Aina et al., 2018). Reducing non-continuation rates thus is a major policy concern for governments and tertiary institutions (Sosu & Pheunpha, 2019).

The analysis of RQ2 suggests that more than one-fourth (26.3%) of university students experienced mental health problems during the period of university study. This rate is comparable to that found by a WHO survey which reports that 20.3% of university students had a diagnosable disorder based on DSM criteria (Auerbach et al., 2016). This finding is also consistent with a recent meta-analysis that reported the pooled prevalence of depression among undergraduate students to be 25% (Sheldon et al., 2021). The current study suggests that the prevalence rate of mental health conditions is higher in university student populations compared to the prevalence in the general population (12.5%; WHO, 2022). This highlights the need for tertiary institutions to provide greater support for students' mental health.

The analysis of RQ3 indicates that depression (OR = 1.143, 95%CI [1.086, 1.203],  $p < .001$ ) and stress (OR = 1.413, 95%CI [1.106, 1.805],  $p = .006$ ) are significantly associated with an increased risk of non-continuation. The mental health conditions pooled into the *other* category (ADHD, ASD, schizophrenia, bipolar affective disorder) were also strong predictors of non-continuation (OR = 1.266, 95%CI [1.133, 1.414],  $p < .001$ ), which was supported by the narrative synthesis of qualitative studies. Although Tinto's Tinto (1975) model does not emphasise the role that students' mental health plays in university non-continuation, our findings suggest that poor mental health may make a significant contribution to students' decision to discontinue their university degrees. Mental health conditions, particularly depression and stress, can impair students' academic ability and achievements and thus may undermine students' ability to progress through their degrees (Boyraz & Granda, 2019). On the other hand, the finding that anxiety, PTSD, substance use disorders, and suicidal thoughts and behaviours were not significantly associated with non-continuation demonstrates the heterogeneous nature of mental health conditions. Different mental health conditions may affect different aspects of people's lives, and some may exert a greater effect on university achievement and eventual non-continuation than others.

The narrative synthesis of the included qualitative studies found that addictions such as problem gambling and drug abuse are associated with university non-continuation. Problem gamblers spend a great amount of time and energy on gambling. Thus, it is not surprising that students who are addicted to gambling experience academic difficulties (Li et al., 2014, 2015), which may lead to university non-continuation. Substance use disorders not only have significant effects on educational processes but also often are comorbid conditions of mental disorders (Ramsdal et al., 2018).

Due to the emphasis of the current study on mental health, the studies included in our review largely focused on student characteristics of mental health and non-continuation. Limited attention has been given to the impact of the structural and societal factors (e.g., cost of living crisis) on university non-continuation. According to the National Union of Students Scotland's 2023 report *Fighting for the Students: The Cost of Survival*, 37% of students intended to discontinue their studies for financial reasons, compared to 36% in 2022. One in five students (19%) reported the cost of living

was the reason for their non-continuation, 52% skipped a meal due to the lack of money, and 11% received meals from food banks (National Union of Students Scotland, 2023). Furthermore, post-COVID-19 wider environmental factors such as finances, access, and government policies have had to change and these may influence university admissions and persistence (Teague et al., 2022).

To respond to the wider environmental factors in university non-continuation and students' mental health, a "whole university" approach has been adopted by many higher educational institutes (Brewster & Cox, 2023; Dooris et al., 2019). The "whole university" approach advocates that mental health support to students should be more than just a specialised clinical team's stand-alone services. Rather, it ought to be integrated into every aspect of university life (Brewster & Cox, 2023). This requires the university to fundamentally redefine the roles and responsibilities of university and services, build a broad understanding of mental health, develop a supportive ethos and culture, and embed mental health into all areas of work at the university (Dooris et al., 2019). The "whole university" approach to student mental health warrants empirical studies investigating the effect of this approach on the relationship between mental health and university non-continuation. While it is unlikely that any program could eliminate mental health conditions among students, it is possible that the support associated with a whole university approach could ameliorate the negative impact of mental health conditions on university retention.

The heterogeneity analysis indicated that among all the included studies there was substantial heterogeneity in the reported prevalence rates and effect sizes. This suggests that prevalence rates and effect sizes for the association between mental health and university non-continuation were low in some of the studies but high in others (Borenstein, 2022). Therefore, the results may not be generalisable to all university student populations without a degree of caution.

There are several limitations in the current study. First, the data presented in the included studies appear to suggest a linear relationship between mental health and university non-continuation. It is pertinent to point out here that the relationship between mental health and non-continuation is complex and nonlinear (and/or mediated or moderated) relationships may be at play. Future empirical studies on the complex relationship between mental health and non-continuation are needed, as are studies which can better speak to the causal direction of the relationship between mental health and non-continuation. Second, our data analysis suggested that non-continuation is a negative outcome that is related to poor mental health. However, for some students, deciding to discontinue their university degrees may have a positive impact on their mental health; for instance, discontinuing a university degree may take away some triggers (e.g., financial and academic stressors) for mental health conditions (Norton et al., 2018)—the potential positive impact of non-continuation on mental health for some students warrants future investigation. Third, possible

publication bias was detected in the effect of mental health on university non-continuation, suggesting that the meta-analyses may overestimate the true effect size due to publication bias (Borenstein et al., 2010). The inclusion of non-published studies in future systematic reviews is recommended. Fourth, studies had to be excluded if they only included participants with mental health conditions or only included participants who were university non-completers. Fifth, some of the studies had limited information on the study populations, such as year of study, gender differences, age of participants, graduate or undergraduate status, and whether participants were previous university students. This lack of information resulted in the exclusion of these studies in the moderator analysis exploring what factors contribute to heterogeneity across studies. Sixth, given the diverse nature of mental health conditions, some conditions (e.g., ADHD and schizophrenia) had limited studies available to be reviewed as a subgroup and had to be grouped under "other mental health conditions". Similarly, disordered use of alcohol and drugs (e.g., amphetamines, cannabis, and cocaine) were all categorized under "substance use disorders". These limitations emphasize the difficulties listed above when capturing the diversity of mental health conditions and warrant future study into these variations. Seventh, self-reporting was used in some studies in relation to both mental health conditions and non-continuation. There is a risk of recall bias with self-reported data. Furthermore, the majority of mental health prevalence included is non-diagnostic. It has been recommended that in-depth or clinical interviews be conducted to achieve accurately establish existence of the mental health condition (Sordo Vieira et al., 2022). Last but not least, there are limited studies investigating university non-continuation among international students. Considering that international students not only boost income for universities, but also bring with them different cultural views and experiences to tertiary education, future research into international students' mental health and non-continuation is warranted.

Despite these limitations, this systematic review and meta-analysis sheds some light on the theoretical, practical, and policy implications of mental health conditions among university students as it relates to university non-continuation. Theoretically, the current study enriches the understanding of the relationship between mental health and university non-continuation, which is a point that is missed in Tinto's (1975) interactive dropout model. Practically, developing programs that help university students identify and manage distress associated with mental health concerns may have a positive impact on non-continuation prevention. In these programs, the university may prioritise support for students with depressive symptoms, high levels of perceived psychological stress, and other mental health conditions to help prevent attrition and support educational achievement. From a policy perspective, both the university and government should invest sufficiently to improve university students' mental health literacy, to ensure student access to effective services, and consider the "whole university approach."

## Conclusion

This review revealed that the prevalence of mental health conditions among university students was higher than that of the general population and that nearly 20% of students withdraw from university without achieving a degree. It also identified that mental health conditions increase the risk of non-continuation among university students. Understanding university student's mental health and its impact on non-continuation offers the potential to find ways to identify strategies that enhance student retention in higher education.

## Author contribution

TL substantially contributed to the conceptualisation of the research, development of the research protocol, data collection and synthesis, and writing of the manuscript. WL contributed to database searches, data selection, providing guidance on data synthesis and critically reviewing the research protocol and manuscript. DM contributed to study selection, providing guidance on data synthesis, and critically reviewing the manuscript. BM contributed to study selection, providing guidance on data synthesis, and critically reviewing the manuscript.

## Ethical approval

Not applicable.

## Disclosure statement

No potential conflict of interest was reported by the author(s)

## Funding

The author(s) reported there is no funding associated with the work featured in this article.

## Data availability statement

Data from this systematic review is available in the [supplementary materials](#).

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## References

- Aina, C., Baici, E., Casalone, G., & Pastore, F. (2018). The economics of university dropouts and delayed graduation: A survey. *SSRN Electronic Journal*, IZA Discussion Paper No. 114221, 2–20. <https://doi.org/10.2139/ssrn.3153385>
- Aldahmashi, T., Algholaiqa, T., Alrajhi, Z., Althunayan, T., Anjum, I., & Almuqbil, B. (2021). A case-control study on personal and academic determinants of Dropout among health profession students. *Higher Education Studies*, 11(2), 120–126. <https://doi.org/10.5539/hes.v11n2p120>
- Alexander, D. A., & Haldane, J. D. (1980). Medical education: the discontinuers' view point. *Medical Education*, 14(1), 16–22. <https://doi.org/10.1111/j.1365-2923.1980.tb02607.x> 7366490
- Alexander, K. L., Entwistle, D. R., & Kabbani, N. S. (2001). The dropout process in life course perspective: Early risk factors at home and school. *Teachers College Record: The Voice of Scholarship in Education*, 103(5), 760–822. <https://doi.org/10.1111/0161-4681.00134>
- Alschuler, M., & Yarab, J. (2018). Preventing Student Veteran Attrition: What more can we do? *Journal of College Student Retention: Research, Theory & Practice*, 20(1), 47–66. <https://doi.org/10.1177/1521025116646382>
- Anderson, A. H., Stephenson, J., & Carter, M. (2020). Perspectives of former students with ASD from Australia and New Zealand on their university experience. *Journal of Autism and Developmental Disorders*, 50(8), 2886–2901. <https://doi.org/10.1007/s10803-020-04386-7>
- Andersson, C., Johnsson, K. O., Berglund, M., & Ojehagen, A. (2009). Stress and hazardous alcohol use: Associations with early dropout from university. *Scandinavian Journal of Public Health*, 37(7), 713–719. <https://doi.org/10.1177/1403494809344359>
- Arria, A. M., Caldeira, K. M., Vincent, K. B., Winick, E. R., Baron, R. A., & O'Grady, K. E. (2013). Discontinuous college enrollment: Associations with substance use and mental health. *Psychiatric Services*, 64(2), 165–172. <https://doi.org/10.1176/appi.ps.201200106>
- Astridge, B., Li, W. W., McDermott, B., & Longhitano, C. (2023). A systematic review and meta-analysis on adverse childhood experiences: Prevalence in youth offenders and their effects on youth recidivism. *Child Abuse & Neglect*, 140, 106055. <https://doi.org/10.1016/j.chabu.2023.106055>
- Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., Hwang, I., Kessler, R. C., Liu, H., Mortier, P., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L. H., Benjet, C., Caldas-de-Almeida, J. M., Demytteenaere, K., ... Bruffaerts, R. (2016). Mental disorders among college students in the World Health Organization World Mental Health Surveys. *Psychological Medicine*, 46(14), 2955–2970. <https://doi.org/10.1017/S003291716001665>
- Bakker, E. J. M., Roelofs, P. D. D. M., Kox, J. H. A. M., Miedema, H. S., Francke, A. L., van der Beek, A. J., & Boot, C. R. L. (2021). Psychosocial work characteristics associated with distress and intention to leave nursing education among students: A one-year follow-up study. *Nurse Education Today*, 101, 104853. N.PAG-N. PAG. <https://doi.org/10.1016/j.nedt.2021.104853>
- Barefoot, B. O. (2004). Higher education's revolving door: confronting the problem of student drop out in US colleges and universities. *Open Learning: The Journal of Open, Distance and e-Learning*, 19(1), 9–18. <https://doi.org/10.1080/0268051042000177818>
- Behr, A., Giese, M., Teguim Kamdjou, H. D., & Theune, K. (2020). Dropping out of university: A literature review. *Review of Education*, 8(2), 614–652. <https://doi.org/10.1002/rev3.3202>
- Borenstein, M. (2019). Common mistakes in meta-analysis and how to avoid them. *Biostat*, 1, 75–135.
- Borenstein, M. (2022). In a meta-analysis, the I-squared statistic does not tell us how much the effect size varies. *Journal of Clinical Epidemiology*, 152, 281–284. <https://doi.org/10.1016/j.jclinepi.2022.10.003>
- Borenstein, M., Hedges, L. V., Higgins, J. P., & Rothstein, H. R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, 1(2), 97–111. <https://doi.org/10.1002/jrsm.12>
- Boyraz, G., & Granda, R. (2019). Crossing the finish line: The role of posttraumatic stress and type of trauma exposure in college graduation. *Journal of Loss and Trauma*, 24(1), 50–68. <https://doi.org/10.1080/15325024.2018.1512828>
- Boyraz, G., Horne, S., Owens, A., & Armstrong, A. (2016). Depressive Symptomatology and College Persistence among African American College Students. *The Journal of General Psychology*, 143(2), 144–160. <https://doi.org/10.1080/00221309.2016.1163251>
- Boyraz, G., Horne, S. G., Owens, A. C., & Armstrong, A. P. (2013). Academic achievement and college persistence of African American students with trauma exposure. *Journal of Counseling Psychology*, 60(4), 582–592. <https://doi.org/10.1037/a0033672>
- Brewster, L., & Cox, A. M. (2023). Taking a 'whole-university' approach to student mental health: The contribution of academic libraries. *Higher Education Research & Development*, 42(1), 33–47. <https://doi.org/10.1080/07294360.2022.2043249>



- Cipher, J. D., & Urban, R. W. (2022). Discontinuation and the intention to reenroll in undergraduate nursing education. *The Journal of Nursing Education*, 61(2), 97–100. <https://doi.org/10.3928/01484834-20211213-06>
- Coelho, M., & Menezes, I. (2021). University social responsibility, service learning, and students' personal, professional, and civic education [Brief Research Report]. *Frontiers in Psychology*, 12, 617300. <https://doi.org/10.3389/fpsyg.2021.617300>
- Cohen, M. A. O., & Greenberg, S. (2011). The struggle to succeed: Factors associated with the persistence of part-time adult students seeking a master's degree. *Continuing Higher Education Review*, 75, 101–112.
- Crawford, C., Black, P., Melby, V., & Fitzpatrick, B. (2022). The academic journey of students with specific learning difficulties undertaking pre-registration nursing programmes in the UK: A retrospective cohort study. *Nurse Education Today*, 111, 105318. <https://doi.org/10.1016/j.nedt.2022.105318>
- Cruwys, T., Ng, N. W. K., Haslam, S. A., & Haslam, C. (2021). Identity continuity protects academic performance, retention, and life satisfaction among international students. *Applied Psychology*, 70(3), 931–954. <https://doi.org/10.1111/apps.12254>
- Cvetkovski, S., Jorm, A. F., & Mackinnon, A. J. (2018). Student psychological distress and degree dropout or completion: A discrete-time, competing risks survival analysis. *Higher Education Research & Development*, 37(3), 484–498. <https://doi.org/10.1080/07294360.2017.1404557>
- Dancot, J., Pétré, B., Dardenne, N., Donneau, A. F., Detroz, P., & Guillaume, M. (2021). Exploring the relationship between first-year nursing student self-esteem and dropout: A cohort study. *Journal of Advanced Nursing*, 77(6), 2748–2760. <https://doi.org/10.1111/jan.14806>
- Davis, H., Hall, F., Cadoret, R., & McClure, J. J. (1971). Incidence and type of psychiatric disturbance in dropouts from a State University. *Journal of the American College Health Association*, 19(4), 241–246.
- DeBerard, M. S., Spielmans, G. I., & Julka, D. L. (2004). Predictors of academic achievement and retention among college freshmen: A longitudinal study. *College Student Journal*, 38(1), 66–80.
- Del Savio, A. A., Galantini, K., & Pachas, A. (2022). Exploring the relationship between mental health-related problems and undergraduate student dropout: A case study within a civil engineering program. *Heliyon*, 8(5), e09504. <https://doi.org/10.1016/j.heliyon.2022.e09504>
- Dooris, M., Powell, S., & Farrier, A. (2019). Conceptualizing the 'whole university' approach: An international qualitative study. *Health Promotion International*, 35(4), 730–740. <https://doi.org/10.1093/heapro/daz072>
- Dyson, R., & Renk, K. (2006). Freshmen adaptation to university life: depressive symptoms, stress, and coping. *Journal of Clinical Psychology*, 62(10), 1231–1244. <https://doi.org/10.1002/jclp.20295>
- Faas, C., Benson, M. J., Kaestle, C. E., & Savla, J. (2018). Socioeconomic success and mental health profiles of young adults who drop out of college. *Journal of Youth Studies*, 21(5), 669–686. <https://doi.org/10.1080/13676261.2017.1406598>
- Fergusson, D. M., Horwood, L. J., & Beautrais, A. L. (2003). Cannabis and educational achievement. *Addiction*, 98(12), 1681–1692. <https://doi.org/10.1111/j.1360-0443.2003.00573.x>
- Fisher, V., Li, W. W., & Malabu, U. (2023). The effectiveness of mindfulness-based stress reduction (MBSR) on the mental health, HbA1C, and mindfulness of diabetes patients: A systematic review and meta-analysis of randomised controlled trials. *Applied Psychology: Health and Well-Being*, 15(4), 1733–1749. <https://doi.org/10.1111/aphw.12441>
- Fleiss, J. L. (1971). Measuring nominal scale agreement among many raters. *Psychological Bulletin*, 76(5), 378–382. <https://doi.org/10.1037/h0031619>
- French, T. (2017). Toward a new conceptual model: Integrating the social change model of leadership development and Tinto's model of student persistence. *Journal of Leadership Education*, 16(3), 97–117. <https://doi.org/10.12806/V16/I3/T4>
- Fuse-Nagase, Y., Miura, J., Namura, I., Sato, T., Yasumi, K., Marutani, T., & Sugita, Y. (2016). Decline in the severity or the incidence of schizophrenia in Japan: A survey of university students. *Asian Journal of Psychiatry*, 24, 120–123. <https://doi.org/10.1016/j.ajp.2016.08.024>
- Gaultney, J. F. (2016). Risk for sleep disorder measured during students' first college semester may predict institutional retention and grade point average over a 3-year period, with indirect effects through self-efficacy. *Journal of College Student Retention: Research, Theory & Practice*, 18(3), 333–359. <https://doi.org/10.1177/1521025115622784>
- Guzmán, A., Barragán, S., & Cala Vitery, F. (2021). Dropout in rural higher education: A systematic review [Systematic Review]. *Frontiers in Education*, 6, 1–14. <https://doi.org/10.3389/feduc.2021.727833>
- Hällsten, M. (2017). Is Education a risky investment? The Scarring effect of university dropout in Sweden. *European Sociological Review*, 33(2), jcw053. <https://doi.org/10.1093/esr/jcw053>
- Hartl, A., Holzberger, D., Hugo, J., Wolf, K., & Kunter, M. (2022). Promoting student teachers' well-being: A multi-study approach investigating the longitudinal relationship between emotional exhaustion, emotional support, and the intentions of dropping out of university. *Zeitschrift Für Psychologie*, 230(3), 241–252. <https://doi.org/10.1027/2151-2604/a000495>
- Heinrichs, K., Hermülheim, V., Pilz González, L., & Loerbroks, A. (2021). When in Doubt ... career indecision, mental wellbeing, and consultation-seeking behaviour-a qualitative interview study among students and counsellors. *International Journal of Environmental Research and Public Health*, 18(23), 12604. <https://doi.org/10.3390/ijerph182312604>
- Hernández-Torрано, D., Ibrayeva, L., Sparks, J., Lim, N., Clementi, A., Almukhambetova, A., Nurtagayev, Y., & Muratkyzy, A. (2020). Mental health and well-being of university students: A bibliometric mapping of the literature [Original Research]. *Frontiers in Psychology*, 11, 1226. <https://doi.org/10.3389/fpsyg.2020.01226>
- Higgins, J., Thomas, J., Chandler, J., Cumpston, M., Li, T., Page, M., & Welch, V. (Eds.). (2021). *Cochrane Handbook for Systematic Reviews of Interventions version 6.2 (updated February 2021)*. Cochrane. [www.training.cochrane.org/handbook](http://www.training.cochrane.org/handbook).
- Hjorth, C. F., Bilgrav, L., Frandsen, L. S., Overgaard, C., Torp-Pedersen, C., Nielsen, B., & Bøggild, H. (2016). Mental health and school dropout across educational levels and genders: a 4.8-year follow-up study. *BMC Public Health*, 16(1), 976. <https://doi.org/10.1186/s12889-016-3622-8>
- Homel, J., Thompson, K., & Leadbeater, B. (2014). Trajectories of marijuana use in youth ages 15–25: Implications for postsecondary education experiences. *Journal of Studies on Alcohol and Drugs*, 75(4), 674–683. <https://doi.org/10.15288/jasd.2014.75.674>
- Hong, Q. N., Pluye, P., Fàbregues, S., Bartlett, G., Boardman, F., Cargo, M., Dagenais, P., Gagnon, M. P., Griffiths, F., Nicolau, B., O'Cathain, A., Rousseau, M. C., & Vedel, I. (2019). Improving the content validity of the mixed methods appraisal tool: a modified e-Delphi study. *Journal of Clinical Epidemiology*, 111, 49–59.e41. <https://doi.org/10.1016/j.jclinepi.2019.03.008>
- Hunt, J., Eisenberg, D., & Kilbourne, A. M. (2010). Consequences of receipt of a psychiatric diagnosis for completion of College. *Psychiatric Services (Washington, D.C.)*, 61(4), 399–404. <https://doi.org/10.1176/ps.2010.61.4.399>
- Ishii, T., Tachikawa, H., Shiratori, Y., Hori, T., Aiba, M., Kuga, K., & Arai, T. (2018). What kinds of factors affect the academic outcomes of university students with mental disorders? A retrospective study based on medical records. *Asian Journal of Psychiatry*, 32, 67–72. <https://doi.org/10.1016/j.ajp.2017.11.017>
- Jennison, K. M. (2004). The short-term effects and unintended long-term consequences of binge drinking in college: A 10-year follow-up study. *The American Journal of Drug and Alcohol Abuse*, 30(3), 659–684. <https://doi.org/10.1081/ADA-200032331>
- Kahn, M., & Kulick, F. (1975). Relationship of drug involvement to dropping out of college. *Psychological Reports*, 37(3, Pt 2), 1095–1098. <https://doi.org/10.2466/pr.0.1975.37.3f.1095>
- Kennett, D. J., & Reed, M. J. (2009). Factors influencing academic success and retention following a 1st-year post-secondary success course. *Educational Research and Evaluation*, 15(2), 153–166. <https://doi.org/10.1080/13803610902804382>
- Kilstrom, J., Neary, S., Roman, C., Garrubba, C., LeLacheur, S., & Van Rhee, J. (2022). Factors influencing physician assistant student attrition rates. *Journal of Physician Assistant Education*, 33(4), 341–345. <https://doi.org/10.1097/JPA.00000000000000468>

- Koh, J., Farruggia, S. P., Back, L. T., & Han, C-W. (2022). Self-efficacy and academic success among diverse first-generation college students: The mediating role of self-regulation. *Social Psychology Of Education*, 25, 1071–1092. <https://doi.org/10.1007/s11218-022-09713-7>
- Li, W., Tse, S., & Chong, M. D. (2014). Why Chinese international students gamble: Behavioral decision making and its impact on identity construction. *International Journal of Mental Health and Addiction*, 12(3), 321–334. <https://doi.org/10.1007/s11469-013-9456-z>
- Li, W. W., Li, Y., Yu, H., Miller, D. J., Rouen, C., & Yang, F. (2021). Mental health of Chinese People during the COVID-19 pandemic: Associations with infection Severity of Region of Residence and Filial Piety [Original Research]. *Frontiers in Psychology*, 12(1567), 633452. <https://doi.org/10.3389/fpsyg.2021.633452>
- Li, W. W., & Tse, S. (2015). Problem gambling and help seeking among Chinese international students: Narratives of place identity transformation. *Journal of Health Psychology*, 20(3), 300–312. <https://doi.org/10.1177/1359105314566611>
- Liguori, G., & Lonbaken, B. (2015). Alcohol consumption and academic retention in first-year college students. *College Student Journal*, 49(1), 69–77.
- Liu, X. L., Wang, T., Bressington, D., Nic Giolla Easpaig, B., Wikander, L., & Tan, J. B. (2023). Factors influencing retention among regional, rural and remote undergraduate nursing students in Australia: A systematic review of current research evidence. *International Journal of Environmental Research and Public Health*, 20(5), 3983, 1–14. <https://doi.org/10.3390/ijerph20053983>
- Lockard, A. J., Hayes, J. A., Locke, B. D., Bieschke, K. J., & Castonguay, L. G. (2019). Helping those who help themselves: Does counseling enhance retention? *Journal of Counseling & Development*, 97(2), 128–139. <https://doi.org/10.1002/jcad.12244>
- Manze, M., Lattanzio, A., Larsen, J., Keegan, J., Freudenberg, N., & Jones, H. E. (2022). The primacy of meeting public university students' essential needs in the wake of COVID-19: An overdue higher education priority. *Journal of American College Health*: J, 70, 1–6. <https://doi.org/10.1080/07448481.2022.2076105>
- Martinez, J. A., Sher, K. J., Krull, J. L., & Wood, P. K. (2009). Blue-Collar Scholars?: Mediators and Moderators of University Attrition in First-Generation College Students. *Journal of College Student Development*, 50(1), 87–103. <https://doi.org/10.1353/csd.0.0053> 19750141
- Martinez, J. A., Sher, K. J., & Wood, P. K. (2008). Is heavy drinking really associated with attrition from college? The alcohol-attrition paradox. *Psychology of Addictive Behaviors: journal of the Society of Psychologists in Addictive Behaviors*, 22(3), 450–456. <https://doi.org/10.1037/0893-164x.22.3.450>
- McAnulla, S. J., Ball, S. E., & Knapp, K. M. (2020). Understanding student radiographer attrition: Risk factors and strategies. *Radiography*, 26(3), 198–204. <https://doi.org/10.1016/j.radi.2019.12.001>
- McCubbin, I. (2003a). An Examination of Criticisms made of Tinto's 1975 Student Integration Model of Attrition by Ian McCubbin.
- McCubbin, I. (2003b). An examination of criticisms made of Tinto's 1975 student integration model of attrition. <https://www.psy.gla.ac.uk/~steve/located/icubb.pdf>
- McMichael, A. J., & Hetzel, B. S. (1975). Mental health problems among university students, and their relationship to academic failure and withdrawal. *Medical Journal of Australia*, 1(16), 499–504. <https://doi.org/10.5694/j.1326-5377.1975.tb111533.x>
- Meilman, P. W., Manley, C., Gaylor, M. S., & Turco, J. H. (1992). Medical withdrawals from college for mental health reasons and their relation to academic performance. *Journal of American College Health*, 40(5), 217–223. <https://doi.org/10.1080/07448481.1992.9936283>
- Montreuil, B., Bendavid, Y., & Brophy, J. (2005). What is so odd about odds? *Canadian Journal of Surgery*. 48(5), 400–408.
- Mortier, P., Auerbach, R. P., Alonso, J., Axinn, W. G., Cuijpers, P., Ebert, D. D., Green, J. G., Hwang, I., Kessler, R. C., Liu, H., Nock, M. K., Pinder-Amaker, S., Sampson, N. A., Zaslavsky, A. M., Abdulmalik, J., Aguilar-Gaxiola, S., Al-Hamzawi, A., Benjet, C., Demyttenaere, K., ... Bruffaerts, R. (2018). Suicidal thoughts and behaviors among college students and same-aged peers: Results from the World Health Organization World Mental Health Surveys. *Social Psychiatry and Psychiatric Epidemiology*, 53(3), 279–288. <https://doi.org/10.1007/s00127-018-1481-6>
- National Institute of Mental Health. (2023). What is Prevalence?. National Institute of Mental Health (NIMH). Retrieved from <https://www.nimh.nih.gov/health/statistics/what-is-prevalence>
- National Union of Students Scotland. (2023). Fighting for the Students: The Cost of Survival. Retrieved from: [https://www.nus-scotland.org.uk/the\\_cost\\_of\\_survival](https://www.nus-scotland.org.uk/the_cost_of_survival)
- NCES. (2022). Undergraduate Retention and Graduation Rates. Condition of Education Retrieved from: <https://nces.ed.gov/programs/coe/indicator ctr>
- Nicoletti, M. D C. (2019). Revisiting the Tinto's Theoretical Dropout Model. *Higher Education Studies*, 9(3), 52. <https://doi.org/10.5539/hes.v9n3p52>
- Norton, A., Cherastidham, I., & Mackey, W. (2018). *Dropping out: the benefits and costs of trying university*. Retrieved from: <https://grattan.edu.au/wp-content/uploads/2018/04/904-dropping-out-the-benefits-and-costs-of-trying-university.pdf>
- OECD. (2022). *Education at a glance 2022* <https://www.oecd-ilibrary.org/sites/3197152b-en/index.html?itemId=/content/publication/3197152b-en>
- Okasha, A., Kamel, M., Khalil, A. H., Sadek, A., & Ashour, A. (1985). Academic difficulty among male Egyptian university students. I. Association with psychiatric morbidity. *The British Journal of Psychiatry: The Journal of Mental Science*, 146(2), 140–144. <https://doi.org/10.1192/bjp.146.2.140>
- Osegura, L., Rios, J. D. L., Park, H. J., Aparicio, E. M., & Rao, S. (2022). Understanding who stays in a STEM Scholar program for underrepresented students: High-achieving scholars and short-term program retention. *Journal of College Student Retention: Research, Theory & Practice*, 24(3), 773–809. <https://doi.org/10.1177/1521025120950693>
- Pritchard, M. E., & Wilson, G. S. (2003). Using emotional and social factors to predict student success. *Journal of College Student Development*, 44(1), 18–28. <https://doi.org/10.1353/csd.2003.0008>
- Ramsdal, G. H., Bergvik, S., & Wynn, R. (2018). Long-term dropout from school and work and mental health in young adults in Norway: A qualitative interview-based study. *Cogent Psychology*, 5(1), 1455365. <https://doi.org/10.1080/23311908.2018.1455365>
- Richardson, J. T. E. (2010). Course completion and attainment in disabled students taking courses with the Open University UK. *Open Learning: The Journal of Open and Distance Learning*, 25(2), 81–94. <https://doi.org/10.1080/02680511003787263>
- Richardson, J. T. E. (2014). Academic attainment of students with disabilities in distance Education. *Journal of Postsecondary Education and Disability*, 27(3), 291–305.
- Higgins, J., M. R., Rooney, A., Taylor, K., Thayer, K., Silva, R., Lemeris, C., Akl, A., Arroyave, W., Bateson, T., Berkman, N., Demers, P., Forastiere, F., Glenn, B., Hrđobjartsson, A., Kirrane, E., LaKind, J., Luben, T., Lunn, R., McAleenan, ... S., Sterne, J. (2023). *Risk Of Bias In Non-randomized Studies - of Exposure (ROBINS-E)*. Launch version, 20 June 2023. Available from: <https://www.riskofbias.info/welcome/robins-e-tool>
- Rotar, O. (2022). A missing theoretical element of online higher education student attrition, retention, and progress: A systematic literature review. *SN Social Sciences*, 2(12), 278. <https://doi.org/10.1007/s43545-022-00550-1>
- Rothstein, H. R., Sutton, A. J., & Borenstein, M. (2005). Publication bias in meta-analysis. *Publication Bias in Meta-Analysis: Prevention, Assessment and Adjustments*, 1, 1–7.
- Ruban, P. U., Petersen, M. G., & Møller-Madsen, B. (2013). More than half of the medical students who apply for a dispensation drop out and need focused counselling. *Danish Medical Journal*, 60(7), A4663.
- Ryan, R. (2013). Cochrane Consumers and Communication Review Group: data synthesis and analysis. *Cochrane Consumers and Communication Review Group*, 1, 1–5.
- Samlan, H., McWhirter, E. H., & Clark, B. A. M. (2021). The counseling center assessment of psychological symptoms-62 (CCAPS-62) and college academic outcomes. *The Counseling Psychologist*, 49(6), 882–906. <https://doi.org/10.1177/00110000211010301>

- Samoila, M. E., & Vrabie, T. (2023). First-year seminars through the lens of Vincent Tinto's theories of student departure. A systematic review [Systematic Review]. *Frontiers in Education*, 8, 1–11. <https://doi.org/10.3389/feduc.2023.1205667>
- Scholz, B., Bevan, A., Georgousopoulou, E., Collier, A., & Mitchell, I. (2019). Consumer and carer leadership in palliative care academia and practice: A systematic review with narrative synthesis. *Palliative Medicine*, 33(8), 959–968. <https://doi.org/10.1177/0269216319854012>
- Sheldon, E., Simmonds-Buckley, M., Bone, C., Mascarenhas, T., Chan, N., Wincott, M., Gleeson, H., Sow, K., Hind, D., & Barkham, M. (2021). Prevalence and risk factors for mental health problems in university undergraduate students: A systematic review with meta-analysis. *Journal of Affective Disorders*, 287, 282–292. <https://doi.org/10.1016/j.jad.2021.03.054>
- Sordo Vieira, L., Nguyen, B., Nutley, S. K., Bertolace, L., Ordway, A., Simpson, H., Zakrzewski, J., Jean Gilles, M. E., Nosheny, R., Weiner, M., Mackin, R. S., & Mathews, C. A. (2022). Self-reporting of psychiatric illness in an online patient registry is a good indicator of the existence of psychiatric illness. *Journal of Psychiatric Research*, 151, 34–41. <https://doi.org/10.1016/j.jpsychires.2022.03.022>
- Sosu, E. M., & Pheunpha, P. (2019). Trajectory of university dropout: Investigating the cumulative effect of academic vulnerability and Proximity to Family Support. *Frontiers in Education*, 4(6), 1–10. <https://doi.org/10.3389/feduc.2019.00006>
- Sujan, M. S. H., Tasnim, R., Hossain, S., Sikder, M. T., & Hasan, M. T. (2023). Impact of drug abuse on academic performance and physical health: a cross-sectional comparative study among university students in Bangladesh. *Journal of Public Health*, 31(1), 65–71. <https://doi.org/10.1007/s10389-020-01428-3>
- Tamin, S. K. (2013). Relevance of mental health issues in university student dropouts. *Occupational Medicine*, 63(6), 410–414. <https://doi.org/10.1093/occmed/kqt071>
- Teague, M., Baker, S., Laffernis, F., Head, K., Singh, S., Morison, C., Johnston, C., & Micsko, J. (2022). *University responses to enhancing equity in the post-COVID landscape*. National Centre for Student Equity in Higher Education. Retrieved from: [https://www.ncsehe.edu.au/wp-content/uploads/2022/03/Teague\\_UNSW-Final-23-3-22.pdf](https://www.ncsehe.edu.au/wp-content/uploads/2022/03/Teague_UNSW-Final-23-3-22.pdf)
- Thomas, N. S., Barr, P. B., Hottell, D. L., Adkins, A. E., & Dick, D. M. (2021). Longitudinal influence of behavioral health, emotional health, and student involvement on college student retention. *Journal of College Student Development*, 62(1), 2–18. <https://doi.org/10.1353/csd.2021.0001>
- Tinto, V. (1973). College proximity and rates of college attendance. *American Educational Research Journal*, 10(4), 277–293. <https://doi.org/10.3102/00028312010004277>
- Tinto, V. (1975). Dropout from higher education: a theoretical synthesis of recent research. *Review of Educational Research*, 45(1), 89–125. <https://doi.org/10.2307/1170024>
- Vest, B. M., Hoopsick, R. A., Homish, D. L., & Homish, G. G. (2020). Mental health and educational outcomes among current and former National Guard and Reserve soldiers. *Journal of American College Health*, 68(2), 110–114. <https://doi.org/10.1080/07448481.2018.1536056>
- Viechtbauer, W., & Cheung, M. W. (2010). Outlier and influence diagnostics for meta-analysis. *Research Synthesis Methods*, 1(2), 112–125. <https://doi.org/10.1002/jrsm.11>
- Wainipatpong, S., & Chiddaycha, M. (2022). Assessment of dropout rates in the preclinical years and contributing factors: a study on one Thai medical school. *BMC Medical Education*, 22(1), 461. <https://doi.org/10.1186/s12909-022-03527-z>
- WHO. (2022). *Mental disorders* (Fact sheets). Retrieved from: <https://www.who.int/news-room/fact-sheets/detail/mental-disorders>
- Willoughby, T., Heffer, T., Dykstra, V. W., Shahid, H., & Braccio, J. (2020). A latent class analysis of adolescents in first-year university: Associations with psychosocial adjustment throughout the emerging adult period and post-university outcomes. *Journal of Youth and Adolescence*, 49(12), 2459–2475. <https://doi.org/10.1007/s10964-020-01318-7>
- Witkow, M. R., Huynh, V., & Fuligni, A. J. (2015). Understanding differences in college persistence: A longitudinal examination of financial circumstances, family obligations, and discrimination in an ethnically diverse sample. *Applied Developmental Science*, 19(1), 4–18. <https://doi.org/10.1080/10888691.2014.946030>
- Yates, J. (2012). When did they leave, and why? A retrospective case study of attrition on the Nottingham undergraduate medical course [Article]. *BMC Medical Education*, 12(1), Article 43. <https://doi.org/10.1186/1472-6920-12-43>
- Zajac, T., Perales, F., Tomaszewski, W., Xiang, N., & Zubrick, S. R. (2023). Student mental health and dropout from higher education: an analysis of Australian administrative data. *Higher Education*, 87(2), 325–343. <https://doi.org/10.1007/s10734-023-01009-9>
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *BMJ*, 372n, 71. <https://doi.org/10.1136/bmj.n71>
- Peterson, R. A., & Brown, S. P. (2005). On the use of beta coefficients in meta-analysis. *The Journal of Applied Psychology*, 90(1), 175–181. <https://doi.org/10.1037/0021-9010.90.1.175> 15641898