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Review

The Impact of Depressive and Anxiety Symptoms on Academic Achievement among Undergraduate University Students: A Systematic Review

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Abstract

Numerous studies have explored the prevalence of depression and anxiety symptoms among university students worldwide. However, only a few have examined how these symptoms affect students' academic performance. This systematic review explores the relationship between depression, anxiety, and academic performance among undergraduate university students. Peer-reviewed articles published between 1997 and June 2020 were included if they: (a) were in English; (b) had a study population that was exclusively undergraduate students; (c) the study assessed depression and/or anxiety through standardized, validated measures; and (d) included an objective outcome measure of academic performance. Of 2,746 citations, 10 met the eligibility criteria, representing 14,695 participants. All six cross-sectional analyses and three of four longitudinal studies reported a negative relationship between depression and academic performance. Three cross-sectional analyses and one longitudinal study reported a negative relationship between anxiety and academic performance. This review

supports a consistent relationship between depression and academic performance but less support for anxiety. Depressive and anxiety symptoms have a significant impact on university students' academic performance.

Keywords
Depression; anxiety; academic performance; university students

1. Introduction

1.1 Prevalence of Depression and Anxiety among University Students

Depression and anxiety disorders are two of the most prevalent mental health disorders among university students [1]. A previous study suggested that university students have higher prevalence rates of mental health problems, including depression and anxiety, than the general population [2]. In recent years, depression and anxiety have been reported in university students at alarming levels. For example, a recent, representative, cross-sectional survey of first-year students residing in dormitories at a Bangladesh University reported that more than two-thirds of students experienced moderate to severe depression (69.5%) and anxiety (61.0%) [3].

As noted in the latest annual report of the Center for Collegiate Mental Health records, anxiety and depression are the top reasons college students seek counselling in the USA. The report suggests that anxiety and depression continue to be the most common problems presenting in mental healthcare [4], with a reported prevalence rate of 62.7% for anxiety, followed by depression at 49.3% of 82,685 students who completed the Counseling Center Assessment of Psychological Symptoms [4]. Similarly, in the UK, it was estimated that one in six university students experience a common mental health condition, such as depression or anxiety [5]. Both are associated with a decreased quality of life and impairment of cognitive and social skills and are a dominant cause of disability [1].

The cost of affective mood disorders can be exceptionally high in young people. They are in a transitional period between adolescence and early adulthood when they need to make key decisions about their future and take more responsibility for their lives and achievements. Hence, this can be perceived as one of the most stressful times in a person's life [6]. Additionally, university students face many new experiences (e.g., changes in the learning environment and making new friendships) and associated behavioral, emotional, academic, and socioeconomic changes [7]. For example, university academic courses require more excellent self-directed learning, with demands to obtain high-class grades that put the students under tremendous pressure to adapt to a new environment and new modes of learning. Therefore, failing to make this transition effectively has the potential to affect the mental health and social wellbeing of this group [8].

1.2 Depression, Anxiety and Academic Performance

Depression is a mood disorder characterized by a composite of physical, emotional, psychomotor, and cognitive impairments that display various symptoms, including sleep disturbance, poor concentration, negative thoughts, and feelings of guilt. Students with high levels of depression

might struggle to perform well academically because they do not have interest and motivation [9]. They may lack confidence, not reach the required performance standard, discern things negatively, and consider themselves inefficient. Thus, their academic and social life is bound to be affected, resulting in poor grades, low achievement, and absence from college or university [10]. A recent study among graduate and undergraduate students in Jordan reported that students with persistently high levels of anxiety and depressive symptoms are more likely to exhibit lower academic achievement and a higher absenteeism rate than those experiencing normal and moderate levels of anxiety and depression [11]. The same study's findings reflect that depression is highly correlated with students' academic success and class attendance. Furthermore, a survey by De Roma et al. [12] reported that university students experiencing a moderate level of depressive symptomology perform worse academically than those with symptoms that are milder or normal.

Anxiety symptoms reflect an emotional and physical condition distinguished by intellectual, bodily, emotional, and behavioral elements that create a distasteful feeling that is usually associated with uneasiness, fear, and worries [13]. High levels of anxiety impact an individual's attention and memory, which may result in hyper-vigilance and impairments in reasoning and judgment, leading to the impairment of cognitive functioning and academic performance [14].

A survey from the American College Health Association (ACHA 2018/19) suggested that about 60% of the students in the USA felt "overwhelming" anxiety. However, little is known about any association between high levels of anxiety symptoms and academic achievement at universities. A cross-sectional study among high school students found a negative relationship between anxiety symptoms and poor academic performance [15]. Furthermore, a survey conducted by Vitasari et al. [16] among engineering university students found that students who have high levels of anxiety display low academic performance. In a different context, some studies revealed a positive correlation between low levels of anxiety and better academic performance [17]. Conversely, appropriate degrees of anxiety about the fear of failure could enhance students' self-motivation to perform better academically [18].

Depressive symptoms have been shown to negatively impact academic achievement, with perceived control (PC) playing a critical mediating role. In a study of adolescents, PC—encompassing factors such as self-regulated learning strategies, effort attribution, and perceived competence—was found to mediate the relationship between depressive symptoms and GPA significantly. When PC was considered, the direct negative impact of depressive symptoms on academic performance became non-significant. These findings highlight the importance of addressing strategic and motivational elements when designing interventions for depressive symptoms in educational contexts [19].

A recent study conducted by Liu and colleagues [20] applied a piecewise growth mixture model to examine the trajectories of depression, anxiety, and stress among college students.

Analyzing longitudinal data, the research identified distinct trajectories, including low-stable, increasing, and decreasing symptoms over time. Factors such as academic workload, social relationships, and coping mechanisms significantly impacted these patterns. The study underscores the importance of tailored mental health interventions that address the specific needs of students at different stages of their academic journey.

There have been several studies on the prevalence of depression among university students worldwide [21]. However, a minority of studies have explored the impact of depressive symptoms and anxiety on university students' academic performance. Academic performance is affected by

various factors, such as cognitive function, motivation, and prior educational experience. Furthermore, motivation and cognition are both affected by symptoms of depression and anxiety [22].

Given that less is known about emotional difficulties and academic performance, the effect of depression and anxiety is of particular interest in the present undertaking. An in-depth exploration of the correlation between depression/anxiety and academic achievement could be very beneficial in supporting university students' success. Therefore, further research, specifically longitudinal studies, is needed in this area. Moreover, additional efforts to validate the causal association between depressive and anxiety symptomatology and academic challenges are essential.

1.3 Rationale and Objectives

To the best of our knowledge, no published systematic review has examined the impact of depressive and anxiety symptoms on academic performance in undergraduate university students. Considering this research gap, this review has two main objectives:

1. To identify studies reporting the relationship between depression and/or anxiety and academic performance among university students.
2. To examine the hypothesis that higher levels of depression and higher levels of anxiety are associated with poorer academic performance among university students.

2. Methods

2.1 Search Methods for Identification of Studies

2.1.1 Electronic Searches

In June 2020, a systematic literature review of the PsychINFO, PubMed, Embase, Google Scholar, and Medline databases was conducted to identify peer-reviewed studies published between January 1997 and June 2020 on the impact of depressive and/or anxiety symptoms on academic performance of university students.

2.1.2 Searching Other Resources

References within the included studies were examined to identify further relevant studies.

2.2 Eligibility Criteria

Studies published in peer-reviewed journals were included in the review if they met the following inclusion criteria:

1. The sample consisted solely of undergraduate university students in any year of study at higher education institutions (i.e., universities and colleges) in any country. If studies included a mix of university students and another sample (e.g., adolescents, non-student age-matched peers, postgraduates), they were included if undergraduates had been analyzed and reported separately.
2. The study assessed depression and/or anxiety through standardized, validated outcome measures or clinical diagnosis.

3. The study reported an objective outcome measure of academic performance, such as GPA, degree classification, or examination results.
4. The study reported a statistical estimate of the association between depression and/or anxiety and academic performance.
5. The study was a cross-sectional, longitudinal, or randomized controlled trial of an intervention to reduce depression and/or anxiety that measured academic outcomes. If the study was a randomized control trial, baseline data was considered to explore the effect of depression and anxiety on academic performance.
6. The study was published in English and peer-reviewed journals.

2.3 The Following Studies Were Excluded

2.3.1 Sample Composition

Studies were excluded if they included mixed populations (e.g., undergraduates combined with postgraduate students or other non-student groups) and did not separately analyze or report outcomes for undergraduate university students.

2.3.2 Assessment of Depression/Anxiety

Studies were excluded if they did not assess depression and/or anxiety using standardized, validated outcome measures (e.g., HADS, BDI-II) or through a formal clinical diagnosis.

Studies that relied on unvalidated tools, self-reported non-standardized measures, or anecdotal assessments were excluded.

2.3.3 Academic Performance Outcomes

Studies that did not report an objective measure of academic performance (e.g., GPA, exam scores, degree classification) and studies that used subjective or non-academic outcomes (e.g., perceived performance, qualitative feedback) were excluded.

2.3.4 Statistical Association

Studies that failed to report a statistical estimate of the association between depression and/or anxiety and academic performance were excluded.

2.3.5 Study Design

Excluded studies included designs that did not align with the criteria, such as case studies, systematic reviews, meta-analyses, gray literature, and theses.

2.3.6 Language and Peer Review

Studies were excluded if they were not published in English or peer-reviewed journals.

Gray literature, unpublished studies, or reports not subject to peer review were excluded.

2.4 Database Search Strategy

Boolean terms and/or combinations of the following keywords were used to search for relevant literature: depression, depressive symptoms, major depression, depressive disorder, academic performance, university students, college students, anxiety symptoms, anxiety disorders, and educational achievements (Table 1).

Table 1 Search terms used in online databases (except publisher websites and Google Scholar).

Database	Search strategy
Psych INFO	Exp Major Depression/Exp Anxiety Disorders/OR Exp Anxiety/Depress* OR Anxiety/.ti,ab. Exp Colleges Students/OR Exp Students/Undergraduate*.ti,ab/College OR University) Adj2 Student*.ti,ab. Exp Academic Achievement/Academic OR Education*) Adj2 (Perform* OR Achiev* OR Function* OR Succes*ti,Ab. Limit TO (English Language AND yr = "1997 - 2020")
PubMed	Undergraduate*.ti,ab/College OR University) Adj2 Student*.ti,ab. Exp Academic Achievement/Academic OR Education*) Adj2 (Perform* OR Achiev* OR Function* Educational Status/OR((academic or education*) adj2 (perform* or achiev* OR function* or succes*)).ti,ab. Limit TO (English Language AND yr = "1997 - 2020")
Embase	exp MAJOR DEPRESSION/OR exp ANXIETY DISORDERS/OR exp ANXIETY/depress* OR anxiety).ti,ab. OR exp COLLEGE STUDENTS/or exp STUDENTS OR undergraduate*.ti,ab ((college or university) adj2 student*).ti,ab. OR exp ACADEMIC ACHIEVEMENT/((academic or education*) adj2 (perform* OR achiev* OR function* OR succes*)).ti,ab. limit 13 to (english language and yr = "1997 - 2020")
Medline	exp Depression/OR exp Anxiety/exp Anxiety Disorders/(depress* or anxiety).ti,ab. exp Students/undergraduate*.ti,ab. ((college or university) adj2 student*).ti,ab.OR exp Achievement/OR exp Educational Status/OR ((academic or education*) adj2 (perform* or achiev* OR function* or succes*)).ti,ab. limit 15 to (english language and yr = "1997 - 2020")

Google Scholar (reduced search terms were used).

2.5 Data Collection and Analysis

2.5.1 Selection of Studies

Search results were imported into EndNote X8, and duplicates were removed. Titles and abstracts were screened according to the review's inclusion criteria. The full texts of the remaining articles were obtained and reviewed against the inclusion criteria.

Findings and recommendations from studies published in the past two decades are more relevant and applicable to current university students. The higher education sector has experienced unparalleled growth over the past 20 years globally concerning students' expectations and perceptions of the quality of their learning experience and academic standards [23]. Nevertheless,

consideration should be given to the significant changes in university life for the new generation of undergraduates over the past two decades in terms of technology, economics, and social aspects [24].

2.6 Data Extraction and Management

2.6.1 Extraction

A data extraction form was created using Microsoft Excel to produce a tabulated summary of study characteristics such as population, psychological and academic performance scales, outcomes, study design and other characteristics considered important for inclusion.

2.6.2 Management

The relevant tables in the review were created using a Microsoft Excel sheet as a data entry and management tool.

2.7 Analyzing/Synthesizing the Data

Meta-analysis was not considered in this review as the data and the objectives of the review did not meet the criteria for a meta-analysis design.

2.8 Quality Evaluation

We adapted the quality assessment tool for surveys developed by Parker et al. [25] in order to assess the risk of bias in the studies included in this systematic review. Articles scored one point for each of the following quality markers:

1. The target population (i.e., undergraduate university students) was defined clearly by describing the inclusion and exclusion criteria.
2. Complete, random, or consecutive recruitment was conducted.
3. The targeted sample is representative**,** or the report presents evidence that the results can be generalized to the undergraduate population and has a minimum 50% response rate.
4. The scale used is a validated measure of depression or anxiety with valid cut-off values for the classification of depression and anxiety.
5. The sample size was adequate, with a minimum sample size of 300 [26]. The last quality criterion was added because the more significant the sample, the more precise the results [27].
6. Missing data are accounted for. For example, reasons for dropout are explained, the impact of missing data on results is discussed, and the number of people lost in the follow-up compared to initial responders is explained.
7. The study accounted for potential confounding variables by design and/or statistical analysis.

A full description of the quality assessments for the examined studies is provided in Table 2.

Table 2 Quality assessment of the ten included studies.

SN	Source	Sample definition	Recruitment	Representative sample	Scale	Sample size	Accounts for missing values	Controls for confounding variables	Quality Score
1	Hysenbegasi et al. [28]	1	0	0	1	1	1	1	5
2	Newcomb-Anjo et al. [29]	1	0	1	1	1	1	1	6
3	Ciobanu et al. [30]	1	1	1	1	0	0	1	5
4	Andrews & Wilding [31]	1	0	1	1	1	1	1	6
5	Deb et al. [32]	0	0	0	1	1	0	0	2
6	Sindhu & Basha [33]	0	1	0	1	0	0	0	2
7	Yeh et al. [34]	1	0	1	1	0	0	0	3
8	Cheung et al. [35]	1	1	1	1	1	0	0	5
9	Bahmani et al. [36]	1	1	1	1	1	0	1	6
10	Junaid et al. [37]	1	1	1	1	0	0	1	5

2.9 Study Search and Screening

The search yielded 2,746 citations. After examining the titles and abstracts, 112 full-text articles were retrieved and thoroughly inspected. Subsequently, 102 articles were excluded as a result of the following justifications: studies examining test anxiety and motivation (n = 14); the study population was non-university students or young adults (n = 21); studies that reported only the prevalence of depression and anxiety and not academic performance, (n = 19), studies that did not report any measure of educational performance (n = 18); studies examining the relationship between academic performance and other psychological disorders (n = 24); and studies that did not assess depression or anxiety with standardized measures (n = 6). The remaining articles (n = 10) were included and evaluated for quality. Figure 1 outlines the search process.

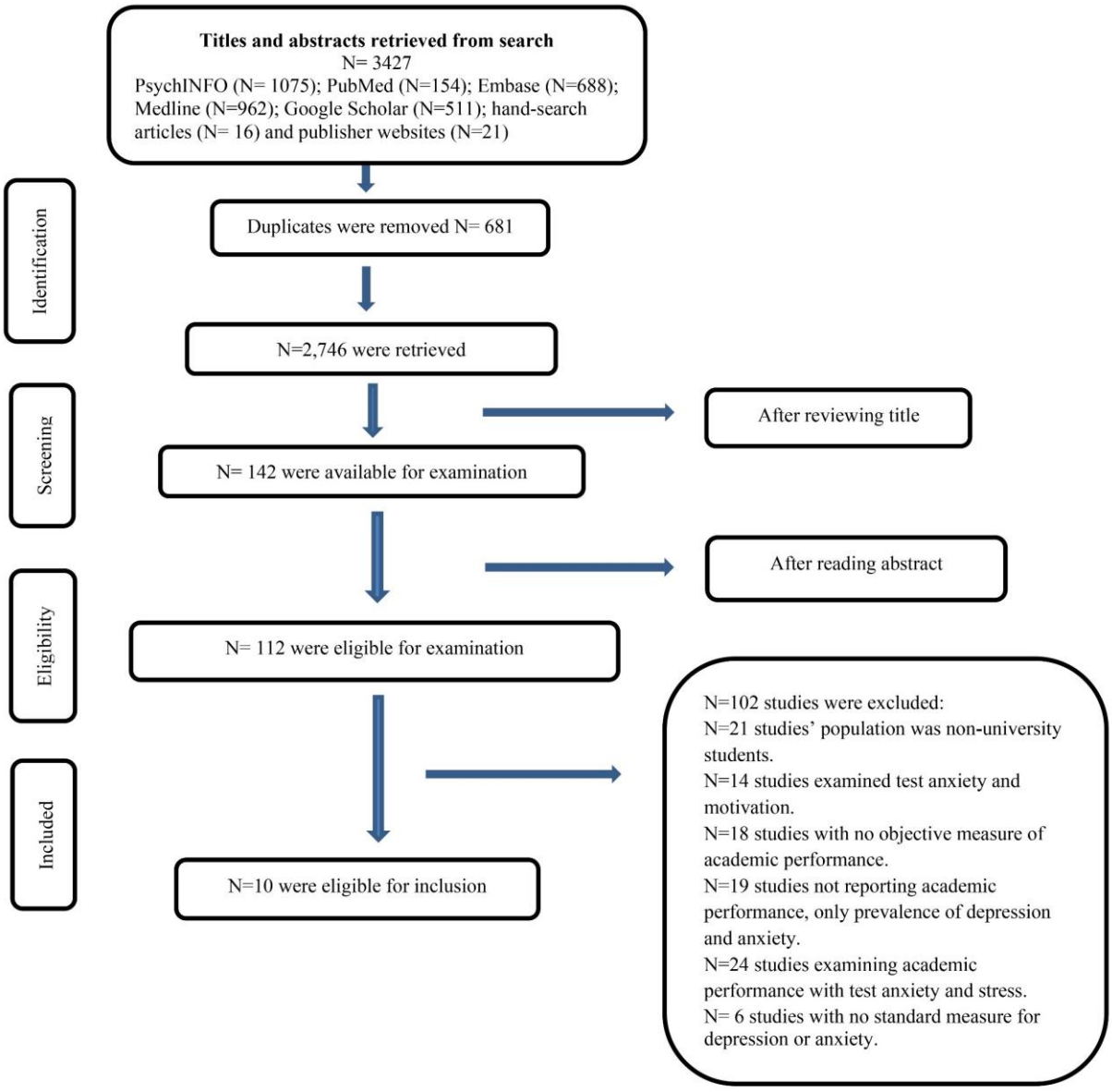

Figure 1 Process of identification of eligible studies for inclusion within the review.

3. Results

The search yielded 2,746 citations. After examining the titles and abstracts, 112 full-text articles were retrieved and thoroughly inspected. Ten studies met all inclusion criteria (Figure 1). Nearly half (n = 4) was carried out in Western countries: one in the USA [28], one in Canada [29], one in Romania [30], and one in the United Kingdom [31]. Four studies were conducted in East and South Asia: two in India [32, 33], one in China [34], and one in Hong Kong [35]. Finally, two were in the Middle East: one in Iran [36] and one in Saudi Arabia [37] (Table 3).

Table 3 Description of the included studies (N = 10).

Study	Year	Country	Period of study	Sample size	Scale to measure depression/anxiety	Academic performance measure
Andrews & Wilding [31]	2004	UK	2000–2002	University students	14-HADS	2nd year-exam averages
Bahmani et al. [36]	2018	Iran	NR	Medical students	21-BDI=II	Exam scores
Cheung et al. [35]	2020	Hong Kong	2019–2020	University students	DASS-21	sGPA, cGPA, aGPA
Deb et al. [32]	2016	India	NR	University students	30-USDI	Choice Based Credit System (CBCS) (cGPA)
Hysenbegasi et al. [28]	2005	USA	NR	University students	Clinical diagnosis	GPA
Junaid et al. [37]	2020	KSA	March 2018 to August, 2018	Medical students	21-BAI-II	cGPA
Ciobanu et al. [30]	2016	Romania	NR	Medical students	ZAS ZDS	GPA Academic Achievements Records
Newcomb-Anjo et al. [29]	2016	Canada	NR	University students	20-CES-D	Grades and academic assignment
Sindhu & Basha [33]	2017	India	NR	University students	BAI- BDI-II	Course marks
Yeh et al. [34]	2007	China	2006–2007	Medical students	20-ZDS 20-ZAS	Achievement Scale marks

ZDS: Zung Self-Rating Depression Scale, ZAS: Zung Self-Rating Anxiety Scale, BAI: Beck Anxiety Inventory Scale, BDI: Beck Depression Inventory Scale, GHO-12: General Health Questionnaire, HADS: Hospital Anxiety and Depression Scale, USDI: University Students Depression Inventory, DASS: The Depression, Anxiety and Stress Scale, GPA: Grade Point Average, cGPA: Cumulative Grade Point Average, sGPA: Semester Grade Point Average and Choice Based Credit System (CBCS).

Medical students were the sole sample in four studies [30, 34, 36, 37]. Six studies recruited and collected data from students across different faculties [28, 29, 31-33, 35]. The majority of studies (n = 6) used a random sample [29, 30, 32, 33, 35, 36], with three studies using convenience sampling [28, 31, 34] and one study employing the systematic method for selecting the sample [35]. The majority adopted a cross-sectional design (n = 6) [29, 32, 33, 35-37], with four studies applying a longitudinal design [28, 30, 31, 34].

A range of measures were used to assess depressive and anxiety symptoms in the articles included in this review. The 10 studies used rating scales to identify depression or anxiety and academic scales to measure scholastic performance (Table 2). Seven different scales were used to measure depression and anxiety in the 10 articles included in the review: the Beck Depression Inventory (BDI) was used in two studies (n = 2) [33, 36], Zung's Anxiety and Depression Scale (ZDS-ZAS) was used in two studies (n = 2) [30, 34], Center for Epidemiological Studies Depression Scale (CES-D) was used in one study (n = 1) [29], the Depression Anxiety and Stress Scale (DASS-21) was used in one study (n = 1) [35]. Hospital Anxiety and Depression Scale (HADS) was used in one study (n = 1) [31]. University Students Depression Inventory (USDI) was used in one study (n = 1) [32], the Beck Anxiety Inventory (BAI (Annexure) was used in one study (n = 1) [37], and one study had clinically diagnosed sample [28].

Seven different measures were used to measure academic performance. Grade point averages (GPAs) were used in three studies (n = 3) [28, 35, 37], followed by the examination marks and the year examination average, which were used in two studies (n = 2) [31, 36]. The Academic Achievements scale was used in two studies (n = 2) [33, 34]. Academic records and academic project assignments were used in two studies (n = 2) [29, 30], and one study (n = 1) [33] used Choice Based Credit System (CBCS) which includes cumulative grade point average (CGPA).

In terms of study quality, the actual quality scores for the 10 included studies ranged from 2 to 6 out of a possible maximum score of 7 (Table 1). The overall sample size of the current review was n = 14,695, ranging from n=20 to n=9,479 participants [33, 35]. The mean age of the samples in the ten studies was between 18 and 26 years [28-37].

Five studies did not report participants' gender [28, 30, 33-35]. In three studies, females comprised 54%–82% of the sample [29, 31, 36], while males comprised 56%–68% of the sample in the two studies [32, 37]. The majority of studies (n = 8) [28-34, 36] reported no significant gender differences in rates of anxiety and depression; one study reported that anxiety rates were higher among female students [37], and another study reported that male students screened for greater elevated depressive symptoms than females [35]. Half of the included studies (n = 5) assessed both anxiety and depression (n = 5) [30, 31, 33-35]. Four studies looked at depression only (n = 4) [28, 29, 32, 36], and one study investigated anxiety only [37].

3.1 Cross-Sectional and Longitudinal Relationships between Depression and Academic Performance

Among the six studies that assessed a cross-sectional relationship between depression and academic performance, all reported a negative relationship between depression and academic performance, so higher levels of depression were associated with poorer performance [29, 32-36]. One of the six studies did not find a significant cross-sectional correlation between depression and academic performance. However, dividing students into high, medium and low groups for

depression revealed a significant effect of group ($p < 0.05$), with students in the low depression group at time one having higher academic scores in block one [34].

Of the four studies [28, 30, 31, 34] to conduct longitudinal analyses, three [28, 30, 31] found that higher levels of depression predicted subsequent poorer academic performance. Hysenbegasi et al. [28] indicated that a diagnosis of depression was associated with a decrease in student GPA of 0.49 points, and depression also mediated the negative relationship between financial difficulties and a decline in academic performance. Academic performance improved for students having treatment for depression.

3.2 Cross-Sectional and Longitudinal Relationships between Anxiety and Academic Performance

Four studies conducted cross-sectional analyses to explore the relationship between anxiety and academic performance [33-35, 37]. Of these, three found a relationship between higher levels of stress and poorer academic performance [33, 35, 37].

Of the three longitudinal studies [30, 31, 34], only one [30] reported a significant longitudinal relationship between higher anxiety and subsequent poorer academic performance. This was significant for first-year students only (Table 4).

Table 4 Characteristics of methodologies employed in the 10 studies and details of the results relating to depression and/or anxiety and academic performance among university students from 1997 to June 2020.

Study	Sample size	Response rate	% female in the sample	Location of the study	Mean/Range age	Study results	Correlation coefficient
Andrews & Wilding [31]	351	76%	75%	UK	NR	Depression made an independent contribution to decrease in exam scores between year 1 and year 2 (controlling for first year marks and demographic variables). Anxiety not related to subsequent exam performance. In the first year, no significant correlation was found. In the second year, depression made an independent contribution to exam marks (beta = -0.11) P value < 0.01	r square = 0.51 p < 0.01
Bahmani et al. [36]	275	84.87%	66.2%	Iran	21.24	Depression is associated with low academic achievement.	Coefficient = -0.49 p < 0.001
Cheung et al. [35]	9,479	56.5%	NR	Hong Kong	18.9	Among the direct entry from secondary school (DEfSS) students' group, there was a negative relationship between GPA (sGPA and cGPA) and depression score. All the groups in this study found a significant negative relationship between high levels of depression, anxiety, and academic performance but the effect sizes very small.	**Depression for all groups:** Spearman r Semester GPA: r = -0.045 p < 0.001 Cumulative GPA: r = -0.038 p < 0.001 Awarded GPA: r = -0.050 p < 0.05 **Anxiety for all groups:** Semester GPA: r = -0.007 p > 0.05 Cumulative GPA: r = -0.003 p > 0.05 Awarded GPA: r =-0.040 p < 0.05

Deb et al. [32]	717	NR	43%	India	22.5	Students who had poorer academic performance had higher depression scores. With means of depression as following: Very good (CGPA 9–10) = 69.92 Good (CGPA 7–8) = 74.93 Moderate (CGPA 5–6) = 80.67 Poor (CGPA below 5) = 86.6	F = 12.56 p < 0.001
Hysenbegasi et al. [28]	330	37%	NR	USA	NR	The coefficient of the depression variable indicates that the diagnosis of a depressive disorder was associated with 0.49-point drop in GPA. An increase in students' GPA of 0.44 was associated with treatment for depression in the depressed group.	Regression coefficient = -0.4854 p < 0.0001 r square = 0.14
Junaid et al. [37]	247	90%	31.2%	KSA	NR	The cumulative GPA was significantly and negatively associated with higher anxiety levels.	p = 0.017 p = 0.014
Ciobanu et al. [30]	356	89%	NR	Romania	18-24	First year students only experienced a negative association between depression, anxiety and GPA (time 1). There was no correlation between depression, anxiety and academic performance among second year students (time 2).	Anxiety rho = -0.290 p < 0.05 Depression rho= -0.254 p < 0.05
Newcomb-Anjo et al. [29]	903	NR	82%	Canada	18-25	Weak negative correlation between grades and depression. No significant relationship once controlled for demographic variables.	Grades and depression r= -0.14
Sindhu & Basha [33]	20	75%	NR	India	NR	Students in low achieving group (n = 3) reported a higher level of depression and anxiety compared to those in the high achieving group (n = 12). P values 1-tailed.	Level of significance for anxiety and academic performance = t (15) = 1.74, p = 0.05 Level of significance for depression and academic performance = t (15) = 2.45, p = 0.014

Yeh et al. [34]	252	90%	NR	China	NR	**The first assessment (time 1):** There was no significant cross-sectional correlation between anxiety and academic performance. Although depression didn't correlate with academic scores, dividing depression scores into high, medium and low showed a significant effect on the group ($p < 0.05$), with students in the low depression group at time 1 having higher academic scores in block 1. **Second assessment (time 2):** There was no longitudinal association between anxiety or depression and subsequent academic performance.	**First assessment (time 1):** Severe depression $r = -0.252$ $p < 0.05$

3.3 Factors Affecting the Relationship between Depression/Anxiety and Academic Performance

Five studies (n = 5) mentioned potential (psychological, social and financial) factors that are most likely to affect the association between depressive or anxiety symptoms and academic achievements. Andrews and Wilding [31] reported that only two factors, depression and financial difficulties, were significantly related to examination performance. Sindhu and Basha [33] stated that stress among university students could affect both high academic achievers and low academic achievers and mediate the relationship between depression, anxiety, and academic performance. Deb et al. [32] reported that students who had poorer academic performance had higher depression scores.

Bahmani et al. [36] reported that depression, loneliness, and scores in all dimensions of social satisfaction were independently associated with academic achievement scores. Additionally, Cheung et al. [35] reported that both higher study load and academic performance were associated with depression but did not control for study load when correlating academic performance with depression.

The remaining five studies (n = 5) did not include or analyze any confounding factors that could affect the impact of depression or anxiety on academic performance [28-30, 34, 37].

4. Discussion

The current review included studies published between 1997 and June 2020 that reported the relationship between depressive and/or anxiety symptoms on academic performance among university students. Of the identified studies, five addressed depression and anxiety, four examined depression only, and one investigated anxiety only.

After reviewing the 10 studies, all six studies have conducted cross-sectional analyses revealed negative associations between depression and academic performance [29, 32-36]. From the four longitudinal studies, three studies found negative longitudinal associations between depression and poorer academic outcomes [28, 30, 31]. The evidence for the negative impact of anxiety on academic performance was less intense. Of the four studies to have conducted cross-sectional analyses [33-35, 37]. Three reported a negative cross-sectional relationship between higher levels of anxiety and poorer academic performance [33, 35, 37]. Of the three longitudinal [30, 31, 34] studies, only one reported a significant longitudinal relationship between higher anxiety and subsequent poorer academic performance [30].

The association between higher levels of depression and poorer academic performance was supported by a recent longitudinal study conducted by Awadalla et al. [38] of a representative sample of university students in the UAE. The study's cross-sectional analysis found higher levels of depression and anxiety were independently but weakly associated with poorer academic performance. Longitudinal analysis found that baseline depression - but not anxiety - predicted poorer GPA at the six-month follow-up. Furthermore, a previous study conducted by Bostanci et al. [39] among university students in Turkey supported these results. The study found that students with elevated symptoms of depression have poorer subjective self-rated academic performance compared to students who do not report symptoms of depression. Similarly, another study of undergraduate and postgraduate students conducted by De Roma et al. [12] and Stark and Brookman [40] found that students with moderate depressive symptoms had significantly lower

GPA compared to those with normal and minimal depressive symptoms. Interestingly, students with severe levels of depression did not have lower GPAs than those with mild or moderate depression. Another prospective study carried out in two cohorts of first-year medical students reported, for the first cohort, a negative relationship between mental health as measured by GHQ12 scores assessed in the second semester and average marks for the first and second year [41]. In the second cohort, GHQ-12 scores were assessed in the first semester and no relationship was found with first- or second-year exam performance.

A number of studies have shown that symptoms of depression affect students' performance and achievement across different levels of education [12, 17, 38, 42]. Findings in this area indicate that academic workload can be highly stressful and psychologically demanding and is a factor that increases the risk of one developing mental health problems [43].

In this study, only one of the three longitudinal studies found anxiety predicated on subsequent academic performance, although three out of four cross-sectional analyses supported a relationship. This is in accord with our recent findings in university students in UAE that depression but not anxiety predicted subsequent academic performance [38].

Consistencies in the relationship may reflect the fact that the relationship between anxiety and performance is not linear. For example, Al-Qaisy [17] reported a negative relationship between depression and academic achievement and a positive relationship between anxiety and academic achievement. The results of this study and other cross-sectional studies that reported a positive relationship between anxiety and academic achievement by Bostani et al. [44] and Eisenberg et al. [45] reflect the complicated relationship between anxiety and academic performance. Some studies suggested that appropriate degrees of anxiety concerning fear of failure could enhance students' self-motivation to perform better in different academic tasks [46]. This can be explained by Yerkes Dodson anxiety curve that suggests performance increases with physiological or mental arousal (stress or anxiety), but only to an extent, after which it can negatively affect the accuracy of one's judgment, working memory and coping, which can lead to poor performance [47].

Some studies in this review examined the relationship between depression and anxiety at different times of the academic year. For example, Andrews and Wilding [31] reported that depression made an independent contribution to a decrease in examination scores at the beginning of the first college year and by the end of the second college year (controlling for first-year marks and demographic variables). Anxiety, however, was not related to subsequent examination performance. Deb et al. [32] reported that there was a significant difference in the level of depression among students in the first and second years of study at the university.

Students in the first year recorded higher levels of depression and poorer academic performance compared to students in the more advanced years. The impact of anxiety and depression on academics may increase during the course. A study conducted by Wyatt et al. [48], found first-year students experienced less negative impact from anxiety and depression compared to second-, third-, and fifth-year students, by referring to the lower workload required by the academic curriculum in the first year compared to what was required in the second and subsequent years of the university study program.

The current review revealed that few studies controlled for potentially confounding factors, and there was a lack of longitudinal studies, which made it difficult to clarify the direction of the relationship. The existence of confounding variables in these studies makes it challenging to establish a clear causal link between depression or anxiety and academic performance among

university students unless appropriate statistical methods were used to measure the impact of the confounding factors [49]. This is consistent with a study carried out by Turner et al. [50] colleagues to study depressive symptoms and academic performance among North Carolina college students using the National College Health Assessment (NCHA) for assessing depressive symptoms. Their study considered other factors that may play a role in the relationship between academic performance and levels of depression, such as race, substance use, and level of financial debt. After statistical adjustment and controlling for variables to measure the level of impact, the study showed a significant association between the controlled confounders, depression level, and cumulative grade average.

Some of the studies identified were conducted in Eastern and South Asia (n = 4) and the Middle East (n = 2), and nearly half of the studies (n = 4) were conducted in the West. This may reflect both publishing bias and a general lack of research in developing countries, generally and specifically in the Middle East, where higher vulnerability to depression and anxiety among people in less economically developed countries due to financial difficulties, stressful life events, mental illness, and a lack of proper sources of health care is culturally dependent [51].

4.1 Educational Implications

In many Arab countries, mental health resources remain underdeveloped, and cultural stigmas surrounding mental health care significantly hinder help-seeking behaviors [52]. In these contexts, online therapeutic interventions offer significant benefits by providing accessible and private alternatives for mental health support.

Digital interventions have shown promise in improving mental health among university students [53]. However, their impact on educational outcomes remains underexplored. In a study by Glazebrook et al. [54], the Moodgym program was assessed for its feasibility and effectiveness in supporting university students in Zambia during the COVID-19 pandemic. This online Cognitive Behavioral Therapy (CBT) intervention was used to address depressive symptoms and anxiety exacerbated by the pandemic. The study found that students appreciated the program for helping them manage stress, improve emotional resilience, and cope with academic pressures. Moreover, it provided valuable insights into the program's acceptability in a low-resource setting, where traditional mental health support is often limited.

Additional research by Lipson et al. [55] and Liu et al. [56] emphasizes the need for mental health services targeting stress and anxiety among students, with interventions such as CBT demonstrating efficacy in managing symptoms and promoting academic resilience.

These findings highlight the importance of incorporating mental health services into university academic support systems to effectively address the combined challenges of psychological well-being and academic demands.

4.2 Limitations

The quality scores for the 10 included studies, ranged from 2 to 6 out of a possible maximum score of 7. As most of the studies included in this review are cross-sectional, identifying the causal relationship among variables might be difficult. In this review, most studies did not control for potentially confounding variables; therefore, the direct relationship could not be assessed. Moreover, the risk of bias due to the low response rate can also affect these analyses' results. For

example, the small sample size of four studies in this review (≤300 participants) and one of the four had only 20 participants, which increases the possibility of bias in the identified studies.

Research bias is the main drawback in a systematic review: studies with statistically significant findings are more likely to be published than those with null findings [57].

4.3 Strengths

It was a strength of the review that studies used either validated measures or a clinical diagnosis of depression and anxiety and an objective measure of academic performance such as grade point average.

5. Conclusion and Recommendations

Although there is a need for in-depth research to confirm the findings of this review, evidence from the ten studies suggests that depressive and anxiety symptoms have a significant impact on university students' academic achievements. The results of this review suggest that more attention should be given to the identification and administration of depression and anxiety in university settings, where there is a high demand for success among students. Student vulnerability may increase further unless research is conducted to establish effective interventions for the treatment of depression and anxiety to enhance students' chances of success in university settings and careers.

This review highlights the importance of access to counseling centers, academic advisors, faculties, and mental health treatment resources to university students and the value of educating this population on the availability of those facilities. Considering the results of this review, to date, little research has been conducted to systematically examine the relationship between depression/anxiety and specific academic performance in a college setting. Therefore, to fully understand the relationship between depression, anxiety, and academic functioning, future research utilizing assessment techniques that would allow for data analysis that enlightens the causality and the specific nature of depression and anxiety is needed. Additionally, future studies might extend the assessment of psychopathology associated with low academic achievement to include symptoms of conditions other than depression and anxiety. Longitudinal designs, as well as other prospective methods of assessing the effects of depressive and anxiety symptoms on academic functioning over semesters, could be utilized to improve our understanding of how academic distress affects depression in college. A well-validated and reliable online therapeutic intervention tools should also be considered as they offer considerable advantages in terms of student access and privacy [58].

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Author Contributions

Titles and abstracts were screened by SA for assessment against the inclusion criteria for the review and the work was double-checked and supervised by CG and EBD. SA provided the first draft

which included conceptualization, data curation, formal analysis and methodology. CG and EBD reviewed and edited the whole review.

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Competing Interests

The authors declare they have no competing interests.

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