Prevalence of mental disorder symptoms among university students: an umbrella review

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**Abstract**

This umbrella review synthesizes data on the prevalence of mental disorder symptoms among university students worldwide. A systematic search of seven databases (inception–July 23, 2023) followed PRISMA guidelines. We included meta-analyses assessing the prevalence of mental disorder symptoms, evaluating methodological quality with AMSTAR-2. A random-effects meta-analysis was conducted, along with meta-regression and subgroup analyses for moderators (percentage of females, publication date, healthcare-related degrees, COVID-19 pandemic).

We included 1,655 primary studies from 62 meta-analyses, encompassing 8,706,185 participants. AMSTAR-2 ratings classified 35% of meta-analyses as low quality and 65% as critically low. Pooled prevalence estimates were: depression—mild (35.41%, CI=33.9–36.93) and severe (13.42%, CI=8.03–19.92; k=952; n=2,108,813); anxiety—mild (40.21%, CI=37.39–43.07) and severe (16.79%, CI=7.21–29.29; k=433; n=1,579,780); sleep disorders (41.09%, CI=35.7–46.58); eating disorders (17.94%, CI=15.79–20.20); gambling disorder (6.59%, CI=5.52–7.75); post-traumatic stress disorder (25.13%, CI=20.55–30.02); stress (36.34%, CI=29.36–43.62); and suicide-related outcomes (ideation past 12 months: 10.76%, CI=9.53–12.06; lifetime ideation: 20.33%, CI=16.15–24.86; suicide attempt past 12 months: 1.37%, CI=0.67–2.29; lifetime attempt: 3.44%, CI=2.48–4.54). Meta-regression analyses identified statistically significant moderators of prevalence such as healthcare academic degrees and the pandemic in the case of depression and studies with more females in the case of sleep disorders. This is the most comprehensive synthesis on the prevalence of mental disorder symptoms in university students, providing crucial insights for clinicians, policymakers, and stakeholders.

**Key words:** umbrella review, meta-analysis, prevalence, mental disorders, university students, anxiety, suicide

**Introduction**

Globally, it is estimated that there are around 254 million university students, a figure that has doubled over the past two decades (UNESCO, n.d.). This rapid growth reflects the increasing emphasis on higher education as an important pathway for development (Sommerfeld, 2016). However, there is also an increasing attention to the significant challenges that students may face during this phase of their life (King et al., 2021; Thompson et al., 2021). In fact, the transition to adulthood during university life often involves many changes such as gaining independence, which comes along with greater autonomy, but also with the need to assume new responsibilities (Thompson et al., 2021). Additionally, this phase also requires social, emotional, and academic adjustments (Worsley et al., 2021). A positive transition experience can enhance well-being, while a negative experience may be psychologically demanding, playing an important role in the mental health of university students (Cage et al., 2021).

Stressors associated with the university period can exacerbate pre-existing psychiatric disorders or make students vulnerable to new ones, leaving them particularly susceptible to mental health challenges (Slimmen et al., 2022; Thompson et al., 2021). Some studies have suggested that university students experience higher rates of mental disorder symptoms, underscoring the urgency of addressing this issue (Akhtar et al., 2020; Auerbach et al., 2016; Ibrahim et al., 2013; Regli et al., 2024; Sheldon et al., 2021; Storrie et al., 2010). Over the years, an evident increasing trend of psychopathology in young adults has been observed (Brunette et al., 2023; Gagné et al., 2022). However, these challenges have been further exacerbated by the COVID-19 pandemic, which introduced new stressors, disrupted educational routines, and triggered a global health crisis with profound impacts on mental health, especially among vulnerable groups (Deng et al., 2021; Li et al., 2021; Zhu et al., 2021). University students were particularly affected, with rates of depression and anxiety rising sharply during this period (Lai et al., 2020; Zhang et al., 2022).

There is a critical need to accurately estimate the prevalence of mental disorder symptoms based on large and comprehensive data, to inform preventive and intervention strategies aimed at addressing these issues in university students. However, despite the growing body of research on mental health in university students, there remains no comprehensive synthesis of prevalence data across countries.

**Objective**

This study aimed to fill this gap by conducting the first umbrella review of meta-analyses reporting data on the prevalence of a broad range of mental disorder symptoms in university students. We also aimed to study factors modifying these prevalence rates, including the impact of the COVID-19 pandemic.

**Methods**

**Study design**

The protocol of this umbrella review was registered on June 5, 2023 at PROSPERO (CRD42023429453). We followed PRISMA recommendations for the conduct and reporting of the umbrella review (Page et al., 2021). There were no deviations from the registered protocol.

**Study outcome**

The umbrella review outcome was the prevalence of mental disorder symptoms in university students. This included the prevalence of mild, moderate or severe symptoms of any mental disorder, and other related outcomes such as suicide and stress.

**Inclusion criteria**

We included systematic reviews with meta-analyses, reporting data on the prevalence of mental disorder symptoms, where the entire sample or a subgroup consisted of university undergraduate or postgraduate (pursuing masters’ degrees or predoctoral studies) students. No specific age range was considered.

We included meta-analyses that provided prevalence of symptoms of mental disorders included in any version of the *International Classification of Diseases* (ICD) or the *Diagnostic and Statistical Manual of Mental Disorders* (DSM). The definition of mild, moderate or severe symptoms was based on the criteria used in the primary studies through a score above a threshold on a validated instrument, a clinical interview, or a self-reported diagnosis.

Additionally, we included other outcomes that, although not classified as mental disorders, are closely associated with mental disorder symptoms: stress, suicidal ideation and intent, following definitions provided in the included meta-analyses.

We aimed to analyze data representative of the overall population of university students by including studies across various educational degrees, educational levels (e.g., freshmen, graduate, PhD students), or gender/sex. However, we excluded studies focusing on subgroups that did not reflect the broader student body, such as foreign students or university athletes.

**Information sources and search strategy**

The search was carried out on PubMed/MEDLINE and Web of Science. CINAHL, ERIC, ScienceDirect, Dialnet and PsycInfo were searched through Unika, an institutional reference aggregator that uses the EBSCO host service. Databases were searched from their inception to July 23, 2023. The search strategy was devised by the senior researchers and included terms for systematic review/meta-analysis, mental disorders (Arrondo et al., 2022), university students, and prevalence (eTable 1). No language, date, or type of publication restrictions were applied. Reference lists of primary studies from the meta-analyses included in this study were also examined to retrieve any additional eligible study.

**Selection process**

Search outputs from each database were imported into Covidence (Veritas Health Innovation, n.d.). Duplicates were removed automatically, with automatic removal double checked manually, and two reviewers independently conducted the title/abstract screening and the full text review. Discrepancies were solved through consensus, or, when not possible, by consulting a senior co-author.

**Data extraction at the meta-analysis level**

Data extraction was completed independently by two authors, using a preformatted excel sheet. Any discrepancies were solved by consensus. Extraction was completed at two levels, meta-analysis and primary study (see supplementary methods). For each meta-analysis, key methodological details and prevalence data were recorded. Authors of included meta-analyses were systematically contacted to gather any relevant information/data on outcome data not reported in the published meta-analysis. Methodological quality of each meta-analysis was assessed independently by two authors using a modified version of the AMSTAR-2 tool (eMethods, eTable 2) (Shea et al., 2017). Data was also obtained for each unique primary study identified across all meta-analyses, including participant information, mental disorders and their evaluation and prevalence data. We accessed the texts of the primary studies to obtain additional information in specific cases where key data were not available at the meta-analysis level.

A variety of psychological tools and thresholds was used across studies. To combine results, scales were simplified into broader categories and symptom severity for depression, anxiety, and sleep disorders was categorized into mild, moderate, and severe by comparing thresholds used in the primary studies to those recommended in the literature. Severity classification for other disorders was not possible due to inconsistent thresholds or a lack of studies.

**Data Synthesis**

Since the overlap of primary studies across different meta-analyses on the same disorder was deemed to be generally low- and this was confirmed when we retrieved the meta-analyses- our approach aimed to pool effect sizes from individual studies from multiple meta-analyses. This greatly increased the coverage across time periods, educational degrees and countries, as well as the overall sample size. Statistical analyses were performed using STATA 18.0 (StataCorp LLC). For each outcome, a random-effects meta-analysis was conducted, employing a Freeman-Tukey transformation to aggregate effect sizes from the primary studies. The pooled prevalence for each outcome, along with 95% confidence intervals, was calculated. Heterogeneity was assessed using the I² statistic, where I² > 50% indicated substantial heterogeneity due to true variance across studies. Additionally, the H² and τ² statistics were used to describe the variability in effect measures across studies or subgroups A leave-one-out analysis was performed to evaluate the influence of each study on the overall effect, and prediction intervals were also calculated.

Categorical meta-regressions and subgroup analyses were conducted to examine the impact of key variables available for most primary studies. These variables included: study period (before 2010, between 2010 and 2014, between 2015 and 2019 and after 2019, with the latter group further split in those carried out before or after the onset of the COVID-19 pandemic following description in the meta-analyses and texts of the primary studies); proportion of healthcare students, the percentage of women in study samples (divided into tertiles); and country-level gross national income (GNI) based on World Bank data (World Bank, n.d.). Low and middle-low-income countries were lumped due to a limited number of studies in the former category. Additionally, the potential change in these variables' prevalence rate before and after the pandemic was explored. Each variable was included in a one-factor meta-regression predicting disorder prevalence if at least 10 primary studies were available for each level of dichotomous variables, as per current suggestions (Borenstein et al., 2009). For variables with more than two levels (e.g., gender distribution, study periods, income levels), a minimum of 10 studies for at least two levels was required. Meta-regressions were also conducted incorporating an additional factor for the pandemic, and further analyses explored interactions between the factors. Subgroup analyses were reported when either both factors were significant without interaction, or when a significant interaction was found.

For depression, anxiety, and sleep problems, prevalence summaries were reported according to severity, whereas for the remaining outcomes, all data from primary studies were combined into a single pooled effect, as severity categorization was usually not reported in the primary studies. Hence, pooled prevalence reflected the combination of severities across existing studies.

**Results**

**Study selection**

The literature search yielded 14,655 results, with 5,742 duplicates. After title/abstract screening, 152 articles underwent full-text review, resulting in 62 eligible meta-analyses (eResults) covering twelve mental disorder symptoms (ten referring to mental disorders and two mental disorder-related outcomes). Included meta-analyses comprised 1,655 primary studies, yielding 2,151 prevalence data points with a combined sample size of 8,706,185 individuals. Figure 1 illustrates the PRISMA flow diagram. Table 1 provides detailed information for the included meta-analyses. The 90 excluded meta-analyses, with reasons for exclusion, are listed in eTable 3 and 4.

**Study characteristics and outcomes**

Most of the meta-analyses provided prevalence data on symptoms of depression (k=952), anxiety (k=433), and sleep disorders (k=163). Additional data on the meta-analyses, including the pooled rate reported for each outcome can be found in Figure 2, eFigure 1, eTables 5 and 6. eTable 7 lists the instruments used to assess symptoms of mental disorders across primary studies. According to the AMSTAR-2 assessment, 35% of the included meta-analyses were rated as low quality, while 65% were deemed critically low. The median number of critical domains was 2 (range: 1-5) (eTable 8). Common sources of bias included the absence of a list of excluded studies (98%) and the lack of a protocol (63%). Other prevalent biases involved insufficient justification for study design selection (73%) and inadequate evaluation (69%) and discussion (69%) of risk of bias.

**Depression**

Nine hundred fifty-two primary studies included in 34 meta-analyses reported the prevalence of symptoms of depression among 2,108,813 university students. Prevalence of mild depression symptoms was 35.41% (CI=33.9-36.93; k=816; I2=99.68%). Moderate symptoms were reported by 24.54% (CI=21.27-27.96; k=127; I2=99.79) of the students, whereas severe symptoms by 13.42% (CI=8.03-19.92; k=9; I2=99.79%).

Prevalence rates of depression symptoms were significantly higher in the post-pandemic period (Figure 3). An effect of country income, which additionally interacted with the pandemic, was also found. Before the pandemic, low and lower-middle-income countries had higher prevalence of symptoms than upper-middle or high-income countries. However, our results showed higher prevalences after the pandemic for students of more developed countries. Additional information in eFigure 2 and eTable 9.

**Anxiety**

Twenty-two meta-analyses including 433 primary studies were analyzed, encompassing a total of 1,579,780 participants. 40.21% (CI=37.39-43.07; k=296; I2=99.87%) of students reported mild anxiety symptoms, 28.18% (CI=24.86-31.61; k=128; I2=99.68%) moderate, and 16.78% (CI=7.21-29.29; k=9; I2=99.7%) severe symptoms (Figure 4).

There was no evidence for an effect of COVID-19 on anxiety in our data (eFigure 3). However, our results show that the effects of COVID-19 interacted with other factors, namely country economic status and percentage of women. Before the pandemic, countries with low and lower-middle-income showed a higher prevalence of symptoms. Studies conducted after the pandemic showed higher prevalence rates in high-income countries. There was also a complex relation between the percentage of women in a study, whether it had been carried pre or post-pandemic, and its reported prevalence of anxiety. Before the pandemic, studies with a higher percentage of women showed higher rates of severe anxiety symptoms. After the pandemic, prevalences were similar across groups.

**Sleep disorders**

Ten meta-analyses, including 163 primary studies, examined the prevalence of sleep disorders in a sample of 203,713 students. 41.09% of the students report mild symptoms (CI=35.7-46.58; k=91; I2=99.71%), 23.3% (CI=20.78-25.92; k=71; I2=98.84%) moderate, and 13.02% (CI=10.96-15.22; k=1) severe symptoms. A significantly higher prevalence of sleep problems was found after the pandemic in females and healthcare-related degree students (eFigures 4 and 5). Moreover, a single meta-analysis indicated that 36.18% (CI=28.45-44.28; k=28; n=10,122; I2=98.54%) of healthcare students experienced excessive daytime sleepiness during the pandemic.

**Symptoms of other disorders**

Figure 2 reports prevalence rates of symptoms (in most cases mild) of eating disorders (17.94%; CI=15.79–20.20; k=134; n=147,333; I2=98.86%; eFigures 6 and 7); gambling disorder (6.59%; CI=5.52–7.75; k=75; n=2,236; I2=94.89%; eFigure 8); post-traumatic stress disorder (25.13%; CI=20.55–30.02; k=46; n=108,898; I2=99.68%; eFigures 9 and 10); borderline personality disorder (10.07%; CI=7.74-12.66; k=43; n=26,353; I2=97.54%); hypochondria (27.24%; CI=16.55-39.46; k=7; n=6,217; I2=99%); internet gaming disorder (6.84%; CI=3.15-11.77; k=6; n=2,236; I2=93.78%); and premenstrual syndrome (56.59%, CI=45.94-66.95; k=13; n=5,617; I2=98.45%). Results from the meta-regressions are provided in supplementary material (eResults). Prevalence of dissociative disorder, as reported in the original meta-analysis is 6.7% (Kate et al., 2020).

**Mental disorder related outcomes (stress and suicide)**

Prevalence of stress was 36.34% (CI=29.36–43.62; k=58; n=43,027; I2=99.58%). Data on suicide are reported according to four categories (eFigure 11): ideation in the past 12 months (10.76%; CI=9.53–12.06; k=95; n=809,986; I2=99.63%); lifetime ideation (20.33%; CI=16.15–24.86; k=30; n=470,397; I2=99.84%); suicide attempt in the past 12 months (1.37%; CI=0.67–2.29; k=23; n=604,300; I2=99.78%); and lifetime suicide attempt (3.44%; CI=2.48–4.54; k=31; n=467,495; I2=99.37%).

**Discussion**

This study aimed to address a significant gap in the literature by conducting the first umbrella review of meta-analyses reporting prevalence data on a wide range of mental disorder symptoms in university students, while also examining factors that may be associated with these rates, including the impact of the COVID-19 pandemic. Prior to this review, studies on the prevalence of mental disorder symptoms among university students were largely limited to specific regions or academic disciplines. By synthesizing data from 62 meta-analyses, comprising 1,655 primary studies and over 8.7 million participants, we provide the first global estimate of the prevalence of these symptoms.

For many years there has been a steady increase in the prevalence of mental disorders among young adults due to multiple factors, as indicated by studies from the United States (Brunette et al., 2023) or Great Britain (Gagné et al., 2022). However, this increase has been further aggravated by the pandemic. Our results highlight the significant impact that the COVID-19 crisis had on the mental health of university students and shows how other variables relate to mental health and interacted with the pandemic.

Depression and anxiety, often comorbid, exhibited the highest prevalence rates (Sansone and Sansone, 2010). In this review, 13.42% and 16.78% of students reported severe depression symptoms and anxiety, respectively.These findings are particularly concerning due to the adverse effects of depression and anxiety on students' academic performance, well-being, and mental health (Batra et al., 2021; Tan et al., 2023). Our results add to existing literature across several populations showing higher prevalence of depression symptoms during and after the pandemic (Ettman et al., 2020; Solla et al., 2023).

Regarding anxiety, while some studies observed increased symptoms during the pandemic, others, including this review, found no significant differences (Kefeli and Akkus, 2023; Shah et al., 2021; Tan et al., 2023). In fact, longitudinal studies have revealed that some individuals with higher levels of anxiety before the pandemic may have experienced a decrease in their symptoms afterwards (Bendau et al., 2021; McLoughlin et al., 2023). This improvement could be attributed to reduced social pressure, fewer interactions, and greater control over their environment, which may have provided a temporary sense of relief for those prone to anxiety. These findings suggest that the pandemic’s impact on anxiety levels may not have been universally negative and may have varied depending on individual circumstances. This inconsistency highlights the need for further research to understand the varying impacts across populations and contexts. Our results also suggest that COVID-19 interacted with factors such as gender, degree type and countries’ economic status differently across disorders. For anxiety specifically, pre-pandemic studies with a higher percentage of women reported higher rates, but post-pandemic, prevalence rates were similar across genders.

We also found significant differences between healthcare students and students from other fields. Healthcare students exhibit higher rates of depression, sleep-disorder symptoms and suicidal ideation, a trend that intensified with the onset of the pandemic (Mulyadi et al., 2021; Peng et al., 2023; Rotenstein et al., 2016; Santabárbara et al., 2021). This discrepancy likely derives from the distinct stressors faced by healthcare students, including greater exposure to healthcare-related challenges during the pandemic. Conversely, non-healthcare students showed more symptoms of eating disorders, contrary to some prior research (Fekih-Romdhane et al., 2022; Jahrami et al., 2019). Better knowledge of medical and nutritional facts could work as a protective factor in this regard.

Regarding gender-based patterns, the presence of more symptoms of anxiety, sleep disorders, and lifetime suicide attempts and less gambling symptoms in studies involving a higher proportion of women aligns with the well-documented greater likelihood of internalizing behaviors in females (Blinn-Pike et al., 2007; Boyd et al., 2015; Kinrys and Wygant, 2005; Rosenfield and Mouzon, 2013).

Mental health outcomes among university students vary significantly across countries with different income levels, reflecting the interplay between socioeconomic contexts and mental health. Pre-pandemic data show that students in lower-income countries reported more symptoms of depression, anxiety, post-traumatic stress disorder (PTSD), and suicide attempts, likely linked to financial instability, limited mental health resources, and other stressors. In contrast, higher rates of sleep and eating disorders in high-income countries prior to the pandemic suggest challenges related to lifestyle factors, cultural expectations, or societal pressures, such as academic demands and unhealthy coping mechanisms like disordered eating. Also, sleep disorders have been associated with negative lifestyles such as excessive screen use (Wacks and Weinstein, 2021), gambling (Zortéa, 2025) or substance abuse (Phiri et al., 2023), which can further contribute to psychological distress, impaired academic performance, and reduced overall well-being among university students.

The findings of this umbrella review should be interpreted considering both its strengths and limitations. A key strength lies in its comprehensive and exhaustive examination of the available literature. Unlike most umbrella reviews, we did not simply report estimates form meta-analyses only, but also retrieve missing data from primary studies, providing a richer dataset. Moreover, we combined data from primary studies across the different meta-analyses. Since the overlap in the included studies across meta-analyses was minimal, this allowed for a more globally representative estimation of prevalence. Additionally, meta-analyses related to other mental health outcomes beyond symptoms of established mental disorders, such as stress or suicide, were also included. Overall, this broad scope offers valuable insights into the mental health of university students, extending previous research, which often focused on a single disorder or country (Ibrahim et al., 2013; Sheldon et al., 2021; Storrie et al., 2010).

Despite including all relevant meta-analyses to ensure reliable prevalence estimates, some limitations remain. For instance, since we did not analyze the primary studies directly and instead followed the terminology used in the meta-analyses, it was not possible to determine whether some of the included symptoms, such as those related to sleep or stress, were identified as primary conditions or secondary to other disorders. Due to possible publication bias, primary studies with non-significant results may have not been included in the meta-analyses that we analyzed. Moreover, meta-analyses on certain conditions such as bipolar disorder or schizophrenia, were unavailable, and the limited focus on graduate students hindered comparisons with undergraduates. Additionally, although symptoms of at-risk states and neurodevelopmental disorders were included in our search strategy, we did not identify any meta-analyses specifically addressing their frequency or continuity across development, particularly within university populations. This absence may be due to the developmental nature of these disorders, which are typically studied in earlier life stages. Nonetheless, this represents a relevant gap in the literature and highlights an important area for future research.

High heterogeneity across the included studies posed a key challenge, driven by variations in sample characteristics (e.g., student numbers, gender ratios, socio-economic conditions) and screening tools. Although subgroup analyses and meta-regression were conducted to explore sources of heterogeneity, this remained high. A significant source of heterogeneity was the use of self-reported measures, which varied in psychometric properties and cut-off points, even when using the same tools. These discrepancies hinder comparability across studies. To address this, we reclassified symptoms in three severity categories based on cut-off points. However, most measures relied on symptom inventories or screening tools rather than clinical interviews, which may affect findings. Future research should prioritize diverse populations, especially graduate students, and adopt more robust mental health assessments to guide targeted interventions for university students worldwide. Finally, underrepresentation of certain regions limits the generalizability of the findings.

Despite these limitations, this umbrella review provides the largest evidence synthesis of the global prevalence of mental disorder symptoms among university students, addressing gaps in the existing literature and being a unique resource, which should inform clinicians, policymakers, and guideline developers. This review also contributes to the discussion on DSM-5 conditions requiring further study, as it includes symptoms such as suicidality and gaming disorders within this category. Closer examination of these conditions is essential, as they currently lack sufficient empirical evidence, and clearly defined treatment guidelines, unlike well-established disorders. In the case of suicidal ideation or behavior, further research is particularly important given its potential co-occurrence with disorders such as depression or post-traumatic stress disorder, and its association with severe, potentially life-threatening outcomes.

By identifying the most prevalent disorders, their trends over time, and related outcomes, this review can guide the development of targeted prevention strategies tailored to specific subgroups of this population such as international students or PhD students. Additionally, it can enhance early identification efforts by highlighting key screening tools and identifying specific academic programs or fields of study that may pose a higher risk of vulnerability. These insights can support policymakers in designing evidence-based interventions, optimizing the use of resources, and integrating mental health services within university settings to improve overall student well-being.

**Conclusion**

Given the increasing concern regarding the mental health of university students, this umbrella review serves as valuable and unique evidence base on the psychological distress experienced by this population.

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**Table 1. Summary of the characteristics of included MAs**

COVID-19: whether the meta-analysis includes studies during the COVID-19 pandemic (yes), or not (no), or both before and during the pandemic (mixed). k: number of studies included in the meta-analysis. n: number of participants included in the meta-analysis. Extracted disorders: mental disorders each meta-analysis dealt with. All the information in the table refers to the meta-analyses as presented in the publications, irrespective of the information used in our umbrella review.

| **Author, year** | **COVID-19** | **Search period** | **Databases searched** | **k** | **n** | **AMSTAR rating (critical domains)** | **Extracted disorders/outcomes** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Ahmed 2023 | Mixed | 1980 - 2020 | 4 | 83 | 130,090 | Low (1) | Anxiety |
| Akhtar 2020 | No | 2009 - 2018 | 3 | 37 | 76,608 | Low (1) | Depression |
| Alhaj 2022 | Mixed | up to 2021 | 9 | 105 | 145,629 | Low (1) | Eating disorders |
| Batra 2021 | Yes | 2019 - 2020 | 5 | 27 | 90,879 | Low (1) | Depression, Anxiety, PTSD, Stress disorders, Sleep disorders and Suicide |
| Binjabr 2023 | Mixed | up to 2023 | 6 | 109 | 59,427 | Low (1) | Sleep disorders |
| Blinn-Pike 2007 | No | 2005 | 3 | 15 | 9,794 | Critically low (4) | Disordered gambling |
| Carvalho 2022 | Yes |  | 3 | 13 | 18,220 | Critically low (3) | Depression, Anxiety and Stress disorders |
| Chang 2021 | Yes | 2020 | 4 | 16 | 144,010 | Critically low (3) | Depression and Anxiety |
| Chiang 2021 | Unclear | up to 2021 | 8 | 6 | 2,236 | Critically low (3) | Internet gaming disorder |
| Demenech 2021 | No | 2020 | 4 | 47 | 37,486 | Critically low (2) | Depression, Anxiety and Suicide |
| Deng 2021 | Yes | 2020 - 2021 | 11 | 89 | 1,441,828 | Low (1) | Depression, Anxiety and Sleep disorders |
| Dutta 2023 | Mixed | 2019 - 2022 | 3 | 19 | 5,944 | Low (1) | Depression |
| Ebrahim 2022 | Yes | 2020 | 5 | 90 | 46,284 | Critically low (3) | Depression and Anxiety |
| Erbil 2021 | No | 2014 - 2018 | 5 | 18 | 6,890 | Critically low (4) | Premenstrual syndrome |
| Fekih-Romdhane 2022 | Mixed | up to 2021 | 9 | 28 | 21,383 | Low (1) | Eating disorders |
| Fernandes 2023 | Mixed | 2011 - 2023 | 6 | 26 | 24,704 | Low (1) | Depression |
| Gao 2020 | No | up to 2020 | 4 | 113 | 185,787 | Critically low (4) | Depression |
| Guo 2021 SH | No | 1980 - 2020 | 10 | 37 | 27,717 | Critically low (2) | Depression |
| Hu 2023 | Yes | 2020 - 2022 | 3 | 38 | 95,375 | Critically low (2) | PTSD |
| Idoiaga 2022 | Yes | 2019 - 2021 | 1 | 6 | 29,739 | Critically low (3) | PTSD |
| Jaafari 2021 | No | 1991 - 2019 | 10 | 89 | 33,564 | Critically low (2) | Depression |
| Jahrami 2019 | No | 1982 - 2017 | 4 | 18 | 5722 | Critically low (3) | Eating disorders |
| Jahrami 2022 | Yes | 2019 - 2021 | 11 | 22 | 21,880 | Low (1) | Sleep disorders |
| Jia 2022 | Yes | 2019-2021 | 5 | 41 | 36,608 | Low (1) | Depression and Anxiety |
| Jiang 2015 M | No | 2000 - 2014 | 5 | 45 | 50,826 | Critically low (4) | Depression |
| Jiang 2015 PH | No | 2000 - 2014 | 6 | 7 | 16,478 | Critically low (2) | Sleep disorders |
| Kaggwa 2022 | Mixed | 1972 - 2021 | 5 | 4 | 1,982 | Low (1) | Depression |
| Kate 2020 | No |  | 2 | 98 | 31,905 | Critically low (5) | Dissociative disorders |
| Khan 2021 | No | up to 2019 | 4 | 26 | 7,652 | Low (1) | Depression |
| Lasheras 2020 | Yes | up to 2020 | 1 | 8 | 11,710 | Critically low (2) | Anxiety |
| Lei 2016 | No | 1995 - 2015 | 5 | 39 | 32,694 | Critically low (4) | Depression |
| Li 2014 | No | 2004 - 2013 | 5 | 41 | 160,339 | Critically low (3) | Suicide |
| Li 2018 | No | up to 2016 | 6 | 76 | 112,939 | Critically low (2) | Sleep disorders |
| Li 2021 | Yes | 2019 - 2020 | 10 | 27 | 706,415 | Low (1) | Depression and Anxiety |
| Liyanage 2022 | Yes | 2020 - 2021 | 3 | 36 | 1,090,901 | Critically low (2) | Anxiety |
| Luo 2021 | Yes | 2020 - 2021 | 6 | 84 | 1,292,811 | Low (1) | Depression |
| Meaney 2016 | No | 1994 - 2014 | 16 | 43 | 26,343 | Critically low (4) | Borderline personality disorder |
| Meng 2019 | No | up to 2019 | 6 | 7 | 6,217 | Critically low (2) | Hypochondria |
| Mortier 2018 | No | 1980 – 2016 | 5 | 36 | 634,662 | Low (1) | Suicide |
| Mulyadi 2021 | Yes | 2020 - 2021 | 4 | 17 | 13,247 | Critically low (2) | Depression, Anxiety, PTSD, Stress disorders and Sleep disorders |
| Muniz 2021 | No | up to 2020 | 3 | 58 | 16,805 | Critically low (2) | Depression |
| Nowak 2014 | No | 2005 - 2013 | 4 | 19 | 13,080 | Critically low (4) | Disordered gambling |
| Nowak 2018 | No | 1987 – 2016 | 4 | 72 | 41,989 | Critically low (4) | Disordered gambling |
| Pacheco 2017 | No | 1909 - 2016 | 4 | 59 | 18,015 | Low (1) | Depression, Anxiety and Sleep disorders |
| Peng 2023 | Yes | 2020 - 2022 | 7 | 201 | 198,000 | Low (1) | Depression, Anxiety, PTSD, Stress disorders, Sleep disorders and Suicide |
| Puthran 2016 | No | up to 2015 | 5 | 77 | 62,728 | Critically low (2) | Depression |
| Quek 2019 | No | up to 2019 | 3 | 68 | 40,438 | Critically low (2) | Anxiety |
| Rotenstein 2016 | No | 1982 - 2015 | 5 | 195 | 129,123 | Critically low (2) | Depression and Suicide |
| Santabarbara 2021 IJER | Yes | 2019 - 2021 | 1 | 15 | 6,141 | Critically low (3) | Anxiety |
| Santabárbara 2021 M | Yes | 2019 - 2021 | 3 | 13 | 4,147 | Critically low (2) | Depression |
| Santabárbara 2021 RMJ | Yes | 2019 - 2020 | 3 | 11 | 6,576 | Critically low (2) | Depression |
| Sarokhani 2013 | No | 1995 - 2012 | 7 | 35 | 9,743 | Critically low (4) | Depression |
| Satinsky 2021 | No | up to 2019 | 5 | 32 | 23,469 | Low (1) | Depression and Anxiety |
| Sheldon 2021 | No | 1946 - 2020 | 4 | 12 | 16,376 | Low (1) | Depression and Suicide |
| Sun 2022 | Mixed | up to 2021 | 5 | 14 | 21,848 | Low (1) | Sleep disorders |
| Trindade 2019 | No | up to 2017 | 3 | 14 | 11,487 | Low (1) | Eating disorders |
| Tsegay 2020 | No | up to 2020 | 3 | 14 | 26,393 | Critically low (4) | Suicide |
| Tung 2018 | No | 2015 - 2016 | 8 | 27 | 8,918 | Critically low (2) | Depression |
| Wang 2021 | Yes | up to 2020 | 4 | 28 | 436,799 | Critically low (3) | Depression, Anxiety and Stress disorders |
| Wang 2022 | Yes | up to 2021 | 5 | 25 | 1,003,743 | Critically low (2) | Anxiety |
| Zeng 2019 | No | 1806 - 2018 | 6 | 10 | 30,817 | Critically low (3) | Depression, Anxiety, Eating disorders and Suicide |
| Zhang 2021 | Yes | up to 2020 | 9 | 31 | 274,175 | Critically low (3) | Depression and Anxiety |

**Figure 1. PRISMA study selection flowchart**

**Figure 2.** **Forest plot of the main effect with Confidence Intervals of every mental disorder symptom**

**Figure 3. Depression in students, sub-group analyses with Confidence Intervals**

**Figure 4. Anxiety sub-group analyses with Confidence Intervals**