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Systematic review

Sleep disturbance and its association with depression and anxiety among Saudi adolescents and young adults: a systematic review

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Abstract

Background: Sleep disturbance is increasingly reported among adolescents and young adults and is its linked with psychological symptoms. In Saudi Arabia, university and healthcare students represent an important young adult group exposed to academic stress, digital screen use, and irregular sleep habits. **Objective:** This systematic review aimed to analyze the association between sleep disturbance and depression or anxiety in Saudi adolescents and young adults. **Methods:** Our systematic review was guided by PRISMA principles. Electronic databases were searched, including PubMed, Web of Science, PubMed Central, MEDLINE, Scopus, and Embase. Eligible studies were original observational studies conducted in Saudi Arabia, included adolescents or young adults, assessed sleep disturbance, poor sleep quality, or insomnia, and reported depression or anxiety outcomes. We exclude reviews, editorials, commentaries, case reports, non-Saudi studies, and studies without relevant sleep or mental health outcomes. Data were extracted on

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study characteristics, population, sample size, assessment tools, sleep outcomes, depression, anxiety, and reported associations. **Results:** We include eight original cross-sectional studies. All studies were conducted among Saudi university, medical, or healthcare students, so the data mainly represented young adults rather than school adolescents. Poor sleep quality ranged from 63.2% to 80.3% in PSQI-based studies, while insomnia ranged from 19.3% to 34.9% in ISI-based studies. Depression and anxiety were common in the included studies. Most studies reported significant associations between poor sleep quality or insomnia and higher depression, anxiety, or stress symptoms. **Conclusion:** Sleep disturbance is common in Saudi young adults and is associated with depression and anxiety.

Keywords: Sleep disturbance; sleep quality; insomnia; depression; anxiety; Saudi Arabia; young adults.

Introduction

Sleep is the vital biological process that supports physical growth, cognitive function, emotional regulation, and daily functioning in adolescents and young adults (Silva 2022). Sleep quality includes, sleep duration, sleep latency, sleep continuity, sleep efficiency, and daytime restoration after sleep (Wang 2021). Disturbance in these dimensions is common during adolescence and young adulthood because this developmental period is affected by circadian changes, academic pressure, social demands, and increasing autonomy in daily habits (Chai 2024). University students are exposed to irregular schedules, caffeine use, evening study, digital screen exposure, and reduced physical activity, which are reported determinants of poor sleep quality (Wang 2021).

Depression and anxiety represent major concerns in student populations (Li 2022). A systematic review and meta-analysis of college students reported pooled prevalence estimates of 33.6% for depression symptoms and 39.0% for anxiety symptoms (Li 2022). Evidence from children and youths indicates that disturbed sleep is associated with later depression, although the reported effect size is small and the data quality has limitations (Marino 2021). Reviews focused on adolescents describe sleep disruption as closely linked with depression and anxiety, while the direction of this

The relationship between sleep disturbance and mental health is relevant because sleep problems and psychological symptoms affect each other through behavioral, emotional, and physiological pathways (Dinis 2018). Poor sleep quality is linked with poorer mental health in college students, and poor mental health contributes to worse sleep quality (Wang 2021). Depression was associated with disturbed sleep in college students, and the existing literature indicate that sleep quality is relevant in understanding depressive symptoms in young adults (Dinis 2018). Anxiety is related to poor sleep because hyperarousal, worry, and difficulty relaxing before sleep interfere with sleep initiation and sleep continuity (Chai 2024).

Digital behavior is another factor in this population because screen exposure before bedtime is associated with poor sleep quality and daytime sleepiness in children and adolescents (Carter 2016). A systematic review of adolescent screen use found that excessive digital screen use was associated with shorter and worse sleep (Silva 2022). Saudi university students show patterns linking screen time, social media use, sleep problems, anxiety, and depressive symptoms (Alkaabba 2025).

In Saudi Arabia, several original studies examined sleep quality, insomnia, depression, anxiety, and

stress among university, medical, and healthcare students (Al-Khani 2019). Poor sleep quality was reported among medical students in Al-Qassim and significantly associated with depression, anxiety, and stress (Al-Khani 2019). Medical students at King Abdulaziz University also had high poor sleep quality, and anxiety was the strongest adjusted predictor of poor sleep quality (Ibrahim 2017). Studies from Jazan University and healthcare students from different Saudi regions reported significant associations between poor sleep quality or insomnia and depression, anxiety, and stress (Albasheer 2020).

Most available original Saudi studies were conducted among university and healthcare students rather than school adolescents (Yaghmour 2023). Our systematic review aimed to analyze original Saudi studies assessing sleep disturbance, poor sleep quality, or insomnia in relation to depression and anxiety among adolescents and young adults.

Method

This systematic review was conducted to analyze original articles about sleep disturbance and its association with depression and anxiety among Saudi adolescents and young adults. The review followed a structured systematic review approach and was guided by PRISMA principles for identification, screening, eligibility assessment, and inclusion of studies. The research question was: What is the association between sleep disturbance and depression or anxiety in adolescents and young adults in Saudi Arabia?

Electronic literature search was performed using PubMed, Web of Science, PubMed Central, MEDLINE, Scopus, and Embase. The search focused on studies conducted in Saudi Arabia and assessing sleep disturbance, poor sleep quality, insomnia, or sleep problems in relation to depression, anxiety, stress, or mental health symptoms. The search terms included: “sleep disturbance,” “sleep quality,” “poor sleep,” “insomnia,” “depression,” “anxiety,” “mental health,” “psychological distress,” “adolescents,” “young adults,” “students,” “university students,” “medical students,” “healthcare students,” “Saudi Arabia,” and “Kingdom of Saudi Arabia.” Boolean operators were used to combine the terms, including AND and OR. The reference lists of eligible articles were checked to identify additional relevant studies.

Studies were included when they are original observational studies, conducted in Saudi Arabia, included adolescents or young adults, assessed sleep disturbance or sleep quality, and reported depression or anxiety outcomes or their association with sleep. Studies were eligible when they used validated tools for sleep assessment, including the Pittsburgh Sleep Quality Index or Insomnia Severity Index, and mental health tools such as DASS-21, HADS, PHQ-9, or GAD-7. We exclude reviews, editorials, commentaries, case reports, non-Saudi studies, studies without sleep outcomes, studies without depression or anxiety outcomes, or studies conducted among older adults or clinical patients outside the target population.

All records identified from the databases were checked for duplication. After removing duplicates, titles and abstracts were screened for relevance to the review topic. Full texts of eligible studies were then reviewed against the inclusion and exclusion

criteria. Studies that did not assess sleep disturbance with depression or anxiety were excluded during full-text assessment. The final included studies were summarized in two tables, one table for study characteristics (Table 2) and one table for the main findings (Table 3).

Data extraction was performed using a structured extraction form. The extracted data included author name, publication year, study location, study design, study population, sample size, age group, sleep assessment tool, mental health assessment tool, prevalence of sleep disturbance, prevalence of depression and anxiety, and reported association between sleep disturbance and mental health outcomes. The main outcome of interest was the association between sleep disturbance and depression or anxiety.

Because the included studies were observational and showed differences in population type, tools, and outcome reporting, a narrative synthesis was used instead of meta-analysis. Findings were grouped according to study population and type of sleep outcome. The direction and statistical significance of the association between sleep disturbance and depression or anxiety were summarized in the included studies.

Fig 1: PRISMA flow chart

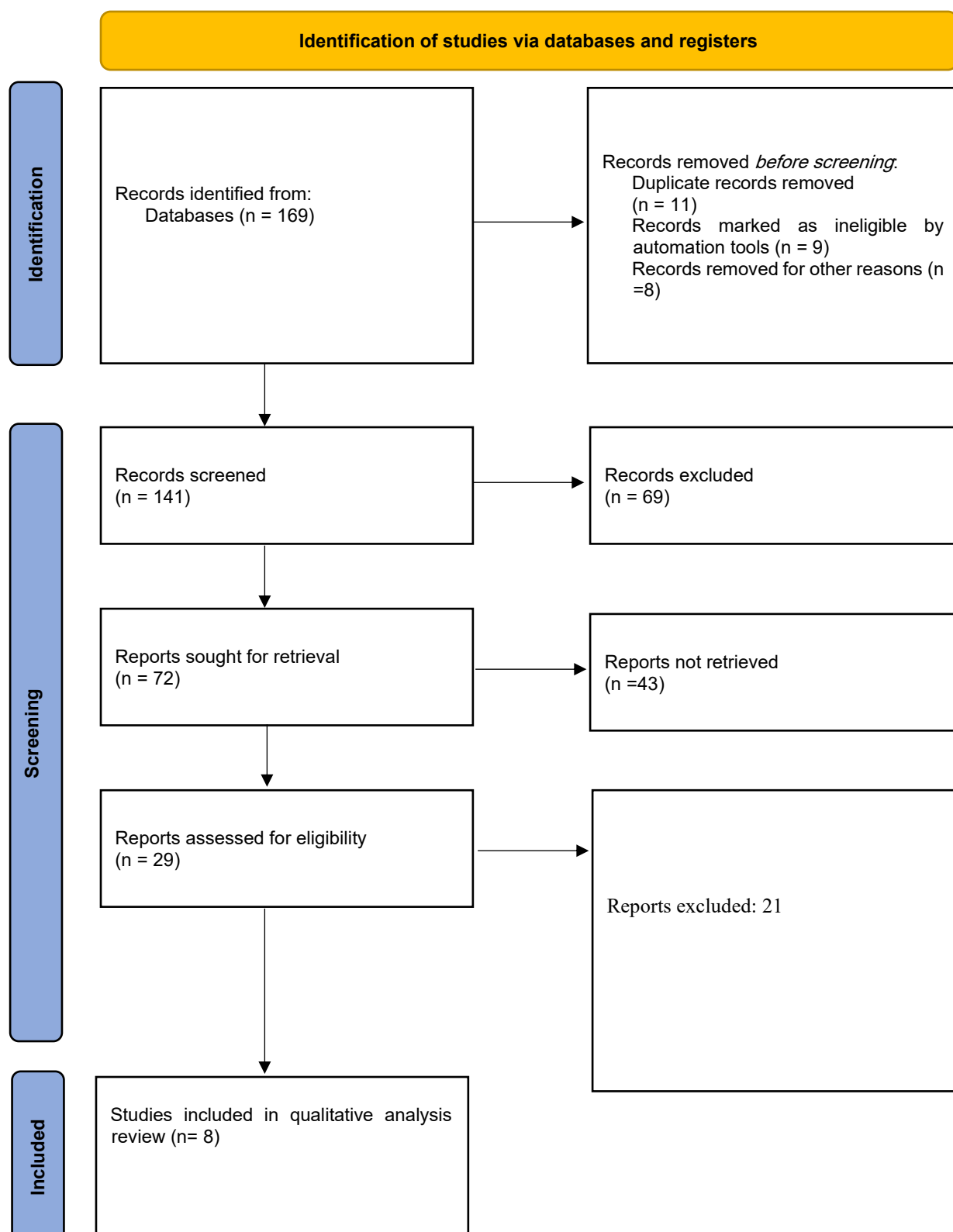


Table 1: characteristics of the included studies

Study Author (Year)	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Quality Rating
Yaghmour et al. (2023)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Alwhaibi & Al Aloola (2023)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Albasheer et al. (2020)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Al-Khani et al. (2019)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Ibrahim et al. (2017)	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Medium
Alrashed et al. (2021)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High
Alkaabba et al. (2025)	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Medium
Gosadi & Shnaimer (2025)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	High

Q1: Were the criteria for inclusion in the sample clearly defined?
 Q2: Were the study subjects and the setting described in detail?
 Q3: Was the exposure measured in a valid and reliable way?
 Q4: Were objective, standard criteria used for measurement of the condition?
 Q5: Were confounding factors identified?
 Q6: Were strategies to deal with confounding factors stated?
 Q7: Were the outcomes measured in a valid and reliable way?
 Q8: Was appropriate statistical analysis used?

Results

Eight original cross-sectional studies were eligible for inclusion, and all were conducted among Saudi university, medical, or healthcare students. The included studies assessed sleep disturbance using PSQI, ISI, or sleep-related questionnaire items, while depression and anxiety were assessed using DASS-21, HADS, PHQ-9, GAD-7, or related psychological distress instruments. From the

included studies, sleep disturbance was common, with poor sleep quality ranging from 63.2% to 80.3% in PSQI-based studies and insomnia ranging from 19.3% to 34.9% in ISI-based studies (Albasheer et al. 2020). No attached study was found that focused only on Saudi adolescents (Yaghmour et al. 2023).

Among medical students in Al-Qassim, poor sleep quality was reported in 63.2% of participants, while depression, anxiety, and stress were reported in

42.1%, 52.6%, and 30.5%, respectively (Al-Khani et al. 2019). Sleep quality was associated with depression, anxiety, and stress, with p-values of 0.03, 0.007, and 0.01, respectively (Al-Khani et al. 2019). In King Abdulaziz University, Ibrahim et al. found poor sleep quality in 70.4% of medical students and excessive daytime sleepiness in 37.3% of students (Ibrahim et al. 2017). Morbid anxiety was present in 34.0% and morbid depression was present in 16.8%, and anxiety remained the strongest adjusted predictor of poor sleep quality with an adjusted odds ratio of 3.92 (Ibrahim et al. 2017).

Two studies from Jazan University supported the association between sleep disturbance and mental health symptoms (Albasheer et al. 2020). Albasheer et al. reported insomnia in 19.3% of university students, and depression, anxiety, and stress were significant risk factors for insomnia with p-values of 0.005, <0.001, and <0.001, respectively (Albasheer et al. 2020). Gosadi and Shnaimer reported poor sleep quality in 74% of university students, and poor sleep was significantly associated with anxiety, depression, and stress (Gosadi and Shnaimer 2025). The odds of poor sleep quality were higher among students with stress, anxiety, and depression, with odds ratios of 4.68, 3.62, and 3.31, respectively (Gosadi and Shnaimer 2025).

Among clinical medical students during the COVID-19 period, Alrashed et al. reported insomnia in 34.9% of participants (Alrashed et al. 2021). Severe stress was associated with higher insomnia prevalence, and severe depression was also associated with greater sleeplessness (Alrashed et al. 2021). In another King Abdulaziz University study, the median PSQI score was 9, which indicate poor sleep quality, and lower sleep quality was significantly correlated with higher depression, anxiety, and stress scores (Yaghmour et al. 2023). Among healthcare students from different Saudi regions, poor sleep quality was reported in 80.3%, and sleep quality showed positive correlations with stress, anxiety, and depression (Alwhaibi and Al Aloola 2023). In the digital behavior study, clinically significant anxiety affected 40.2% and moderate-to-severe depressive symptoms affected 30.4%, while pre-bedtime screen exposure and social media use were linked to sleep-related problems (Alkaabba et al. 2025). The included studies showed that sleep disturbance was common among Saudi young adults and was linked with depression and anxiety symptoms. Since all studies were cross-sectional, the results show association only and do not prove whether sleep disturbance causes depression and anxiety or the reverse direction.

Table 1. Characteristics of the included studies

Study	Setting and location	Design	Population	Sample	Sleep and mental health tools
Al-Khani et al., 2019	Sulaiman AlRajhi Colleges, Al-Qassim, Saudi Arabia	Online cross-sectional survey	Medical students aged ≥ 18 years	95 complete cases	PSQI for sleep quality; DASS-21 for depression, anxiety, and stress
Ibrahim et al., 2017	King Abdulaziz University, Jeddah	Cross-sectional study with multistage stratified random sampling	Medical students after freshman year	576	PSQI; Epworth Sleepiness Scale; HADS for anxiety and depression
Albasheer et al., 2020	Jazan University, Jazan	Observational cross-sectional study	University students from health, science, and humanities colleges	712	Insomnia Severity Index; DASS-21
Alrashed et al., 2021	King Saud University, Riyadh	Cross-sectional quantitative descriptive study during COVID-19	3rd–5th year clinical medical students and interns	463	Insomnia Severity Index; K10 psychological distress; PHQ-9 depression scale
Yaghmour et al., 2023	King Abdulaziz University, Jeddah	Online cross-sectional study	2nd–6th year medical students	382	PSQI; DASS-21
Alwhaibi & Al Aolola, 2023	Healthcare students from different Saudi regions	Cross-sectional online survey	Undergraduate healthcare students in medicine, dentistry, pharmacy, nursing, and applied medical sciences	701	PSQI; PSS-14; HADS for anxiety and depression
Alkaabba et al., 2025	Imam Muhammad Ibn Saud Islamic University, Riyadh	Descriptive cross-sectional questionnaire study	Saudi university students, mostly health sciences students	102	Self-reported sleep characteristics; GAD-7; PHQ-9; PSS-10
Gosadi & Shnaimer, 2025	Jazan University, Jazan	Online cross-sectional study	University students from health and non-health specialties	508	PSQI; DASS-21

Table 2. Main findings of the included studies

Study	Sleep disturbance finding	Depression and anxiety findings	Main association relevant to the review
Al-Khani et al., 2019	Poor sleep prevalence was 63.2%.	Depression 42.1%, anxiety 52.6%, stress 30.5%.	Poor sleep was associated with depression ($p=0.03$), anxiety ($p=0.007$), and stress ($p=0.01$).

Study	Sleep disturbance finding	Depression and anxiety findings	Main association relevant to the review
Ibrahim et al., 2017	Poor sleep quality was 70.4%; excessive daytime sleepiness was 37.3%.	Morbid anxiety was 34.0%; morbid depression was 16.8%.	Poor sleep quality was associated with anxiety and depression; anxiety was the strongest adjusted predictor of poor sleep quality (aOR=3.92; 95% CI: 2.46–6.24).
Albasheer et al., 2020	Insomnia prevalence was 19.3%.	Depression, anxiety, and stress symptoms were assessed by DASS-21.	Depression, anxiety, and stress were significant risk factors for insomnia (p=0.005, p<0.001, and p<0.001, respectively).
Alrashed et al., 2021	Insomnia was found in 34.9% of clinical medical students; age 22–25 years had more sleep disorder.	Depression was assessed by PHQ-9 and psychological distress by K10; no separate anxiety-specific scale was reported.	Insomnia was higher among females (OR=1.67; p=0.005) and was discussed with psychological morbidity during COVID-19; this study is eligible because it covers insomnia and depression/psychological distress, not anxiety specifically.
Yaghmour et al., 2023	PSQI median was 9, IQR 6–11, indicating low sleep quality.	Normal scores: depression 67%, anxiety 63.1%, stress 82.2%.	Poorer sleep quality correlated with higher depression (r=0.432), anxiety (r=0.499), and stress (r=0.563), all p<0.001.
Alwhaibi & Al Aloola, 2023	Poor sleep quality prevalence was 80.3%; mean sleep duration was 6.81±1.88 hours.	Anxiety cases 52.9%; depression cases 32.2%; stressed students 72.6%.	Sleep quality correlated with anxiety (r=0.387), depression (r=0.347), and stress (r=0.363). Poor sleep was associated with stress, anxiety, and depression (all p<0.001).
Alkaabba et al., 2025	Sleep was assessed through sleep characteristics; social media use was linked to sleep initiation problems.	Clinically significant anxiety symptoms were 40.2%; moderate-to-severe depressive symptoms were 30.4%.	Pre-bedtime screen exposure >1 hour was associated with relaxation difficulty and depressive symptoms; social media use was linked to sleep initiation problems (p=0.04).
Gosadi & Shnaimer, 2025	Poor sleep quality was reported by 74% of students.	Anxiety, depression, and stress were assessed by DASS-21.	Poor sleep quality was significantly associated with anxiety, depression, and stress (all p<0.001). Reported odds of poor sleep were higher with stress (OR=4.68), anxiety (OR=3.62), and depression (OR=3.31); associations remained significant after adjustment.

Discussion

The present review found association between sleep disturbance and symptoms of depression and anxiety among Saudi young adults (Gosadi 2025). All

eligible original studies were cross-sectional and conducted in university, medical, or healthcare student populations (Al-Khani 2019). Poor sleep quality and insomnia were frequent, with PSQI-

based poor sleep quality reaching 63.2% to 80.3% and ISI-based insomnia reaching 19.3% to 34.9% (Albasheer 2020). This burden fits global student evidence, where pooled depression and anxiety symptoms reached 33.6% and 39.0%, respectively (Li 2022).

The association was consistent in Saudi studies using validated tools (Ibrahim 2017). Al-Khani et al. reported significant associations of poor sleep quality with depression, anxiety, and stress among medical students (Al-Khani 2019). Ibrahim et al. found that anxiety was the strongest adjusted predictor of poor sleep quality in medical students in Jeddah (Ibrahim 2017). The Jazan studies also supported this pattern, because insomnia or poor sleep quality was linked with depression, anxiety, and stress in broader university samples (Albasheer 2020). Yaghmour and Alwhaibi showed positive correlations between poorer sleep quality and higher depression, anxiety, and stress scores (Yaghmour 2023).

The relationship between sleep quality and depression is complex and bidirectional, with longitudinal evidence showing greater depressive symptoms when sleep problems are present (Dinis 2018). Stress, irregular sleep-wake patterns, caffeine intake, media use, and mental health factors were determinants of poor sleep quality in college students (Wang 2021). These determinants give a plausible explanation for part of the Saudi findings (Wang 2021). Systematic review among adolescents also linked bedtime digital screen use with poor sleep quality, shorter sleep duration, and daytime sleepiness (Silva 2022).

Several limitations affect interpretation; the main limitation is the cross-sectional design of all eligible

Saudi studies. Self-reported sleep and mental health measures also create risk of recall bias and shared-method bias. The absence of eligible Saudi studies focused only on school adolescents' limits generalizability to younger age groups.

The findings support routine screening for sleep quality when Saudi university students present with depression or anxiety symptoms. Psychological treatments improve subjective sleep quality in university students, with CBT-I showing a larger effect than mindfulness in available trials. Future Saudi research needs longitudinal designs, objective sleep measures, and samples from secondary schools as well as universities to clarify temporal direction and age-specific risk. Sleep disturbance is a common student complaint in Saudi Arabia and an important marker of depression and anxiety in young adults.

Conclusion

The present systematic review showed that sleep disturbance is common among Saudi young adults, university, medical, and healthcare students. The included studies reported significant associations between poor sleep quality and symptoms of depression and anxiety. These findings support the need for university-based screening, sleep hygiene education, stress management, and mental health support programs targeting students with poor sleep and psychological symptoms.

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