

The Impact of Sleep Deprivation on Mental Health: A Systematic Review of Psychological and Cognitive Consequences

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ABSTRACT

Sleep deprivation is increasingly recognized as a major public health issue impacting mental health. This review investigates its effects on depression, anxiety, stress, cognitive impairments, and psychiatric disorders. A review of literature from PubMed, Google Scholar, ScienceDirect, and PsycINFO covered studies from 2000 to 2023, including only peer-reviewed research involving humans relevant to psychological outcomes. The results reveal a strong connection between chronic sleep deprivation and heightened risks of depression, anxiety, mood swings, and cognitive decline. Research shows that sleep loss affects critical brain areas, increasing emotional reactivity and impairing decision-making. Vulnerable groups, such as adolescents, college students, healthcare workers, and shift workers, were particularly affected. REM sleep disruptions may also signal early neurodegenerative disorders like Parkinson's and Alzheimer's. Given these links, it is crucial to promote public health initiatives, policy changes, and clinical strategies like cognitive-behavioral therapy for insomnia (CBT-I). The review calls for increased awareness regarding sleep health and targeted interventions to alleviate the psychological impacts of insufficient sleep. Future studies should focus on long-term effects and the efficacy of sleep interventions.

Keywords: *Sleep deprivation, Mental health, Cognitive impairment, Psychiatric disorders, Insomnia, Public Health*

Basic biological function, sleep is necessary to preserve mental clarity, emotional stability, and physical health. With major ramifications for mental health, sleep deprivation—a disorder marked by inadequate or poor-quality sleep—has emerged as a global public health problem (Lim et al., 2023). According to research, long-term sleep deprivation is strongly associated with a higher risk of mood disorders, sadness, anxiety, cognitive decline, and even serious mental illnesses including bipolar disorder and schizophrenia (Anderson & Bradley, 2013). Teenagers, college students, medical trainees, and shift workers are among the vulnerable groups that are especially concerned about the negative effects of sleep deprivation on mental health because they frequently suffer from irregular sleep patterns and inadequate rest as a result of social, professional, and academic pressures (Lund et al., 2010; Perotta et al., 2021).

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Received: April 04, 2025; Revision Received: June 21, 2025; Accepted: June 25, 2025

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The Neurological and Psychological Impact of Sleep Deprivation

The anatomical and functional integrity of the brain is significantly impacted by sleep deprivation, especially in areas related to cognitive processing, memory consolidation, and emotional control. Reduced sleep duration has been linked in studies to heightened emotional reactivity, worse decision-making, and decreased hippocampus neurogenesis—all of which worsen mental health (Navarro-Sanchis et al., 2017). Chronic sleep deprivation in teenagers has been associated with poor emotional regulation, a higher chance of developing mental health disorders such as anxiety and depression, and an increase in risk-taking behaviours (Tarokh et al., 2016). Furthermore, inadequate sleep disturbs the hypothalamic-pituitary-adrenal (HPA) axis, raises cortisol levels, and modifies neurotransmitter balance, which results in elevated stress reactions and emotional instability (Mahindru et al., 2023). People who experience chronic sleep deprivation report greater degrees of paranoia, physical complaints, and mental problems, which can be explained by these physiological changes (Kahn-Greene et al., 2007).

Sleep Deprivation and Psychiatric Disorders

Lack of sleep is both a symptom and a risk factor for mental illnesses, according to a large body of research. Up to 30% of individuals suffer from insomnia, one of the most prevalent sleep disorders, which is closely linked to illnesses including schizophrenia, anxiety, and depression (Anderson & Bradley, 2013). The importance of sleep for long-term mental and cognitive health is further highlighted by the discovery that REM sleep behaviour disorder (RBD) is an early predictor of neurodegenerative disorders including Parkinson's disease and dementia with Lewy bodies (Navarro-Sanchis et al., 2017). The psychological effects of long-term sleep deprivation are further highlighted by the association between medical students' lack of sleep and higher levels of mental health shame, less self-compassion, and an increased risk of developing anxiety and depression (Kotera et al., 2021).

Sleep Deprivation in Specific Population

Different demographics are impacted differently by sleep deprivation, however teenagers, college students, healthcare professionals, and shift workers are the groups most affected. Short sleep duration is a serious public health problem for teenagers in rural areas, since it has been associated with increased drug use and suicidal thoughts (Daly et al., 2015). According to research, more than 60% of college students have inadequate sleep, which is strongly linked to emotional discomfort, academic stress, and cognitive decline (Lund et al., 2010). Chronic sleep deprivation increases the risk of burnout, medical mistakes, and mental health issues in medical trainees and healthcare workers, particularly those working shifts (Arimura et al., 2010). Furthermore, research done during the COVID-19 pandemic revealed that sleep disturbances brought on by lockdowns increased stress, anxiety, and depression, especially among students and frontline workers (Facer-Childs et al., 2021; Franceschini et al., 2020).

Need for public Health Intervention

Public health policies and programs that support healthy sleep habits are desperately needed, as sleep deprivation has serious negative effects on mental health. Experts stress that sleep has to be included in global health agendas and acknowledged as a fundamental component of health, on par with diet and exercise (Lim et al., 2023). Adolescents should start school later, sleep education should be promoted, and environmental and occupational variables that contribute to sleep loss should be addressed (Li et al., 2022). Additionally, organised therapies have demonstrated encouraging outcomes in lowering sleep-related mental health

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difficulties, such as stress management programs and cognitive-behavioral therapy for insomnia (CBT-I) (Saito et al., 2022).

Research Gap

Even while the data linking sleep deprivation to mental health is rising, there are still a number of unanswered questions. Studies have shown links between mental illnesses and sleep deprivation (Chattu et al., 2019; Kotera et al., 2021); however, more research is needed to determine the underlying causes of these connections, especially in varied groups. Furthermore, there are gaps in our knowledge of how sleep deprivation impacts older adults, marginalised communities, and people with pre-existing mental health conditions because the majority of the research that has been done so far has concentrated on college students, healthcare professionals, and adolescents (Li et al., 2022; Lim et al., 2023). Additionally, although treatments such as sleep hygiene education and cognitive-behavioral therapy for insomnia (CBT-I) have demonstrated promise, little is known about their long-term efficacy and scalability in public health settings (Saito et al., 2022).

Future Research Scope

The primary objective of future research should be to identify and elucidate the causative processes that link sleep deprivation to various mental health issues. This is particularly vital in the context of longitudinal studies and neurobiological investigations, which can provide deeper insights over time and at a molecular level. Additionally, it is essential to conduct comprehensive research that examines how different sleep patterns are influenced by various external factors such as digital screen exposure, the implications of climate change, and the effects of socioeconomic inequities on mental health outcomes. These areas are crucial for understanding the broader context of sleep health. In order to promote improved sleep health across diverse demographic groups, it is important for studies to systematically explore the effectiveness of interventions that are not only efficient and scalable but also culturally sensitive. Potential interventions could include Cognitive Behavioral Therapy for Insomnia (CBT-I), mindfulness-based therapies, and policies aimed at improving sleep in workplace settings. These interventions can play a significant role in addressing sleep issues on a larger scale.

Moreover, future research should assess how biological factors such as circadian rhythms and genetics interact with sleep to influence mental and emotional health. Customized sleep therapies tailored to individual needs may also hold promise in mitigating the detrimental effects that sleep deprivation can have on mental health. By thoroughly examining these various components and addressing existing gaps in knowledge, future studies can contribute to the development of evidence-based policies and therapeutic procedures. Ultimately, this research can foster improved mental health outcomes through better sleep management, thus enhancing the overall quality of life for individuals impacted by sleep-related challenges.

METHODOLOGY

This study employed a systematic literature review to explore the relationship between sleep deprivation and mental health. Relevant peer-reviewed articles were identified through searches in PubMed, Google Scholar, ScienceDirect, and PsycINFO using keywords like “sleep deprivation,” “mental health,” “psychological disorders,” “cognitive impairment,” and “psychiatric conditions.” Inclusion criteria stipulated those studies be published in English, focus on human subjects, and examine the effects of sleep deprivation on mental

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health outcomes such as anxiety, depression, stress, and cognitive decline. Articles published from 2000 to 2023 were included to ensure relevance to current scientific understanding.

The review encompassed both quantitative and qualitative studies, including cross-sectional surveys, longitudinal studies, experimental trials of sleep deprivation, and meta-analyses. Extracted data covered sample characteristics, research design, sleep assessment tools (e.g., Pittsburgh Sleep Quality Index, actigraphy, polysomnography), mental health measures (e.g., Depression Anxiety Stress Scale, Edinburgh Postnatal Depression Scale), and key findings. The methodological quality of the studies was evaluated using PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines for reliability and validity. A thematic synthesis approach categorized findings into emerging themes, such as the neurological effects of sleep deprivation, its links to psychiatric disorders, its prevalence in specific populations, and potential interventions. This systematic method provided a comprehensive understanding of the connection between sleep deprivation and mental health, leading to a well-informed discussion and conclusions based on existing evidence.

To expand the search even more, the citations of the remaining studies were looked at. Following consideration of these criteria, 21 relevant articles made up the final selection, as shown in Table 1 and Figure 1.

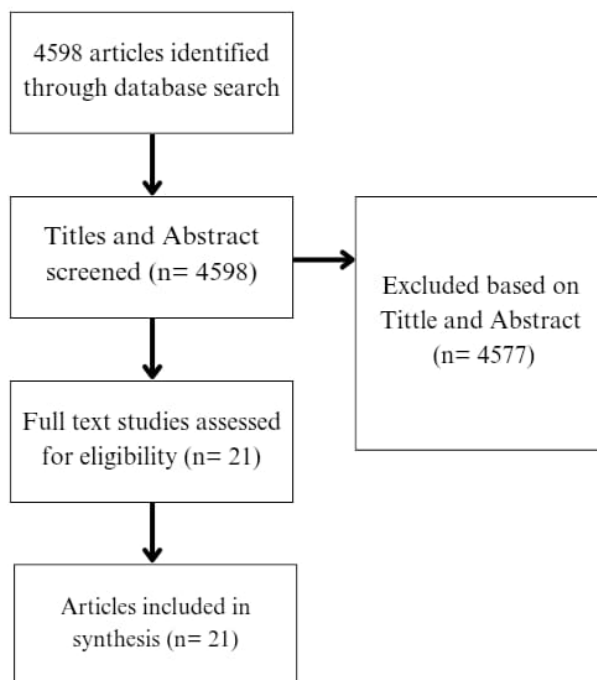


Figure 1

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FINDINGS

Table 1 summarises the distribution of publications across various themes.

Author/Year	Publication	Theme	Method	Key Finding
(Maria Paz Loayza et al., 2001)	Journal Article	Sleep deprivation And Mental Health	Experimental	Insomnia may serve as an early indicator of psychiatric conditions.
(Hiscock et al., 2007)	Journal Article	Sleep deprivation and Mental Health	Experimental	Community-delivered behavioral intervention significantly improved infant sleep problems and maternal mental health.
(Kahn-Greene et al., 2007)	Journal Article	Sleep deprivation and Mental Health	Experimental	56 hours of sleep deprivation led to a significant increase in self-reported symptoms of somatic complaints, anxiety, depression, and paranoia in healthy adults.
(Stein et al., 2008)	Journal Article	Sleep deprivation and Mental Health	Experimental	Individuals with sleep disturbances were significantly more likely to have one or more physical health problems.
(Roberts et al., 2009)	Journal Article	Sleep deprivation and Mental Health	Experimental	Teenagers were disproportionately affected by sleep deprivation, with many reporting fewer than six hours of sleep on weeknights.
(Arimura et al., 2010)	Journal Article	Sleep deprivation and Mental Health	Experimental	Shift work and poor mental health significantly contribute to the occurrence of medical errors.
(Orzeł-Gryglewska, 2010)	Journal Article	Sleep deprivation and Mental Health	Analytical and Descriptive	Sleep loss led to cognitive impairments, including reduced attention, slower reaction times, memory deficits, and increased errors in task performance.
(Lund et al., 2010)	Journal Article	Sleep deprivation and Mental Health	Experimental	Poor sleep quality was strongly associated with increased physical and psychological health problems, including higher levels of stress, tension, depression, and fatigue.

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Author/Year	Publication	Theme	Method	Key Finding
(Anderson & Bradley, 2013)	Journal Article	Sleep deprivation and Mental Health	Analytical and Descriptive	Chronic sleep deprivation and fragmented sleep accelerate cognitive decline in neurodegenerative diseases such as Alzheimer's and Parkinson's, emphasizing the crucial role of sleep in maintaining mental and neurological health.
(Daly et al., 2015)	Journal Article	Sleep deprivation and Mental Health	Experimental	Short sleep duration was linked to increased use of alcohol, tobacco, and marijuana.
(Tarokh et al., 2016)	Journal Article	Sleep deprivation and Mental Health	Qualitative	Persistent sleep problems in adolescence were strongly associated with a higher risk of developing psychiatric disorders such as depression and anxiety.
(Navarro-Sanchis et al., 2017)	Journal Article	Sleep deprivation and Mental Health		Chronic sleep disruption significantly reduced neurogenesis in the hippocampus, leading to impairments in learning, memory consolidation, and emotional regulation.
(Chattu et al., 2019)	Journal Article	Sleep deprivation and Mental Health		Insufficient sleep is a widespread and underrecognized public health epidemic, contributing to cardiovascular diseases, obesity, diabetes, cognitive impairments, mental health disorders, and increased workplace and vehicular accidents.
(Franceschini et al., 2020)	Journal Article	Sleep deprivation and Mental Health	Analytical	Higher levels of stress, anxiety, and depression were strongly associated with sleep disturbances, indicating a bidirectional relationship between sleep and mental health.
(Perotta et al., 2021)	Journal Article	Sleep deprivation and Mental health	Experimental	Poor sleep quality was associated with higher levels of anxiety and depression, as well as lower quality of life

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Author/Year	Publication	Theme	Method	Key Finding
				and worse perception of the educational environment.
(Kotera et al., 2021)	Journal Article	Sleep deprivation and Mental Health	Experimental	The negative impact of sleep deprivation on mental health was fully explained by low levels of self-compassion.
(Li et al., 2022)	Journal Article	Sleep deprivation and Mental Health	Experimental	Changes in sleep duration were linked to alterations in brain structure, particularly in regions such as the precentral cortex, lateral orbitofrontal cortex, and hippocampus.
(Saito et al., 2022)	Journal Article	Sleep deprivation and Mental Health	Experimental	Children spent more time with family and had increased sleep duration, they also experienced disruptions in sleep rhythms, eating habits, and physical activity.
(Mahindru et al., 2023)	Journal Article	Sleep deprivation and mental health	Analytical	Regular exercise improves the hypothalamus-pituitary-adrenal (HPA) axis function, reduces cortisol levels, and enhances brain-derived neurotrophic factor (BDNF) production, which is linked to cognitive health.
(Lim et al., 2023)	Journal Article	Sleep deprivation and Mental Health	Analytical	Sleep deficiency is a significant risk factor for various health conditions, including cardiovascular disease, obesity, diabetes, mental health disorders, and cognitive decline.

RESULTS

The studies collectively emphasize the substantial impact of sleep deprivation on mental health, cognitive function, and overall well-being across diverse populations. A consistent finding is that insufficient sleep correlates strongly with heightened risks of depression, anxiety, and emotional distress (Franceschini et al., 2020; Kahn-Greene et al., 2007). Research indicates that individuals with poor sleep quality experience increased psychological distress, including paranoia, somatic complaints, and mood disturbances (Anderson & Bradley, 2013; Kotera et al., 2021). Additionally, studies on medical students reveal that chronic sleep deprivation leads to greater mental health shame, reduced self-compassion, and an elevated likelihood of depression and anxiety (Kotera et al., 2021).

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These findings highlight the close connection between sleep duration and quality and mental health outcomes, reinforcing the bidirectional relationship between sleep and psychiatric disorders (Anderson & Bradley, 2013).

The research also focused heavily on the physiological effects of sleep deprivation. Chronic sleep deprivation has been linked to reduced synthesis of brain-derived neurotrophic factor (BDNF), which is essential for cognitive function, increased stress responses, and impaired hippocampus neurogenesis. Additionally, the hypothalamic-pituitary-adrenal (HPA) axis was disturbed and cortisol levels rose as a result of sleep loss, which resulted in greater stress reactions, emotional dysregulation, and poor decision-making. Furthermore, changes in REM sleep have been connected to cognitive deterioration and a higher risk of neurodegenerative illnesses including Parkinson's and Alzheimer's. These findings imply that sleep restriction has detrimental impacts on long-term cognitive and neurological health in addition to short-term weariness (Mahindru et al., 2023; Navarro-Sanchis et al., 2017).

Research on various populations highlights the extensive effects of sleep deprivation. In adolescents, short sleep was linked to increased risk-taking, substance use, and suicidal thoughts (Daly et al., 2015). College students exhibited poor sleep quality, with over 60% affected, correlating with greater stress and cognitive issues (Lund et al., 2010). Irregular sleep among medical professionals and shift workers led to more medical errors and psychological strain (Arimura et al., 2010). During the COVID-19 pandemic, sleep disruptions related to lockdowns heightened stress and anxiety, especially in healthcare workers and students (Facer-Childs et al., 2021; Franceschini et al., 2020).

A particularly notable finding was the nonlinear relationship between sleep duration and mental health outcomes. Research indicated that both insufficient and excessive sleep were associated with cognitive decline and psychiatric disorders, forming a U-shaped relationship (Li et al., 2022). Specifically, seven hours of sleep per night was identified as the optimal duration for maintaining cognitive performance and mental well-being (Li et al., 2022). Furthermore, studies identified key environmental and lifestyle factors contributing to poor sleep health, including increased screen time, academic pressure, shift work, and socioeconomic disparities (Lim et al., 2023). A global assessment found that only 22% of WHO member states had collected population-level sleep duration data, highlighting a lack of standardized sleep health policies in public health agendas (Lim et al., 2023).

Research has indicated possible solutions despite the pervasive detrimental effects of sleep loss. According to Saito et al. (2022), a number of studies have highlighted the significance of organised sleep therapies, including stress management programs, cognitive-behavioral therapy for insomnia (CBT-I), and public health campaigns that promote sleep hygiene. Strategies to reduce sleep-related mental health issues also included suggestions for postponing the start of classes, enforcing sleep policies at work, and educating people about the importance of sleep for overall health (Li et al., 2022; Lim et al., 2023).

DISCUSSION

Studies consistently demonstrate the significant effects of sleep deprivation on mental health, cognitive abilities, and overall well-being. Sleep is crucial for regulating mood, memory, and emotional stability; however, modern lifestyle factors like academic pressure, shift work, social obligations, technology use, and stress have led to widespread sleep deprivation (Lim et al., 2023). This evidence indicates that chronic sleep deficiency can both

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result from and contribute to mental health disorders, underscoring the need for a multidisciplinary approach to tackle this growing public health issue. Research has established a significant bidirectional relationship between sleep deprivation and psychiatric disorders. Individuals with insomnia, sleep fragmentation, and poor sleep quality face a higher risk of developing depression, anxiety, schizophrenia, and substance use disorders (Anderson & Bradley, 2013). Conversely, mental health conditions can disrupt sleep patterns, creating a cycle where psychological distress worsens sleep issues, and poor sleep exacerbates mental health outcomes. For instance, over 60% of college students report poor sleep quality, closely linked to academic stress, depression, and cognitive impairments (Lund et al., 2010). Similarly, studies show that sleep deprivation among medical students and healthcare workers leads to increased burnout, decreased cognitive efficiency, and a higher likelihood of medical errors, posing risks to both individuals and their patients (Arimura et al., 2010; Perotta et al., 2021).

Sleep deprivation is also crucial in adolescent development and risk-taking behavior. Adolescents naturally experience a shift in their circadian rhythms, making them more susceptible to delayed sleep. However, early school start times, heavy academic workloads, and excessive screen time contribute to chronic sleep loss, linked to higher rates of depression, anxiety, suicidal ideation, and substance abuse (Daly et al., 2015; Tarokh et al., 2016). This issue is especially concerning in rural areas, where access to mental health resources is limited. Additionally, high-stress environments, such as during the COVID-19 pandemic, further disrupted sleep routines, leading to increased stress, anxiety, and poor emotional regulation (Facer-Childs et al., 2021; Franceschini et al., 2020). Neuroscientific research has revealed that sleep deprivation alters brain function, disrupts the hypothalamic-pituitary-adrenal (HPA) axis, increases cortisol levels, and impairs neurogenesis in the hippocampus (Mahindru et al., 2023; Navarro-Sanchis et al., 2017). These changes reduce cognitive flexibility, impair emotional regulation, and heighten stress responses, increasing vulnerability to mental health conditions. Genetic studies also indicate that variations in sleep duration and quality are associated with structural brain changes that can predispose individuals to cognitive and mood disorders (Li et al., 2022). Despite the substantial evidence of sleep deprivation's negative effects, public awareness and policy interventions are lacking. Unlike nutrition and physical activity, sleep is often overlooked in public health discussions, despite its well-documented impact on cardiovascular health, metabolic disorders, and neurological well-being (Lim et al., 2023). Only 22% of WHO member states have gathered population-level sleep duration data, highlighting a significant gap in global sleep health research and policy. Socioeconomic disparities further exacerbate sleep deprivation, with marginalized populations experiencing higher rates due to economic stress, poor working conditions, and environmental factors like noise pollution and inadequate housing (Saito et al., 2022).

To tackle these challenges, a multifaceted approach is essential. Schools should implement later start times for adolescents, workplaces should offer flexible scheduling for shift workers, and mental health interventions should include sleep education and cognitive-behavioral therapy for insomnia (CBT-I). Policymakers must prioritize sleep health initiatives, invest in research, and integrate sleep awareness programs into healthcare systems. Additionally, individuals can mitigate the adverse effects of sleep deprivation by reducing screen time before bed, maintaining consistent sleep schedules, and practicing mindfulness techniques.

CONCLUSION

Sleep deprivation has increasingly emerged as a critical and multifaceted factor influencing not only mental health but also cognitive function and overall well-being. A substantial body of research consistently highlights the strong association between inadequate sleep and various psychiatric disorders, emotional instability, and impaired decision-making abilities. Chronic sleep loss disrupts essential neurobiological processes, which can lead to a cascade of negative effects, including heightened stress levels, increased anxiety, persistent depression, and a greater vulnerability to severe mental health conditions. Furthermore, certain populations are particularly affected by sleep deprivation due to their unique lifestyle and occupational demands. Adolescents, students, shift workers, and healthcare professionals often experience significant challenges in obtaining sufficient and restorative sleep, which can exacerbate their existing vulnerabilities.

The impact of sleep disturbances extends beyond merely worsening current mental health issues; they can also serve as early indicators of emerging psychiatric disorders and neurodegenerative diseases. This relationship underscores the importance of recognizing sleep disturbances as critical warning signs that should not be overlooked. The widespread impact of poor sleep quality and quantity emphasizes the urgent need for comprehensive public health interventions, policy reforms, and educational initiatives aimed at promoting healthier sleep habits among diverse populations. Effective strategies, such as structured sleep education programs, delayed school start times for adolescents, workplace modifications to encourage better sleep practices, and behavioral therapies tailored to improve sleep quality, can play a vital role in mitigating the adverse effects associated with sleep deprivation.

Recognizing sleep as a fundamental pillar of health—on par with nutrition and physical activity—is crucial for fostering long-term mental and cognitive well-being. Addressing sleep deprivation through multidisciplinary approaches that involve healthcare providers, educators, employers, and policymakers can significantly enhance mental health outcomes and improve overall quality of life for individuals across various demographics. As we move forward, it is imperative that continued research and policy efforts focus on integrating sleep health into mainstream public health initiatives. By prioritizing sleep health, we can address this pressing issue and work towards a healthier society where mental well-being is supported by adequate and restorative sleep for everyone.

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Acknowledgment

The author(s) appreciates all those who participated in the study and helped to facilitate the research process.

Conflict of Interest

The author(s) declared no conflict of interest.

How to cite this article: Maiti, A.P. & Duari, P. (2025). The Impact of Sleep Deprivation on Mental Health: A Systematic Review of Psychological and Cognitive Consequences. *International Journal of Indian Psychology*, 13(2), 4273-4284. DIP:18.01.377.20251302, DOI:10.25215/1302.377