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Understanding Sleep Disturbances in ADHD: Neurobiology, Circadian Mechanisms, and Clinical Impact

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Abstract:

Background: Sleep disturbances are common in adults with attention-deficit/hyperactivity disorder (ADHD) and often include problems such as insomnia and circadian rhythm disturbances, which may negatively affect cognitive functioning and daily performance. However, their clinical characteristics and underlying mechanisms in adult ADHD remain incompletely understood.

Aim: This narrative review synthesizes current evidence on sleep disturbances in adults with ADHD, focusing on prevalence, clinical characteristics, types of sleep disorders, mechanisms, and clinical implications.

Materials and Methods: This narrative review was based on the analysis of published scientific literature retrieved from online databases related to attention-deficit/hyperactivity disorder (ADHD) and sleep. Relevant publications were selected based on their relevance to the topic, with a focus on studies involving adult populations. Most of the included studies were published between 2015 and 2026, with earlier key publications included for background context. Various types of studies were considered, including reviews, clinical studies, and theoretical papers. The findings were synthesized qualitatively.

Results: Approximately 60% of adults with ADHD screen positive for sleep disorders, primarily insomnia and delayed sleep–wake phase disorder. Underlying mechanisms are multifactorial, involving circadian dysregulation, neurobiological, and behavioral factors. These issues are also associated with psychiatric comorbidities and impairments in executive functioning.

Conclusions: Sleep disturbances represent a clinically relevant aspect of adult ADHD. Their heterogeneity and complex mechanisms should be considered in clinical practice. Further research is needed to clarify their characteristics and the role of sleep-focused interventions.

Keywords: attention-deficit/hyperactivity disorder; sleep disturbances; insomnia; circadian rhythm disruptions; adult ADHD; comorbidity

1. Introduction

Attention-deficit/hyperactivity disorder (ADHD) is a neurodevelopmental disorder characterized by persistent symptoms of inattention, hyperactivity, and impulsivity that impair functioning across academic, occupational, and social domains [1]. Although typically diagnosed in childhood, ADHD frequently persists into adulthood, affecting approximately 2.5% of the adult population worldwide [1,2]. In adults, ADHD is commonly associated with significant psychiatric comorbidity, including mood disorders, anxiety disorders, and substance use disorders, which may complicate both diagnosis and treatment [1].

Sleep is a fundamental biological process essential for cognitive performance, executive functioning, and emotional regulation [3]. Experimental evidence from sleep deprivation research demonstrates that insufficient sleep is associated with impairments in attention, working memory, cognitive control, and decision-making, as well as increased variability in cognitive performance, largely linked to alterations in prefrontal cortical network functioning [10]. These cognitive domains are already compromised in individuals with ADHD, suggesting that sleep disturbances may further exacerbate the neurocognitive profile of the disorder.

Insufficient sleep quantity or poor sleep quality may therefore impair attentional control, inhibitory processing, and working memory—functions strongly dependent on intact prefrontal cortex activity [10]. Importantly, beyond overall cognitive slowing, sleep deprivation is also associated with fluctuations in vigilance and state instability, which may be particularly relevant for attentional variability observed in ADHD [10]. A growing body of evidence indicates that sleep disturbances are highly prevalent in adults with ADHD, with insomnia and circadian-related sleep disturbances representing some of the most frequently reported sleep problems, alongside other sleep-related complaints [4,9,11].

Meta-analytic evidence indicates that adults with ADHD differ from non-ADHD controls across several subjective sleep parameters, including sleep quality, sleep onset latency, and sleep efficiency, while findings from objective measures remain less consistent [4]. This discrepancy highlights the complexity of sleep disturbances in ADHD and suggests that subjective complaints may reflect clinically meaningful impairments even in the absence of uniform objective abnormalities.

The relationship between ADHD and sleep disturbances appears to be bidirectional. Neurobiological mechanisms implicated in ADHD, including dysregulation of arousal systems and alterations in circadian timing, may contribute to sleep disruption [6,7]. Conversely, insufficient or fragmented sleep may exacerbate core ADHD symptoms, including inattention, impulsivity, and executive dysfunction [5,6,10]. In this context, sleep loss may act as an additional burden on already vulnerable cognitive control systems, potentially amplifying ADHD symptom expression rather than merely co-occurring with it [10].

Importantly, sleep loss does not only affect cognitive performance but also emotional and affective regulation. Evidence from cognitive neuroscience indicates that sleep deprivation is associated with impaired top-down regulation of emotion, increased limbic reactivity, and reduced functional connectivity within prefrontal control networks, thereby increasing vulnerability to affective dysregulation [10]. This is particularly relevant in ADHD, where emotional dysregulation and impaired executive control are already prominent features.

These observations have important clinical implications. Circadian-oriented interventions, such as bright light therapy and phase-advancing strategies, have shown preliminary efficacy in improving circadian timing and sleep patterns in adults with ADHD [8]. However, substantial heterogeneity persists across studies, particularly regarding objective sleep assessment, pharmacological effects, and the role of psychiatric comorbidity [4,5]. Therefore, a comprehensive understanding of sleep disturbances in adults with ADHD is essential for improving diagnostic accuracy and informing targeted therapeutic approaches.

2. Materials and Methods

This narrative review focuses on sleep disturbances in adults with attention-deficit/hyperactivity disorder (ADHD). Relevant literature was identified through searches of online scientific databases.

Most of the included studies were published between 2015 and 2026, although earlier key publications were also considered when relevant to provide theoretical and methodological background. The search was conducted using combinations of terms related to ADHD and sleep.

Studies were selected based on their relevance to the topic, with particular emphasis on research involving adult populations. The review included a range of publication types, including systematic

reviews, meta-analyses, randomized controlled trials, observational studies, and selected theoretical papers. Studies focusing exclusively on pediatric populations were excluded.

The selection process involved screening titles and abstracts, followed by full-text analysis of the most relevant articles. Due to variability in study designs and reported outcomes, the findings were synthesized qualitatively. The analysis was structured around key thematic areas related to sleep disturbances in adults with ADHD.

3. Results

3.1. Prevalence and clinical characteristics of sleep disturbances in adults with ADHD

Sleep disturbances are highly prevalent in adults with attention-deficit/hyperactivity disorder (ADHD), although their exact frequency and clinical profile vary across studies. Evidence from a systematic review and meta-analysis suggests that adults with ADHD report significantly more subjective sleep problems compared to individuals without ADHD, with moderate to large effect sizes across multiple subjective parameters. [4] Specifically, differences were observed in seven out of nine subjective sleep measures, suggesting that perceived sleep disturbances represent a consistent and clinically relevant feature of adult ADHD. In contrast, objective findings were less consistent, with significant differences detected only for selected actigraphic parameters, such as increased sleep onset latency and reduced sleep efficiency, while polysomnographic measures did not show significant group differences. [4]

More recent large-scale clinical data further support these findings. In a sample of 3,691 adults with ADHD, approximately 60% screened positive for at least one sleep disorder [9]. The most frequently reported problems included delayed sleep phase syndrome (DSPS) (36%), insomnia (30%), and restless legs syndrome or periodic limb movement disorder (29%) [9]. These findings highlight not only the high overall burden of sleep disturbances in adult ADHD, but also the predominance of circadian rhythm-related disorders and insomnia symptoms. Epidemiological and clinical studies consistently indicate that individuals with ADHD are at increased risk of a wide range of sleep disorders compared to the general population [12].

Importantly, sleep disturbances in adults with ADHD are not isolated phenomena but are closely associated with psychiatric comorbidities. Higher rates of sleep problems have been linked to co-occurring conditions such as depression, anxiety disorders, substance use disorders, and post-traumatic

stress disorder [9]. This suggests that the prevalence of sleep disturbances may be influenced by both core ADHD mechanisms and comorbid psychopathology.

However, discrepancies between subjective and objective findings, as well as variability across study designs and populations, highlight the need for further research to better characterize the underlying mechanisms of these disturbances in adults with ADHD.

3.2. Types of sleep disorders in adults with ADHD

Sleep disturbances in adults with ADHD represent a heterogeneous clinical spectrum, with insomnia being the most frequently reported disorder. Insomnia typically manifests as prolonged sleep onset latency, difficulty maintaining sleep, early morning awakening, and non-restorative sleep, with reported prevalence ranging from 43% to 85% in adult ADHD clinical samples. [5] This wide range likely reflects differences in diagnostic criteria, study populations, and methods used to assess insomnia across studies.

The severity of insomnia symptoms is commonly assessed using validated self-report instruments such as the Insomnia Severity Index (ISI). This tool captures difficulties initiating sleep, maintaining sleep, early awakening, dissatisfaction with sleep, and daytime functional impairment. Subjective sleep quality is frequently evaluated using the Pittsburgh Sleep Quality Index (PSQI), whereas excessive daytime sleepiness is commonly measured using the Epworth Sleepiness Scale (ESS). [5]

Beyond insomnia, delayed sleep–wake phase disorder is highly prevalent in adults with ADHD and is characterized by a consistent shift of sleep onset and wake time toward later hours, frequently associated with evening chronotype and circadian misalignment [6, 13]. This circadian preference has been associated with altered melatonin secretion and delayed circadian phase, suggesting that sleep timing alterations may partly reflect intrinsic neurobiological mechanisms [7, 13].

Restless legs syndrome and periodic limb movement disorder are also reported more frequently in adults with ADHD. Some studies have suggested a possible contribution of shared dopaminergic mechanisms underlying both nocturnal motor symptoms and core ADHD manifestations. [1,14]

Sleep-disordered breathing, particularly obstructive sleep apnea, also warrants clinical attention because of its potential contribution to excessive daytime sleepiness and symptom overlap with ADHD. [6]

Importantly, subjective and objective assessments of sleep often produce divergent findings in this population. While adults with ADHD frequently report poor sleep quality and insufficient restorative sleep, polysomnographic studies do not consistently confirm corresponding abnormalities in sleep architecture. [14] This discrepancy highlights the complexity of sleep assessment in ADHD and supports a multimodal diagnostic approach combining clinical interview, validated questionnaires, and objective methods such as actigraphy or polysomnography when clinically indicated [6].

3.3. Mechanisms of Sleep Disorders

Sleep disturbances in adults with ADHD are increasingly conceptualized within a multidimensional framework of circadian dysregulation involving hormonal, behavioral, and molecular mechanisms. Evidence from chronobiological studies suggests that delayed dim light melatonin onset (DLMO) is frequently observed in this population, alongside reports of altered daytime melatonin secretion and reduced pineal gland volume in selected cohorts, collectively indicating a shift in circadian phase and potential alterations in rhythm amplitude [15]. In parallel, dysregulation of the hypothalamic–pituitary–adrenal axis has been described, including blunted or phase-shifted cortisol secretion patterns, which may reflect a broader disruption of circadian output systems rather than isolated endocrine abnormalities [15]. At the molecular level, preliminary findings indicate altered expression of core clock genes such as BMAL1 and PER2; however, the available evidence remains limited and methodologically heterogeneous [15].

Beyond its role as a circadian phase marker, melatonin is increasingly recognized as a key regulator of circadian synchronization and sleep–wake stability. Acting through receptors in the suprachiasmatic nucleus as well as peripheral tissues, melatonin contributes to the alignment of central and peripheral oscillators, a process that may be disrupted in neurodevelopmental and psychiatric conditions, including ADHD [17]. Its chronobiotic properties, distinct from hypnotic effects, support its role in phase shifting and circadian entrainment, which is particularly relevant in individuals with delayed sleep–wake patterns. In addition, experimental and clinical evidence suggests pleiotropic effects of melatonin, including antioxidant and neuroprotective properties that may influence neuronal plasticity in brain regions involved in attention and executive functioning [17].

Importantly, alterations in melatonin signaling may extend beyond secretion timing and include receptor-level sensitivity and downstream intracellular pathways, potentially contributing to interindividual variability in circadian phenotypes and sleep disturbances [17]. In this context, exogenous melatonin has demonstrated efficacy in improving sleep onset latency and advancing circadian phase across several clinical populations, supporting its role as a targeted chronobiological intervention rather than a purely sedative agent [17].

From a sleep architecture perspective, meta-analytic evidence indicates that psychiatric disorders are associated with subtle but measurable alterations in polysomnographic parameters, including reduced sleep efficiency, increased sleep onset latency, and changes in REM sleep regulation [18]. However, these findings are nonspecific and are observed across multiple diagnostic categories, suggesting that such abnormalities may reflect a shared pathophysiological pathway of affective and cognitive dysregulation rather than disorder-specific signatures [18]. This is particularly relevant in ADHD, where inconsistencies between subjective sleep complaints and objective sleep measures are frequently reported.

These endogenous circadian and neurobiological disturbances likely interact with behavioral factors commonly observed in adults with ADHD, including irregular sleep–wake schedules, delayed sleep phase preference, and increased eveningness, thereby contributing to sleep initiation difficulties, fragmented sleep, and daytime sleepiness [6,15]. Furthermore, growing evidence indicates that sleep disruption is closely linked to emotional regulation processes; impaired sleep continuity and altered REM dynamics have been associated with increased affective reactivity and reduced emotional resilience across psychiatric conditions [18].

From a neurocognitive perspective, circadian misalignment and sleep disruption may further exacerbate dysfunction within prefrontal–striatal networks underlying attention, inhibitory control, and executive functioning; however, direct mechanistic evidence in adult ADHD populations remains limited [6,16]. This aligns with broader models of ADHD emphasizing impaired top-down control and dysregulated arousal systems as core neurobiological features.

Taken together, the available literature supports a multifactorial model in which circadian misalignment, molecular clock dysregulation, alterations in melatonin signaling, and sleep architecture abnormalities interact with behavioral and neurocognitive vulnerabilities to shape the heterogeneous sleep phenotypes observed in adults with ADHD. Nevertheless, the current evidence base is

constrained by methodological variability, small sample sizes, and a lack of longitudinal mechanistic studies, underscoring the need for further research in this area.

3.4. Clinical Implications

Sleep disturbances play a significant role in the clinical presentation of attention-deficit/hyperactivity disorder (ADHD) in adults and may, in some cases, mimic or exacerbate core symptoms such as inattention, impulsivity, and executive dysfunction [4,9]. Furthermore, sleep problems frequently co-occur with psychiatric comorbidities, including depression, anxiety disorders, and substance use disorders, thereby complicating the clinical picture and necessitating integrated diagnostic and management strategies [9].

Importantly, current treatment approaches for ADHD do not always adequately address sleep-related issues [6]. Pharmacological treatment, particularly stimulant medication, may negatively affect sleep patterns in some patients—especially when administered later in the day—highlighting the need for careful treatment planning and individualized therapeutic strategies [6]. In this context, non-pharmacological interventions, including behavioral sleep interventions and psychoeducation on sleep hygiene, should be considered essential components of ADHD management [6]. In particular, cognitive behavioral therapy for insomnia (CBT-I) has demonstrated robust efficacy in improving sleep quality and reducing insomnia severity across clinical populations, supporting its potential relevance in adults with ADHD [20,21].

Circadian-oriented interventions may represent a promising therapeutic avenue [6,7]. Interventions such as bright light therapy and melatonin supplementation have been shown to influence circadian phase and improve sleep timing [7, 8]. Bright light therapy has been associated with advances in circadian phase and improvements in ADHD symptoms, which may translate into better daytime functioning in adults with ADHD [8]. Chronotherapeutic approaches, including melatonin, may advance delayed circadian rhythms and improve sleep onset timing, although evidence for their impact on ADHD symptom severity remains limited [6,7,8].

More broadly, sleep-focused interventions may improve sleep quality and reduce fatigue [6,19].

However, evidence for direct effects on ADHD symptom severity remains limited and heterogeneous [6,19].

4. Discussion

The available evidence suggests that sleep disturbances are a common and clinically relevant problem in adults with attention-deficit/hyperactivity disorder (ADHD). Data from large clinical samples indicate that approximately 60% of adults with ADHD screen positive for at least one sleep disorder, highlighting the scale of this issue [9]. This supports the view that sleep problems may play an important role in the overall functioning of individuals with ADHD.

Sleep disturbances in this population do not follow a single pattern. Rather than being uniform, they include a range of difficulties related to sleep timing, continuity, and perceived sleep quality [4]. This variability may be clinically relevant, particularly as sleep problems can affect attention, cognitive performance, and emotional regulation [10].

An issue that appears consistently across studies is the discrepancy between subjective sleep complaints and objective findings. Individuals with ADHD often report poor sleep quality and daytime impairment, while objective methods such as polysomnography do not consistently confirm these difficulties [4,14]. This may suggest that standard objective measures do not fully capture aspects such as irregular sleep patterns or circadian misalignment, which seem particularly relevant in this group [6,7]. At the same time, it highlights the importance of considering subjective sleep quality as a meaningful clinical indicator.

The mechanisms underlying sleep disturbances in ADHD are likely multifactorial. There is evidence pointing to the involvement of circadian processes, including delayed melatonin secretion and altered biological rhythms [7,15]. Behavioral factors, such as irregular sleep schedules, may also contribute to the development and persistence of sleep problems [6]. However, it remains unclear to what extent these mechanisms are specific to ADHD, as similar patterns have been described in other psychiatric conditions [15,18].

Sleep disturbances in ADHD frequently co-occur with other mental health conditions, including depression and anxiety, which are also associated with poor sleep [9]. This overlap makes it difficult to determine whether sleep problems are directly related to ADHD or reflect broader clinical factors.

From a clinical perspective, these findings underline the importance of assessing sleep in adults with ADHD [6]. Sleep problems may worsen attention, executive functioning, and emotional regulation,

which in turn can negatively affect daily performance and quality of life [10,12]. Addressing sleep disturbances may therefore be relevant for improving overall functioning.

Interventions targeting sleep may be useful as part of ADHD management. Cognitive behavioral therapy for insomnia has been shown to improve sleep outcomes [20,21]. In addition, interventions aimed at regulating circadian rhythms, such as light therapy and melatonin, may be beneficial in selected cases [6,7,8]. However, their effects on core ADHD symptoms remain uncertain and require further investigation [6].

Pharmacological treatment should also be considered in relation to sleep, as stimulant medications may affect sleep patterns in some individuals, depending on timing and dosage [6].

It should also be noted that the available evidence has several limitations. These include differences in study design, reliance on self-reported data, and a relatively small number of objective and longitudinal studies [4,6,15]. In addition, the role of psychiatric comorbidities is not always clearly addressed [4,9].

Further research is needed to better understand the relationship between ADHD and sleep disturbances, particularly using longitudinal and multimodal assessment approaches [4,6,15]. This may help to improve both diagnostic accuracy and the development of more targeted interventions.

5. Conclusions

Sleep disturbances are common in adults with attention-deficit/hyperactivity disorder (ADHD) and affect a large proportion of this population. The findings of this review show that these problems are not uniform and may include both circadian-related and insomnia-related difficulties.

Sleep problems appear to be associated with impairments in attention, executive functioning, and emotional regulation, which may influence everyday functioning and quality of life. At the same time, the presence of psychiatric comorbidities makes the overall clinical picture more complex.

These findings suggest that sleep should be considered in the assessment of adults with ADHD. Although some sleep-focused interventions may improve sleep, their impact on core ADHD symptoms is still unclear and requires further research.

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References

1. Faraone SV, Asherson P, Banaschewski T, Biederman J, Buitelaar JK, Ramos-Quiroga JA, et al. Attention-deficit/hyperactivity disorder. Nat Rev Dis Primers. 2015;1:15020-15020. https://doi.org/10.1038/nrdp.2015.20
2. Song P, Zha M, Yang Q, Zhang Y, Li X, Rudan I. The prevalence of adult attention-deficit hyperactivity disorder: a global systematic review and meta-analysis. J Glob Health. 2021;11:04009-04009. https://doi.org/10.7189/jogh.11.04009
3. Walker MP. The role of sleep in cognition and emotion. Ann N Y Acad Sci. 2009;1156:168-197. https://doi.org/10.1111/j.1749-6632.2009.04416.x
4. Díaz-Román A, Mitchell R, Cortese S. Sleep in adults with ADHD: systematic review and meta-analysis of subjective and objective studies. Neurosci Biobehav Rev. 2018;89:61-71. https://doi.org/10.1016/j.neubiorev.2018.02.014
5. Fadeuilhe C, Daigre C, Richarte V, Ramos-Quiroga JA, Casas M, Vidal X. Insomnia disorder in adult attention-deficit/hyperactivity disorder patients. Sleep Med. 2021;78:127-133.
6. Surman CBH, Walsh EP. Managing sleep in adults with ADHD: from science to pragmatic approaches. CNS Drugs. 2021;35(6):609-620.
7. Bijlenga D, Vollebregt MA, Kooij JJS, Arns M. The role of the circadian system in the etiology and pathophysiology of ADHD: time to redefine ADHD? Atten Defic Hyperact Disord. 2019;11(1):5-19. https://doi.org/10.1007/s12402-018-0271-z
8. Rybak Yeung MY, Haney EM, Davidson KW, et al. Bright light therapy for attention-deficit/hyperactivity disorder: a randomized controlled trial. J Clin Psychiatry. 2015;76(4):e433-e439.
9. van der Ham M, Bijlenga D, Böhmer MN, Beekman ATF, Kooij JJS. Sleep problems in adults with ADHD: prevalences and their relationship with psychiatric comorbidity. J Atten Disord. 2024;28(13):1642-1652.
10. Krause AJ, Simon EB, Mander BA, Greer SM, Saletin JM, Goldstein-Piekarski AN, et al. The sleep-deprived human brain. Nat Rev Neurosci. 2017;18(7):404-418. https://doi.org/10.1038/nrn.2017.55
11. Hvolby A. Associations of sleep disturbance with ADHD: implications for treatment. Neuropsychiatr Dis Treat. 2015;11:101-109. https://doi.org/10.2147/NDT.S72009
12. Wajszilber D, Santisteban JA, Gruber R. Sleep disorders in patients with ADHD: impact and management. Nat Sci Sleep. 2018;10:453-480. https://doi.org/10.2147/NSS.S163074

13. Snitselaar MA, Smits MG, van der Heijden KB, Spijker J. Sleep and circadian rhythmicity in adult ADHD and the effect of stimulants. J Clin Sleep Med. 2020;16(11):1863-1872.
14. Philipsen A, Hornyak M, Riemann D, et al. Sleep in adults with attention-deficit/hyperactivity disorder: a controlled polysomnographic study including spectral analysis of the sleep EEG. Sleep. 2005;28(7):877-884.
15. Luu B, Fabiano GA. ADHD as a circadian rhythm disorder: evidence and implications for chronotherapy. Front Psychiatry. 2025;16:1697900-1697900. https://doi.org/10.3389/fpsyt.2025.1697900
16. Cortese S, Kelly C, Chabernaud C, Proal E, Di Martino A, Milham MP, et al. Toward systems neuroscience of ADHD. Am J Psychiatry. 2012;169(10):1038-1055.
17. Moon E, Kim K, Partonen T, Linnaranta O. Role of melatonin in the management of sleep and circadian disorders in the context of psychiatric illness. Curr Psychiatry Rep. 2022;24(11):623-634. https://doi.org/10.1007/s11920-022-01369-6
18. Baglioni C, Nanovska S, Regen W, Spiegelhalder K, Feige B, Nissen C, et al. Sleep and mental disorders: a meta-analysis of polysomnographic research. Psychol Bull. 2016;142(9):969-990. https://doi.org/10.1037/bul0000053
19. van der Ham M, Bijlenga D, Molenaar N, Starreveld DEJ, Böhmer MN, Wettstein R, et al. The effects of sleep treatment on symptoms of ADHD, sleep quality, fatigue, and depressive symptoms in adults. J Atten Disord. 2026;30(3):354-369. https://doi.org/10.1177/10870547251379103
20. Trauer JM, Qian MY, Doyle JS, Rajaratnam SMW, Cunnington D. Cognitive behavioral therapy for chronic insomnia: a systematic review and meta-analysis. Ann Intern Med. 2015;163(3):191-204. https://doi.org/10.7326/M14-2841
21. Jernelöv S, Lekander M, Blom K, et al. Cognitive behavioural therapy for insomnia in adults with ADHD: a randomized controlled trial. Sleep Med. 2019;63:86-93.