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Adolescent Sleep Challenges: Exploring Sleep Disorders

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Abstract

Sleep disorders among adolescents are increasingly recognized as a critical public health issue, with significant implications for both physical and mental well-being. This article review examines the prevalence and causes of sleep disturbances in adolescents, focusing on the influence of circadian rhythm disruptions, academic pressures, technology use, and lifestyle factors. The review highlights the severe consequences of chronic sleep deprivation, including heightened risks of mental health disorders, cognitive impairments, and long-term physical health problems. A particular emphasis is placed on the situation in Thailand, where urbanization, academic demands, and irregular sleep patterns exacerbate the problem. The review calls for urgent interventions, such as school-based sleep education, policy adjustments, and public health campaigns, to mitigate the widespread effects of sleep disorders and promote healthier sleep behaviors among adolescents.

Keywords: Adolescent Sleep Disorders, Circadian Rhythm Disruption, Sleep Deprivation, Mental Health in Adolescents

Introduction

Sleep disorders are increasingly prevalent among adolescents, posing significant risks to both their physical and mental well-being. A growing number of adolescents are receiving as little as six hours of sleep per night, which is substantially below the recommended duration for optimal health. This sleep deprivation is often linked to disruptions in their circadian rhythms, the body's natural sleep-wake cycle, commonly caused by late-night use of technology. The blue light emitted from smartphones and computers can suppress the production of melatonin, the hormone essential for regulating sleep, thus making it more difficult for adolescents to fall asleep and achieve the rest they require [1].

Today's adolescents are under unprecedented pressure, both socially and academically, which further exacerbates their sleep problems. Unlike previous generations, many teens now tend to stay up later and attempt to compensate for lost sleep by sleeping in on weekends—a pattern referred to as "social jetlag." This chronic sleep deprivation can result in various adverse effects, including mood swings, impaired concentration, and declining academic performance. Over time, consistently inadequate sleep elevates the risk of developing mental health disorders and contributes to physical health issues such as obesity and heart disease [2]. The impact of sleep deprivation extends far beyond just feeling fatigued—it can have profound long-term effects on brain development and overall health. Studies indicate that insufficient sleep can even influence gene expression, potentially affecting critical functions such as learning, memory, and emotional regulation. While adolescents typically require around nine hours of sleep each night to perform at their peak, many fall significantly short of this amount, resulting in numerous challenges in their daily lives [3].

Comprehending the widespread sleep struggles among adolescents is essential for effectively addressing this issue. The causes are multifaceted, including biological shifts during puberty, pervasive electronic device usage, and early school start times. By investigating these factors, we can begin to formulate strategies to enhance sleep patterns and promote the overall health and well-being of adolescents. This research seeks to thoroughly examine the prevalence of sleep disorders in adolescents, explore the underlying causes, and identify actionable strategies to ensure they achieve sufficient rest [4].

Sleep Disorder

Sleep disorders, or sleep-wake disorders, are marked by disruptions in the duration, timing, and quality of sleep, which result in significant daytime distress and impair daily functioning. Among adolescents, these disorders frequently present as challenges with initiating sleep, maintaining sleep, or waking up prematurely, ultimately leading to inadequate sleep—typically defined as receiving fewer than six hours of sleep per night [5]. Delayed Sleep Phase Syndrome (DSPS) is one of the most prevalent sleep disorders in adolescents. This circadian rhythm disorder involves a delay in the body's internal clock, leading them to fall asleep much later than usual and have difficulty waking up in the morning. The condition is often worsened by excessive use of technology, including smartphones and computers, which emit blue light that interferes with the production of melatonin, the hormone responsible for regulating sleep [6]. Insomnia is another widespread sleep disorder among adolescents, defined by persistent difficulty in falling asleep or maintaining sleep. In adolescents, insomnia can be triggered by various factors, including the stress associated with demanding school schedules, anxiety, and poor sleep hygiene—such as inconsistent bedtimes and the habit of using electronic devices late into the night [7]. Obstructive Sleep Apnea (OSA), while more frequently diagnosed in adults, also affects adolescents. This disorder is characterized by repeated interruptions in breathing during sleep, resulting from the obstruction of the upper airway. These interruptions lead to fragmented sleep, which can cause excessive daytime sleepiness, impaired concentration, and even behavioral problems [8].

The impact of sleep disorders on teenagers is significant and multifaceted. Physically, these disorders can lead to symptoms such as headaches, muscle pain, and chronic fatigue, with long-term consequences including an elevated risk of obesity, cardiovascular disease, and diabetes. Psychologically, inadequate sleep is closely associated with mood disorders like depression and anxiety, creating a detrimental cycle that exacerbates sleep disturbances. Academically, sleep-deprived teens often face challenges with concentration, memory retention, and motivation, resulting in diminished performance and a lack of engagement in school activities [9].

Causes of sleep problems in teen

Biological Changes: In adolescence, biological changes can greatly disturb sleep patterns, primarily because of alterations in the circadian rhythm, the body's internal clock for sleeping and waking. This internal clock, which determines our alertness or drowsiness, is influenced by both our genes and surroundings. As adolescents mature, their internal body clocks naturally change, leading to them staying awake later and having difficulty waking up early. This adjustment, commonly known as a shift in "chronotype," creates difficulties for teenagers in syncing their sleep patterns with early school start times, resulting in a mismatch between their internal body clocks and daily activities [10]. This misalignment can result in a variety of complications, including interrupted sleep schedules and potential changes in eating habits, which can lead to metabolic problems and other health concerns. Furthermore, variances in how circadian rhythms are affected might even impact things like blood pressure management, which vary among different groups of people [11]. The disconnect between a adolescent’s natural biological rhythms and the demands of their daily routine can impact their ability to function and learn effectively, indicating that current school schedules may not align with the natural developmental changes teens undergo [12]. In summary, the biological changes that take place during adolescence can significantly affect sleep and overall health. Recognizing these changes underscores the importance of adapting daily routines and habits to align more closely with teenagers' natural rhythms, which can support better physical and mental well-being [13].

School Workload: A major contributor to insufficient sleep among young adults is the demanding nature of their school schedules. Many teenagers alter their

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sleep patterns to meet academic obligations, often resulting in sleep debt due to disruptions in their natural sleep-wake cycles. This issue is especially pronounced among students who face academic challenges, as they tend to get less sleep, worsening their struggles during school hours. Research indicates that students in countries with intense academic demands, such as China, Taiwan, South Korea, and Japan, are more prone to sleep disorders. Taiwan, with the world's longest school day at 10 hours, exemplifies this rigorous academic culture [14]. In China, students spend about 9.5 hours in school each day, according to data [15]. In South Korea, students frequently dedicate 12 to 16 hours daily to school and after-school tutoring academies, with much of this time focused on preparing for the crucial Suneung exam, which determines their university placement [16]. A study in Japan found a decrease in sleep disorders among high school students from 2004 to 2017. However, it also highlighted that poor time management has resulted in later bedtimes and shorter sleep duration, prompting school officials to emphasize the need for educating students on the importance of adequate sleep [17].

Technology Use: The use of electronic devices like smartphones, tablets, and computers, especially before bedtime, can disrupt sleep due to the blue light emitted by screens. Late-night usage of these devices is increasingly affecting teenagers' sleep, resulting in shorter sleep duration, lower sleep quality, and various negative health effects. The blue light interferes with circadian rhythms by suppressing melatonin production, making it more difficult to fall and stay asleep. This disruption not only leads to daytime fatigue but is also associated with mental health issues like depression, decreased self-esteem, and reduced coping skills [18]. Nighttime use of digital media is linked to later bedtimes, longer times to fall asleep, early awakenings, and greater daytime fatigue, all of which contribute to a decline in overall sleep quality [19]. Although blue light has certain therapeutic benefits, excessive exposure can negatively impact sleep and potentially damage photoreceptors, highlighting the importance of using it with caution [20].

Social Activity: Social activities, homework, and part-time jobs can cut into the time available for sleep. Recent studies reveal the significant impact school-related stress has on disrupting adolescent's sleep. Early morning school start times conflict with adolescent's natural sleep cycles, making it challenging for them to get adequate rest. This disruption often leads to poor sleep quality and difficulty in maintaining a consistent sleep routine [21]. Compounding this issue is the significant homework burden many adolescents experience. Some of them spend over 15 to 20 hours a week on homework, leading to high stress levels that can keep them awake at night [22]. They tend to go to bed later, wake up earlier, and have difficulty falling or staying asleep. Many teenagers are only getting 5 to 7 hours of sleep on school nights, which is significantly less than the amount needed to maintain good health [23]. Insufficient sleep can lead to serious issues, including exhaustion, headaches, and more significant mental health challenges, particularly for girls. The combination of early school start times and heavy homework can severely disrupt their sleep, emphasizing the need for a better balance. By adjusting academic demands and promoting healthy sleep habits, we can help teens achieve the rest they need to thrive [24].

Stress and Anxiety: Academic pressures, social challenges, and family dynamics can contribute to stress and anxiety, making it hard for teens to unwind and fall asleep. Sleep deprivation in teenagers is closely connected to mental health issues like stress, anxiety, and depression, creating a cycle where each problem worsens the other. Research shows that many teens face considerable stress and anxiety, which negatively affects their sleep. For instance, a survey revealed that over half of adolescents feel stressed and anxious, with reduced sleep linked to higher levels of depression. This, in turn, exacerbates sleep problems, perpetuating a vicious cycle [25]. Adolescents who experience anxiety or depression generally get less sleep and have lower sleep quality compared to their peers. Research indicates that adolescents with depression sleep about three and a half hours less per week than those without mental health issues, while those with anxiety frequently report poor sleep quality [26]. The connection between sleep and mental health is two-way—depression and anxiety can cause sleep issues, and inadequate sleep can heighten the risk of developing these mental health conditions [27]. Inadequate sleep is also strongly associated with serious risks, such as suicidal thoughts and non-suicidal self-injury (NSSI). Research has shown that

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adolescents who get less sleep are notably more likely to contemplate or attempt suicide, even when accounting for depressive symptoms [28]. Moreover, biological changes during adolescence, such as shifts in circadian rhythms and a slower accumulation of sleep pressure, make it more challenging for teens to fall asleep early, resulting in shorter and more fragmented sleep. These biological factors, together with external stressors like early school start times and academic pressures, contribute to chronic sleep deprivation, which has significant consequences for teenagers' mental and emotional health [29].

Diet and Caffeine Intake: The intake of caffeine and large or late-night meals can impact the ability to fall and stay asleep. Diet and caffeine consumption significantly influence sleep disorders among adolescents. High caffeine intake, commonly from coffee, tea, energy drinks, and even chocolate, is associated with increased sleep problems and disturbances. Adolescents who consume large amounts of caffeine often experience difficulty falling asleep, poor sleep quality, and morning fatigue. This creates a cycle where poor sleep prompts higher caffeine consumption the following day to counteract tiredness, further disrupting sleep [30]. Dietary habits also play a major role in sleep quality. Unhealthy eating patterns, such as irregular meal times and high-calorie consumption, are linked to shorter sleep duration and disrupted sleep. Obesity, frequently resulting from poor dietary habits, is closely associated with sleep disorders like obstructive sleep apnea. Furthermore, the timing of food intake can affect circadian rhythms, which in turn impacts sleep patterns [31]. The gut microbiome is also essential in this relationship. Imbalances in gut health, often due to poor diet or irregular eating habits, can lead to sleep issues and metabolic disturbances. On the other hand, a healthy diet and probiotic consumption can improve gut health and enhance sleep quality [32]. In summary, diet and caffeine consumption greatly affect sleep quality and duration in adolescents. Effectively managing these factors is crucial for improving sleep and overall health [33].

Lack of Physical Activity: The reduction in physical activity not only affects sleep but also contributes to broader health issues, which can further disrupt sleep patterns. As physical activity levels decline, teenagers are more likely to experience issues such as obesity, which is closely linked to sleep disorders like obstructive sleep apnea. The combination of insufficient physical activity and its associated health problems creates a cycle that exacerbates sleep difficulties in teenagers [34]. Urbanization has significantly transformed economic, social, and physical landscapes, resulting in lifestyle shifts that frequently diminish levels of physical activity [35]. The reduction in physical activity directly affects sleep, as moderate-intensity exercise is known to enhance sleep quality and aid in managing sleep disorders. When teenagers lack adequate physical activity, they are more likely to encounter sleep disturbances, lower sleep quality, and increased difficulty falling asleep [36].

Consequences of Sleep Problems in Adolescents

One in four adolescents reported needing more sleep, while 10% struggled with falling asleep. These sleep issues are linked to heightened anxiety, depression, inattentiveness, and conduct disorder behaviors [37]. Insufficient sleep in adolescents has profound and wide-ranging effects, adversely affecting their health, academic achievement, and overall quality of life. Persistent sleep deprivation is strongly associated with numerous problems, such as elevated rates of depression, obesity, and a greater propensity for risk-taking behaviors, including drowsy driving, which significantly increases the likelihood of accidents [38]. Sleep disorders in children and adolescents can have lasting mental health repercussions, particularly in increasing the risk of depression. Research highlights a strong correlation between sleep disorders and the onset of depression, with adolescents being especially susceptible. One study found that 5% of children and adolescents diagnosed with sleep disorders developed depression within five years, in contrast to just 2% of those without sleep issues [39]. In addition to its impact on mental health, sleep deprivation negatively influences cognitive function, mood, and overall physical well-being. Insomnia, a prevalent sleep disorder, is associated with elevated cortisol levels, weakened immune response, and increased markers of sympathetic nervous system activity. These physiological changes contribute to a heightened risk of cardiovascular diseases, such as hypertension and diabetes [40]. The cumulative effects of inadequate sleep extend to reduced academic performance, higher healthcare costs, and a lowered quality of life. Early intervention is essential to alleviate these risks. Effective strategies include encouraging good sleep

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hygiene, such as maintaining consistent bedtime routines, limiting screen time before bed, and fostering a sleep-conducive environment. Additionally, schools and healthcare providers should prioritize educating families on the significance of sleep and recognizing early signs of sleep disorders to prevent long-term adverse consequences [41].

Sleep behavior among Thai Teen

Thai adolescents encounter serious sleep challenges that significantly impact their overall well-being. A survey of 1,259 Thai teens aged 11-19 showed that the average sleep duration was just 7.2 hours per night, falling short of the recommended amount. Alarmingly, 69% of these adolescents reported insufficient sleep, with the rate increasing to 80.6% among those residing in urban areas. Contributing factors such as irregular wake times, high academic demands, and urban living were identified as key risks for inadequate sleep [42]. These sleep issues are strongly connected to numerous health risks. Poor sleep quality was linked to heightened levels of anxiety, depression, and irritability, leading to significant psychosocial distress. Adolescents who reported poor sleep quality frequently displayed symptoms of anxiety, tension, and depression, alongside other emotional and physical health concerns, including chronic illnesses and somatic pain [43]. Insomnia, the most prevalent sleep disturbance among Thai adolescents, is a major health concern with extensive repercussions that impact their physical, psychological, and social well-being. Although academic performance (GPAX) was not directly linked to sleep quality, other factors—such as caffeine consumption, family environment, and GPAX—were significant predictors of sleep quality among students [44]. In summary, the sleep patterns of Thai adolescents are shaped by a combination of academic pressure, urbanization, and lifestyle choices, resulting in widespread insufficient sleep and the accompanying health risks. Tackling these challenges is essential for enhancing the overall health and well-being of Thai adolescents [45].

Conclusion

Sleep disorders among adolescents, especially in Thailand, have become a significant public health concern with extensive consequences for both physical and mental well-being. The prevalence of insufficient sleep among Thai adolescents is particularly alarming in urban areas, where academic pressures and lifestyle factors intensify the problem. The repercussions of inadequate sleep are severe, leading to heightened levels of anxiety, depression, irritability, and other forms of psychosocial distress. Insomnia, the most prevalent sleep disturbance, poses substantial risks to the overall health and development of Thai adolescents, adversely affecting their academic performance, cognitive function, and long-term health outcomes. These findings underscore the urgent need to prioritize the management of sleep disorders in adolescents within public health and educational policies.

Recommendation

To combat the escalating issue of sleep disorders among Thai adolescents, it is crucial to implement comprehensive school-based sleep education programs that highlight the importance of sleep hygiene and the dangers of sleep deprivation. Schools should consider adjusting start times to better align with adolescents' natural sleep rhythms, thereby helping to minimize sleep deficits. Encouraging regular physical activity, balanced nutrition, and reduced caffeine consumption can also improve sleep quality. Furthermore, expanding access to mental health resources and early intervention strategies is essential for addressing the psychological factors contributing to sleep disorders. Public health campaigns targeting both adolescents and their families are vital for raising awareness about the critical role of sleep in overall health and well-being.

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