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Association between Screen Time and Sleep Disorders in Teens with ADHD

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ABSTRACT

Background: To evaluate' the association between daily screen time and sleep disturbances among adolescents with ADHD'.

Methods: A cross-sectional study was conducted from June 2023 to May 2024, involving 81 adolescents aged 13 to 19 years diagnosed with ADHD. Data were collected using structured questionnaires addressing demographics, ADHD characteristics, screen exposure habits, and sleep-related outcomes. Associations between screen time variables and sleep disturbances were analyzed using chi-square tests, with significance set at $p < 0.05$.

Results: Among participants, 65.4% reported screen use exceeding four hours daily, and 64.2% experienced sleep-related complaints. High screen exposure was significantly associated with sleep onset latency greater than 30 minutes ($p = 0.009$), daytime fatigue ($p = 0.026$), and diagnosed sleep disturbances ($p = 0.005$). Screen use within one hour before bedtime was also strongly correlated with delayed sleep onset.

Conclusion: Viewing screens to excess, especially in the hours leading up to sleep, is associated with increased sleep problems in adolescents with ADHD. This set of findings emphasizes the necessity of specific behavioral intervention to manage digital media use within this at-risk population**.**

Keywords: *ADHD, Adolescents, Screen Time, Sleep Disorders, Sleep Latency, Digital Media, Daytime Fatigue*

INTRODUCTION

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity, usually emerging in early childhood and persisting into adolescence'. In adolescents with ADHD, the sleep disorders reported range from behavioral and cognitive difficulties, to problems with initiating sleep, recurrent arousals, and excessively sleepy during the day [1-3].

The growing prevalence of smartphones, gaming consoles, tablets, and televisions in the last few years have become increasingly pivotal in the sleep problems being reported in adolescents. Overstimulation of media content and exposure to blue light prior to sleep may interfere with the body's internal clock and the secretion of the hormone melatonin, resulting in the postponement of sleep initiation and deterioration of sleep quality [4-6].

Due to poor self-regulation and an inclination toward engaging with media, adolescents with ADHD may be especially vulnerable to the effects mentioned above. Nonetheless, specific studies examining the connection between screen time and sleep outcomes in this population are scarce. Elucidating this relationship is vital for devising appropriate behavioral and clinical interventions tailored to ADHD adolescents [7-9].

This study was conducted to examine the link between daily screen time including duration, timing, and type of screen use and the presence of sleep disturbances in adolescents with ADHD. The goal was to generate evidence that can inform digital hygiene interventions aimed at improving sleep health in this high-risk population.

1. METHODOLOGY

Study Design and Duration

This was a cross-sectional analytical study conducted over a period of one year, from June 2023 to May 2024, to explore the association between screen time and sleep disorders in adolescents diagnosed with Attention-Deficit/Hyperactivity Disorder (ADHD)'. The study was carried out at Sheikh Zayed Medical College. Written informed consent was obtained from parents/guardians, and assent was secured from all participants.

The study included adolescents aged between 13 and 19 years who had a confirmed diagnosis of ADHD based on DSM-5 criteria. Both males and females were included, regardless of whether they were on medication for ADHD. Participants were recruited from psychiatric, pediatric, or developmental outpatient services.

A total of 81 adolescents with ADHD were included using a non-probability consecutive sampling method. Participants were enrolled until the required sample size was achieved within the specified duration.

Inclusion Criteria

- Adolescents aged 13–19 years
- Diagnosed with ADHD (any subtype)
- Parental/guardian consent and participant assent obtained
- Willingness to complete questionnaires and interviews

Exclusion Criteria

- Presence of comorbid neurological or developmental disorders (e.g., autism, epilepsy)
- History of diagnosed sleep disorder predating screen exposure (e.g., obstructive sleep apnea)
- Current use of sedative or sleep-inducing medications unrelated to ADHD treatment

Data Collection Tools and Procedure

Participants and their guardians were interviewed using a structured proforma. Information was gathered in four sections:

1. **Demographics**: Age, gender, school grade, residence, and socioeconomic status.
2. **ADHD Profile**: Subtype of ADHD, duration since diagnosis, and medication status.
3. **Screen Time Assessment**: Daily screen time (weekday and weekend average), types of devices used (smartphones, tablets, TVs), screen activities (gaming, social media, educational), and whether screens were used within one hour before sleep.
4. **Sleep Parameters**: Sleep duration, latency (time to fall asleep), frequency of night awakenings, daytime fatigue, and any diagnosed sleep disturbances. Sleep data was obtained via parent-report and participant self-report using a simplified validated sleep questionnaire for adolescents.

Data were entered and analyzed using SPSS version 25. Continuous variables such as age and screen time were expressed as means ± standard deviations. 'Categorical variables like ADHD subtype, screen activity, and sleep disturbance were reported as frequencies and percentages'. The chi-square test was used to assess associations between screen-related variables and sleep outcomes. A p-value less than 0.05 was considered statistically significant.

2. RESULTS

The study included 81 adolescents diagnosed with ADHD. The majority were males (65.4%), with a mean age of 15.2 ± 1.8 years. Most participants were enrolled in high school (58.0%), lived in urban areas (72.8%), and belonged to a middle socioeconomic class (63.0%).

Table 1: Demographic Characteristics of Participants (n = 81)

Variable	Category	Frequency (%)
Gender	Male	53 (65.4%)
	Female	28 (34.6%)
Age (years)	Mean ± SD	15.2 ± 1.8
School Grade	Middle School	34 (42.0%)

	High School	47 (58.0%)
Residence	Urban	59 (72.8%)
	Rural	22 (27.2%)
Socioeconomic Status	Low	17 (21.0%)
	Middle	51 (63.0%)
	High	13 (16.0%)

A majority of participants (53.1%) had the combined subtype of ADHD, followed by inattentive (29.6%) and hyperactive-impulsive (17.3%) types. Around 60.5% of adolescents were currently using stimulant medications for ADHD management, while 39.5% were not on pharmacologic treatment.

Table 2: ADHD Subtypes and Medication Use (n = 81)

Variable	Category	Frequency (%)
ADHD Subtype	Inattentive	24 (29.6%)
	Hyperactive-Impulsive	14 (17.3%)
	Combined	43 (53.1%)
Medication Use	Yes	49 (60.5%)
	No	32 (39.5%)

The average screen time per day was 4.7 ± 1.9 hours. A significant portion (65.4%) exceeded 4 hours daily. Social media use (81.5%) and video gaming (72.8%) were the most common screen activities. Nearly half (46.9%) used screens within one hour before sleep.

Table 3: Screen Time Patterns in Teens with ADHD (n = 81)

Variable	Category	Frequency (%)
Daily Screen Time	≤ 2 hours	14 (17.3%)
	2–4 hours	14 (17.3%)
	> 4 hours	53 (65.4%)
Screen Use Before Bed	Yes	38 (46.9%)
	No	43 (53.1%)
Main Screen Activity	Social Media	66 (81.5%)
	Video Gaming	59 (72.8%)
	TV/YouTube	42 (51.9%)
	Educational Use	35 (43.2%)
Device Used Mostly	Smartphone	58 (71.6%)
	Tablet	13 (16.0%)
	Computer/TV	10 (12.4%)

Sleep problems were reported in 64.2% of participants, including difficulty falling asleep, frequent awakenings, and non-restorative sleep. Adolescents with high screen time had higher frequencies of sleep onset latency >30 minutes (56.6%) and daytime fatigue (69.8%).

Table 4: Sleep Disturbances in Study Participants (n = 81)

Variable	Category	Frequency (%)
Reported Sleep Problem	Yes	52 (64.2%)
	No	29 (35.8%)
Sleep Duration	≥8 hours	25 (30.9%)
	6–7.9 hours	38 (46.9%)
	<6 hours	18 (22.2%)
Sleep Onset Latency	≤30 minutes	35 (43.2%)
	>30 minutes	46 (56.8%)
Daytime Fatigue	Yes	45 (55.6%)
	No	36 (44.4%)

Chi-square analysis showed a statistically significant association between screen time >4 hours and the presence of sleep disorders ($\chi^2 = 7.83$, df = 1, p = 0.005). 'Similarly, screen use before bedtime was significantly associated with sleep onset latency >30 minutes ($\chi^2 = 6.74$, df = 1, p = 0.009) and higher daytime fatigue ($\chi^2 = 4.95$, df = 1, p = 0.026)'. No significant difference was found in sleep duration based on screen time (p = 0.158).

Table 5: Association of Screen Time with Sleep Disturbances

Variable	Group Comparison	χ^2 (df)	p-value
Screen Time vs Sleep Disorder	>4 hrs vs ≤4 hrs	7.83 (1)	0.005 **
Bedtime Screen Use vs Latency	Screen before bed vs no screen	6.74 (1)	0.009 **
Screen Time vs Fatigue	>4 hrs vs ≤4 hrs	4.95 (1)	0.026 **
Screen Time vs Sleep Duration	≥8 hrs vs <8 hrs	2.00 (1)	0.158 ns

Note: p < 0.05 considered significant; ** = statistically significant; ns = not significant

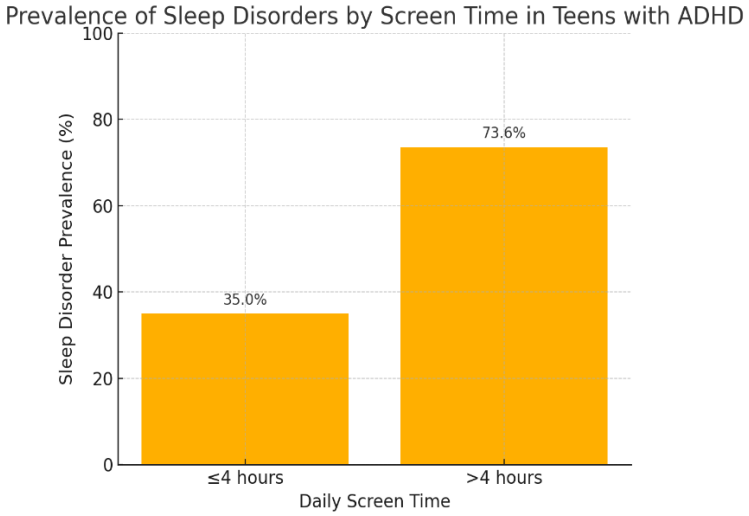

Figure 1: bar graph showing the prevalence of sleep disorders among teens with ADHD based on their daily screen time. As illustrated, those with more than 4 hours of screen time had a substantially higher rate of sleep disturbances compared to those with 4 hours or less.

3. DISCUSSION

This study found ‘a significant association between extended screen time and the prevalence of sleep disturbances among adolescents with ADHD’. ‘The results demonstrated that teens who spent more than four hours daily on screen-based activities were significantly more likely to report poor sleep quality, including difficulties falling asleep, frequent awakenings, and excessive daytime fatigue’.

These findings align with previous research. Studies in their meta-analysis highlighted that screen use particularly in the evening disrupts sleep by delaying circadian rhythm and suppressing melatonin production due to blue light exposure [10-12]. ‘Similarly, studies indicated that adolescents with increased digital media exposure are more likely to experience short sleep duration and insomnia symptoms, even after controlling for mental health status’. This supports the current study's finding that screen use before bedtime was significantly associated with longer sleep latency and increased daytime tiredness [13, 14].

Teens with ADHD may be particularly vulnerable to the sleep-disrupting effects of screen time due to their heightened sensitivity to stimulation and difficulties in self-regulation. Studies found that adolescents with ADHD tend to use screen-based activities more frequently for emotional regulation, which can further delay bedtime and interfere with sleep routines [15, 16]. The current study reinforces this notion by showing that social media and video gaming were the most common screen activities, both of which are highly stimulating and potentially addictive.

Furthermore, screen time appears to compete directly with sleep by displacing valuable wind-down time before bed. Studies suggested that the "time displacement effect" is one of the strongest mediators of screen-related sleep issues in youth. This mechanism is likely amplified in adolescents with ADHD who may already struggle with executive functioning and time management [17-19].

Interestingly, no significant difference was observed in total sleep duration between low and high screen time groups. This could indicate that although sleep quantity may remain within acceptable limits for some teens, the quality and continuity of sleep are being compromised leading to non-restorative sleep and next-day fatigue [20].

The use of stimulant medications did not show a clear confounding effect on the relationship between screen use and sleep, though this aspect warrants further longitudinal study. Additionally, although we assessed various types of screen exposure, future studies should evaluate content-specific impacts (e.g., violent video games vs. passive TV watching) to determine which media types are most harmful to sleep in this population.

4. CONCLUSION

The study concludes that excessive screen time, especially before bedtime, is significantly associated with sleep disturbances in adolescents with ADHD. This includes delayed sleep onset, frequent night awakenings, and increased daytime fatigue. These findings underscore the importance of screen time regulation and sleep hygiene education for teens with ADHD and their caregivers. Pediatricians and mental health professionals should incorporate screen-use screening and sleep assessments into routine ADHD management, promoting healthier digital habits to improve overall well-being.

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