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Association Between Sleep Pattern and Screen Time in Children With Autism Spectrum Disorder

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ABSTRACT

Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental condition often accompanied by sleep disturbances and elevated screen exposure, both of which can negatively impact behavioral and emotional health.

Objective: To determine the association between screen time and sleep patterns in children diagnosed with Autism Spectrum Disorder.

Methods: A cross-sectional study was conducted at the PSRD Occupational Therapy Department. A total of 280 children aged 3–15 years with confirmed ASD diagnoses were included through non-probability sampling. Children with comorbidities or additional physical conditions were excluded. The Children Sleep Habits Questionnaire (CSHQ), along with structured questions on screen use, was administered to parents after obtaining informed consent. Data were analyzed using SPSS version 22. Statistics including chi-square tests were used to examine associations, with a significance level set at $p < 0.05$.

Results: Among 280 participants, 54.3% were male and 45.7% female. Most children used smartphones (58.2%), and screen use was highest in the evening (41.9%). A significant association was found between total screen time and sleep disturbances (χ^2=96.055, p<0.001). Significant relationships were also observed for screen use duration on holidays (p<0.001) and weekdays (p=0.052), and time of day of screen use (p<0.001).

Conclusion: Increased screen time was significantly associated with disturbed sleep patterns in children with ASD. Parental regulation of digital media use may mitigate sleep-related difficulties in this population.

Keywords: Autism Spectrum Disorder, Children Sleep Habits Questionnaire, Exposure to Media, Sleep, Sleep Disorders, Sleep Initiation and Maintenance Disorders, Sleep Wake Disorders, Video Display Terminals.

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Introduction

Autism Spectrum Disorder (ASD) is a heterogeneous neurodevelopmental condition characterized by persistent deficits in social communication and interaction, alongside restricted, repetitive patterns of behavior, interests, or activities (1). Clinically, these core features manifest early in childhood, often between the ages of 3 to 5 years, and can significantly affect an individual's capacity to engage meaningfully in relationships, academic pursuits, and later occupational roles (2). The global prevalence of ASD is estimated to be approximately 1 in 100 children, with the World Health Organization placing it around 0.76%, accounting for only a fraction of the global child population (3). While some individuals with ASD are able to function independently, many require substantial support due to co-occurring intellectual disabilities and challenges in adaptive functioning (4).

According to the DSM-5, early signs of ASD include limited responsiveness to social interactions, impaired use of nonverbal communication (e.g., eye contact, gestures), difficulties in establishing and maintaining relationships, and repetitive behaviors or restricted interests such as stereotyped speech, fixations on particular objects, and motor movements like hand-flapping or spinning (5). Interventions such as Pivotal Response Treatment (PRT), which targets essential behavioral skills, and occupational therapy, including sensory integration therapy (SIT), have been developed to address the complex needs of children with ASD (6, 7). These therapies aim to improve self-regulation, coordination, and social engagement through structured sensory stimulation and motor integration strategies (8).

Sleep, a vital neurophysiological process for brain development, plays a foundational role in a child's cognitive, emotional, and physical well-being (9). Evidence indicates that healthy sleep patterns in childhood are critical predictors of later life outcomes in health and development (10). The sleep cycle comprises non-rapid eye movement (NREM) and rapid eye movement (REM) stages, both of which are regulated through intricate neural mechanisms measurable via electroencephalography (EEG) (11, 12). Notably, children with ASD experience higher rates of sleep disturbances compared to their typically developing peers or those with other developmental disorders. Common problems include prolonged sleep latency, frequent nighttime awakenings, and reduced overall sleep duration (13).

Parallel to sleep challenges, screen time has emerged as a growing concern in pediatric neurodevelopmental health. Screen exposure is influenced by multiple socio-environmental factors, including parental education and socioeconomic status. In low-income households, screen time regulations are often inconsistently enforced, resulting in excessive exposure, particularly in children with ASD (12). Recommendations on screen time limits vary by age, with guidelines suggesting a maximum of 1–2 hours daily depending on the child's developmental stage (12). However, studies reveal that children with ASD disproportionately engage in screen-based activities during their free time, sometimes to the exclusion of social or physical play (14). The implications of this behavioral pattern are substantial: screen overuse is linked to reduced peer interaction, increased behavioral challenges, and exacerbation of ASD symptomatology (15). In fact, up to 80.9% of children with ASD reportedly suffer from sleep disturbances, and excessive screen exposure is believed to play a contributory role (11). Furthermore, toddlers with sleep problems tend to exhibit heightened autistic traits, while adolescents who frequently use screens exhibit shorter sleep durations, longer sleep onset times, and more fragmented sleep patterns, with effects varying depending on the type of media and context of use (16, 17).

The intersection between screen time and sleep disturbances in children with ASD presents a pressing area of investigation, given its potential implications for developmental outcomes and therapeutic interventions. Understanding how these two variables interact could inform targeted strategies for caregivers and clinicians aiming to enhance sleep hygiene and reduce maladaptive behaviors in this vulnerable population.

Materials and Methods

This cross-sectional analytical study was conducted at the Occupational Therapy Department of PSRD, involving children diagnosed with Autism Spectrum Disorder (ASD). The study included a total of 280 participants, selected through a non-probability purposive sampling technique, from an initially calculated sample size of 307. A total of 27 participants were excluded for not meeting the inclusion criteria. The sample size was estimated using a 95% confidence interval, 5% margin of error, and a population proportion of 28%, ensuring statistical relevance and generalizability to similar clinical settings.

Children aged between 3 to 15 years with a clinical diagnosis of ASD, confirmed by relevant medical professionals, were included in the study, provided that informed consent was obtained from their legal guardians. Participants with comorbid neurodevelopmental, psychiatric, or physical conditions were excluded to minimize confounding variables that might influence sleep patterns or screen time behavior. Data were collected from various private clinical and rehabilitation centers catering to children with developmental disorders.

The primary assessment tool utilized in this study was the Children's Sleep Habits Questionnaire (CSHQ), a standardized Likert-type scale (18) comprising 22 items designed to evaluate multiple dimensions of pediatric sleep behavior. The tool assesses bedtime resistance, sleep duration, night wakings, and morning awakenings, with response categories ranging from 0 to 7 (0 = Never, 1 =

Rarely, 2–4 = Sometimes, 5–6 = Usually, 7 = Always), and has demonstrated acceptable internal consistency with a validity coefficient of 0.6 (18). In addition, a set of structured general questions regarding daily screen time usage (including duration, type of media, and timing) was included to evaluate the exposure of participants to digital devices.

Parental responses were recorded via self-administered questionnaires, which were distributed after obtaining formal permission from institutional authorities and following identification of eligible participants. All respondents were briefed about the purpose of the study, and informed written consent was secured prior to participation. The study protocol adhered strictly to the ethical standards outlined in the Declaration of Helsinki for research involving human participants. Ethical approval was obtained from the institutional review board before commencement of data collection.

Data were tabulated and analyzed using the Statistical Package for Social Sciences (SPSS), version 25. Descriptive statistics, including mean and standard deviation, were used for continuous variables, while frequencies and percentages were calculated for categorical variables. Inferential analysis was conducted using chi-square tests to assess associations between sleep patterns and screen time exposure. Statistical significance was determined at an alpha level of 0.05.

Results

The study included 280 children with Autism Spectrum Disorder (ASD), aged between 3 and 15 years. The sample was nearly evenly distributed across three age groups: 36.4% (n=102) were 3–5 years old, 37% (n=106) were 6–10 years old, and 25.7% (n=72) were 11–15 years old. The gender distribution showed a slightly higher proportion of male participants (54.3%, n=152) compared to female participants (45.7%, n=128). In terms of socioeconomic status, 11.1% (n=31) of participants came from low-income households, 62.9% (n=176) from middle-income families, and 26.1% (n=73) from higher-income households. Additionally, the majority of participants (56.43%, n=158) lived in nuclear families, while 43.57% (n=122) were from joint family systems.

Table 1: . Descriptive Statistics of CSHQ and Screen Time Scores

Variable	No. of Participants	Minimum	Maximum	Mean	Std. Deviation
Children Sleep Habits (CSHQ)	280	27	82	53.84	12.07
Screen Time Score		5	41	10.38	2.65

Regarding screen device usage, smartphones were the most frequently used digital devices (58.21%, n=163), followed by televisions (21.07%, n=59) and laptops (20.71%, n=58). On a typical holiday, 18.9% (n=53) of children used screens for 1 hour, 39.6% (n=111) for 2 hours, 37.5% (n=105) for 3–5 hours, and 3.7% (n=11) for more than 5 hours. On school days, 28.2% (n=80) used screens for 1 hour, 41.9% (n=119) for 2 hours, 27.5% (n=78) for 3–5 hours, and 2.5% (n=3) for more than 5 hours. These usage patterns revealed extended screen exposure particularly on holidays.

Figure 1. Distribution of Screen Time by Time of Day

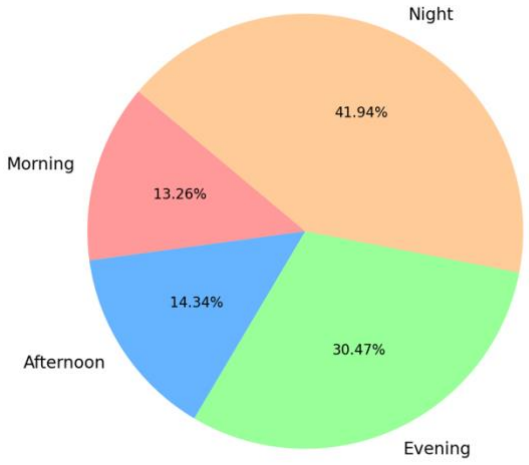

Figure 2. Type of Screen Most Frequently Used

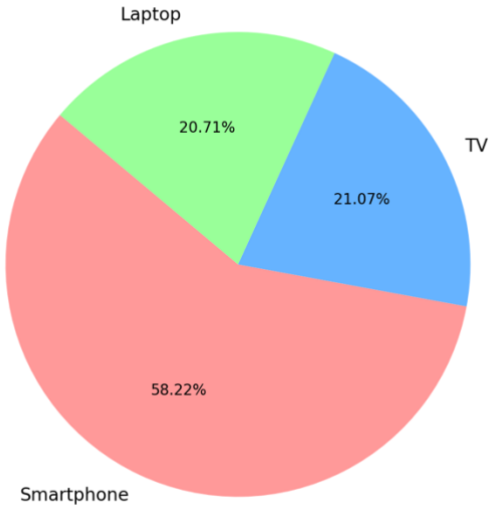

Figure 1: ***Distribution of Screen Time by Time of Day***

Figure 2: ***Type of Screen Most Frequently Used***

The descriptive statistics for the Children Sleep Habits Questionnaire (CSHQ) scores revealed a minimum score of 27 and a maximum of 82, with a mean of 53.84 (SD = 12.07). A CSHQ score of 53.84 indicates significant sleep difficulties, suggesting the presence of multiple sleep problems among children's with ASD. For screen time, scores ranged from 5 to 41, with a mean of 10.38 (SD = 2.65), indicating considerable variance in digital exposure.

Table 2: Association of Screen Use Variables and CSHQ Scores

Factor	Chi-Square (x)	p-value	Significance
Type of Screen and CSHQ	10.207	0.251	No significance
Duration of Screen Use in Holidays and CSHQ	43.291	<0.001	Statistically significant
Duration of Screen Use in School Days and CSHQ	26.159	0.052	Significantly related
Time of Day of Screen Use and CSHQ	51.135	<0.001	Statistically significant
Screen Time and Child Sleep Habits (CSHQ)	96.055	<0.001	Statistically significant

Discussion

This study aimed to explore the association between screen time and sleep patterns among children with Autism Spectrum Disorder (ASD), a population known to be vulnerable to both excessive digital media exposure and sleep disturbances. The present study explored the patterns of screen use and their association with sleep habits in children with autism spectrum disorder (ASD). Among the 280 participants, a slight male predominance was noted (54.3% male vs. 45.7% female), consistent with the established higher prevalence of ASD in males (19). The majority of participants were found to engage in screen activities for 2 to 5 hours daily, whether on school days or typical holidays. Notably, nighttime emerged as the most common period for screen use, and smartphones were the most frequently used devices, highlighting both the accessibility and preference for portable digital media among children with ASD.

Comparative data from Hale and Guan (2015) reinforce the findings of the current study. Their systematic review of 67 studies identified a robust relationship between increased screen time and negative sleep outcomes in school-aged children and adolescents. They reported that excessive screen exposure was linked to delayed bedtimes, shorter sleep durations, and diminished sleep quality, aligning with the current study's findings that high screen engagement is common and potentially detrimental to sleep in children with ASD. (20)

The current study provides compelling evidence that increased screen time significantly contributes to bedtime resistance ($p = 0.003$), night awakenings ($p < 0.001$), morning wake-up difficulties ($p = 0.035$), and overall disrupted sleep habits in children ($p < 0.001$). Interestingly, screen time did not show a statistically significant association with sleep behavior when considered more broadly, likely due to the complexity and multifactorial nature of sleep routines. These findings align with previous literature, particularly a study conducted among Spanish children, which reported a negative association between screen exposure and sleep duration—children who engaged in prolonged leisure screen time were more likely to have shorter sleep durations (21).

The current study underscores a robust relationship between total screen time and multiple facets of sleep disturbance in children, including bedtime resistance, night waking, and difficulty waking in the morning. The most pronounced finding—the significant correlation between screen time and overall CSHQ (Children's Sleep Habits Questionnaire) scores ($p < 0.001$)—suggests that greater screen exposure detrimentally affects both the quality and duration of sleep. These results are consistent with prior research, such as Ribner et al. (2017), which identified that increased daily leisure screen use among Spanish children was associated with shorter sleep durations. This convergence in findings supports the theory that screen exposure, particularly before bedtime, may interfere with the body's natural circadian rhythm due to cognitive stimulation and blue light suppression of melatonin production (22). Moreover, these findings align with research indicating that children with ASD are especially susceptible to sleep disturbances. Previous studies have shown that children with ASD exhibit significantly longer nighttime wakefulness and reduced total sleep compared to neurotypical children, particularly in the 6–9 age range (Köse et al., 2017). The present study confirms that these vulnerabilities are exacerbated by screen overuse, with potential behavioral and developmental consequences (23).

Our results indicated no significant relationship between the type of screen and Child Sleep Habits, with a p-value of 0.251, which is greater than the 0.05 threshold. However, the duration of screen time during holidays

showed a highly significant relationship with child sleep habits, with a p-value less than 0.001. Similarly, the duration of screen use on school days was significantly associated with child sleep habits, with a p-value less than 0.05. Furthermore, the time of day when screens were used was statistically significant in relation to child sleep habits, with a p-value of less than 0.001. In comparison, a study on sleep problems in children with or without autism found that children with ASD typically slept less than those without ASD, likely due to longer waking intervals during the night. Sleep issues were most prominent in children with ASD between the ages of 6 and 9 years (24).

This study's strengths included diverse sample and the use of the reliable CSHQ tool for sleep assessments, along with parent-reported data providing ecologically valid insights. However, limitations included the cross-sectional design, preventing causal conclusions, and reliance on caregiver self-reports for screen time, which may have introduced bias. The study also lacked objective measures and did not control for potential confounders like co-occurring conditions or environmental factors. Additionally, it did not distinguish between content types, which may have different effects. Future research should include longitudinal designs, objective monitoring, and content type analysis.

Based on these findings, clinicians, caregivers, and educators should be encouraged to implement structured screen time routines, particularly emphasizing reduced use in the evenings and limiting total exposure. Parental education programs and behavioral interventions targeting digital hygiene could play a significant role in mitigating sleep disturbances in children with ASD. Overall, the results reinforce the need for integrative strategies that balance therapeutic screen use with protective sleep practices in vulnerable pediatric populations.

Conclusion

This study highlights a significant association between screen time and sleep disturbances in children with Autism Spectrum Disorder. Increased screen exposure, particularly during evening hours, was linked to disrupted sleep patterns. These findings emphasize the importance of regulating screen time as part of a holistic strategy to improve sleep hygiene and overall well-being in children with ASD.

Authors' Contributions

ICMJE authorship criteria	Detailed contributions	Authors
Substantial Contributions	Conception or Design of the work	1,2,3,5
	Data acquisition	2,3,4,6
	Data analysis or interpretation	1,3,5
Drafting or Reviewing	Draft the work	2
	Review critically	1,2,3,4
Final approval	Final approval of the version to be published.	1,2,3,4,5,6
Accountable	Agreement to be accountable for all aspects of the work.	1,2,3,4,5,6

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