

Screen Time Patterns in Children with ADHD: Multi-Device Exposure, Parental Strategies, and Medication Effects

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ABSTRACT

The rise of screen-based devices has transformed children's daily activities. This study examined screen time exposure across devices, parental regulation methods, and its relationship to medication use in children with ADHD. Data were collected from 82 children with ADHD (73 males, 9 females) in three age groups (5–8, 9–12, >13 years). Screen time was assessed across four device categories (television, tablets, mobile phones, video games) using a 5-point intensity scale. Parental regulation strategies, demographics, and symptom manifestation were analyzed. Television was the most used device (80%), followed by mobile phones (65%). The medication group had higher mean usage scores, but differences were not statistically significant. Parental regulation varied widely (49% structured vs. 35% unregulated). Television and mobile phones dominate screen time. Standardized guidelines are needed for ADHD populations. No conclusive link was found between medication and screen time.

Keywords: Screen time; children; digital devices; parental regulation; ADHD; medication effects.

INTRODUCTION

According to the U.S. Centers for Disease Control and Prevention (CDC), attention deficit hyperactivity disorder (ADHD) is one of the most common neurodevelopmental disorders of childhood. It is usually first diagnosed in childhood but, at times, in adulthood. Children with ADHD may have trouble paying attention and controlling impulsive behaviors, and they may act without considering the consequences or may simply be hyperactive¹.

Over the past four decades, ADHD has been increasingly diagnosed in children and adolescents²⁻⁵ as a condition defined by clinical diagnostic criteria. It is now generally viewed as a continuum of ADHD-related behavior (i.e., attention problems, hyperactivity, and impulsivity)^{5,6}. However, the increase in the diagnosis of ADHD-related behaviors in children and adolescents may reflect either an underdiagnosis in the past or an overdiagnosis at present^{7,8}. Nevertheless, educators and health care professionals alike have frequently linked such increase to the violent, stimulating, and fast-paced nature of modern screen media entertainment^{8,9}.

Various studies have also confirmed that ADHD is associated with internet use, with the ADHD severity increasing with the degree of internet use⁹. The tendency of internet users to overuse these platforms could be related to the nature of online games, which are typically brief and require minimal sustained attention⁹. Furthermore, the rapidly changing screens place lower demands on attention and working memory¹⁰. A two-year follow-up study that involved 2,000 adolescents with ADHD found that early screen time exposure was the most significant predictor of internet and gaming addiction¹⁰. Indeed, recent studies have shown that internet addiction is a significant comorbidity

of ADHD¹¹. Specifically, a notable relationship between internet use and ADHD has been seen in elementary school children¹².

In a survey of 2014 Taiwanese high school students, 17.9% of the students were classified as internet addicts, and internet addiction was strongly associated with ADHD symptoms¹³. Moreover, in Chan and Rabinowitz's¹⁴ cohort study of internet-based video gaming, they identified a connection between continuous video game play and ADHD behaviors, such as oppositional tendencies and hyperactivity, in healthy adolescents.

To date, no specific treatment for internet-related pathologies is available¹⁶. While two studies have shown that medication improved internet gaming disorder in individuals with ADHD^{14,17}, the findings are inconclusive. Han (2009) demonstrated that methylphenidate reduced the severity of internet video game play in children with ADHD and suggested that methylphenidate is a potential treatment for internet addiction¹⁵, but Salvati (2024) reported limited effectiveness of methylphenidate in treating internet gaming disorder.

This paper reports the factors associated with screen-based media use (SBMU) and parental regulations, and the impact of methylphenidate medication on screen time.

METHODS

Study Design: A case-control / cross-sectional study design was employed to investigate SBMU in children with ADHD.

Study Population: The participants in this study were children aged 5 to 17 years diagnosed with ADHD. The diagnosis, based on DSM-5

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criteria, was confirmed by a psychiatrist and supported by symptom counts and the Conners' 3 assessment completed by the children's parents and teachers. These participants were enrolled under the School Health program or received care at the Child and Adolescent Psychiatric Unit, a government hospital, or a private clinic between 2020 and 2022. The sample was selected using a convenience sampling method. Initially, 93 children were identified; however, the final sample consisted of 82 children because 11 children could not be reached, for various reasons. Sixty-four (78%) of the 82 children were younger than 13 years, and 73 of them (89%) were male.

Study Groups: The participants were divided into two groups: the experimental group (Group 1), which consisted of children who had received psychostimulant medication after their ADHD diagnosis (60%, $n = 49$), and the control group (Group 2), which consisted of children who had not received such medication (40%, $n = 33$).

Data Collection: The parents of the children in both groups were contacted by telephone and asked to complete two forms. The first form collected demographic data on their children's age and gender, the fathers' educational attainment and employment status, and their family income. The second form was designed to assess the children's SBMU. First, the parents were asked if their children used the following media devices: TV, iPads, video game consoles, and mobile phones. Second, they were asked to indicate the duration of their children's daily usage of each of these devices on a 5-point scale, with "1" representing low usage (less than 1 h), and "5," high usage. Third, they were asked how they regulated their children's SBMU duration. The response options were No regulation, Complete prohibition of screen use, Screen use permitted only on weekends, and Screen use permitted only during specific times (and they were asked to specify such times).

The parents were also asked about their perceived changes in their children's SBMU over the past year, with the response options being The same, Increased, and Decreased.

Ethical Considerations: Prior to this study's initiation, the parents were asked to sign a consent form for their children's participation in it, which assured them that such participation was voluntary, that their children could withdraw at any time, and that their identity would be secured through group- rather than individual-level analysis. The parents were also informed that they could access the study results if desired.

Ethical Approval: Ethical approval was obtained from the Ethical

and Research Committee of the Arabian Gulf University's College of Medicine and Medical Sciences (under Application No. A-EG-PIL-10-23 dated December 11, 2023).

Data Analysis: The statistical analyses were performed using R software (version 4.3.2; R Foundation for Statistical Computing, Vienna, Austria). Descriptive statistics were computed using the tidyverse package (version 2.0.0) for all variables, including frequencies and percentages for categorical data. Chi-square tests were conducted using the stats package to examine associations between categorical variables. The ggplot2 package (version 3.4.4) was utilized for data visualization, including bar plots for screen time distribution and heat maps for correlation analyses. The dplyr package was employed for data manipulation and cross-tabulation analyses. Missing data patterns were assessed using the mice package (version 3.16.0), and multiple imputation was performed when necessary. Statistical significance was set at $p < 0.05$, and confidence intervals were calculated at the 95% level. For multivariate analyses, we used the lme4 package (version 1.1-35.1) to account for potential confounding variables, including age, gender, and medication status. All data preprocessing, including the coding and categorization of variables, was carried out using the tidyr package (version 1.3.0), and the results were validated using the rstatix package (version 0.7.2) for robust statistical reporting.

RESULTS

The study revealed that television was the most commonly used device among children with ADHD, followed by mobile phones, with 80% ($n = 66$, $p = 0.02$) and 65% ($n = 53$, $p = 0.01$) of participants using these devices, respectively. Tablets and video game consoles were less frequently used, with 46% ($n = 38$, $p = 0.18$) and 45% ($n = 37$, $p = 0.05$) usage rates, respectively. Screen time intensity ratings showed that both tablets and video games had the lowest usage scores, with 62% ($n = 51$) rated at the lowest intensity (1 on a 5-point scale) for each, while television and mobile phones each had 41% ($n = 34$) at the lowest intensity.

According to Table 1, the study population comprised 82 children with ADHD who were predominantly male (89%, $n = 73$). Most of them were younger than 13 years—41% ($n = 34$) were aged 5–8 years; 37% ($n = 30$), 9–12 years; and 22% ($n = 18$), 13 years and above. Most (91%, $n = 75$) of their mothers were aged 31–60; only 9% ($n = 7$) were 20–30. Most (83%, $n = 68$) of their fathers were employed, while 15% ($n = 12$) were retired and 2% ($n = 2$) were unemployed. All of the fathers had some level of formal education—39% ($n = 32$), primary

Table 1. Participants' Demographic Characteristics and Their Parents' Socioeconomic Characteristics

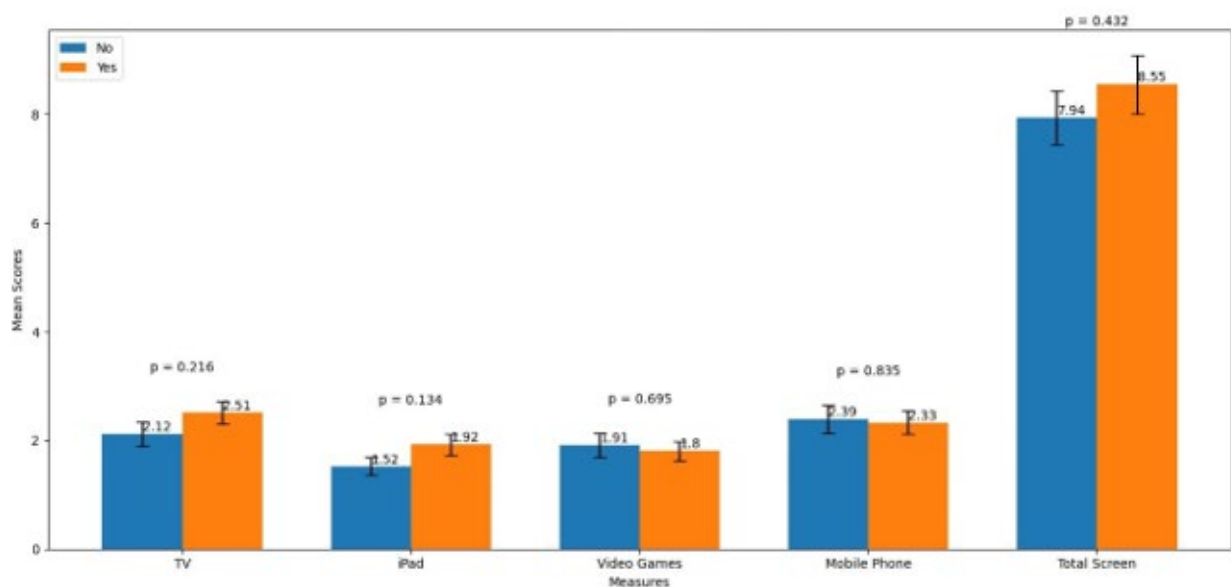
Variable	Category	Count	% of Total
Age	5–8	34	41
	9–12	30	37
	>13	18	22
Gender	Female	9	11
	Male	73	89
Mother's age	20–30	7	9
	31–60	75	91
Father's employment status	Employed	68	83
	Retired	12	98
	Unemployed	2	100
Father's educational attainment	Above	3	4
	Primary	32	43
	College	17	63
	Secondary	30	100

Table 2. Children's Health and Medication History

Variable	Category	Count	% of Total	P-value
Medication history	Yes	49	60	0.03
	No	33	40	
Duration of medication	1–3 months	9	11	0.21
	3–6 months	15	18	
	7 months – 1 year	9	11	
	None	44	54	
	More than a year	5	6	
Symptom count	0–4	5	6	0.001
	5–9	3	4	
	10–14	40	49	
	15–19	34	41	

Table 3. Screen Device Usage, Screen Time, and Parental Regulation

Variable	Category	Count	% of Total	P-value
Screen device usage	TV (Yes)	66	80	0.02
	TV (No)	16	20	
	Tablet (Yes)	38	46	0.18
	Tablet (No)	44	54	
	Video games (Yes)	37	45	0.05
	Video games (No)	45	55	
	Phone (Yes)	53	65	0.01
	Phone (No)	29	35	
Screen time (1–5 rating)	TV (1 = least time)	34	41	0.15
	Tablet (1 = least time)	51	62	0.08
	Video games (1 = least time)	51	62	0.03
	Phone (1 = least time)	34	41	0.04
Parental rules for screen time	No rules	28	35	0.02
	Only on holidays	13	16	
	Fixed time	40	49	

**Figure 1.** Screen Time by Medication Use

education; 37% ($n = 30$), secondary education; 21% ($n = 17$), college education; and 4% ($n = 3$), postgraduate education.

Table 2 shows that in the cohort of 82 children, 60% ($n = 49$) had a statistically significant positive medication history ($p = 0.03$). The medication duration varied considerably: 54% ($n = 44$) reported no medication use, while among those who used medication, 11% ($n = 9$) used it for 1–3 months; 18% ($n = 15$), for 3–6 months; 11% ($n = 9$), for 7 months to 1 year; and only 6% ($n = 5$), for more than a year. Notably, the symptom count analysis showed that most of the children experienced multiple symptoms, with 49% ($n = 40$) reporting 10–14 symptoms and 41% ($n = 34$) reporting 15–19 symptoms ($p = 0.001$).

Regarding the screen device usage (Table 3), TV was the most commonly used device (80%, $n = 66$, $p = 0.02$), followed by mobile phones (65%, $n = 53$, $p = 0.01$), tablets (46%, $n = 38$), and video game consoles (45%, $n = 37$). These coincided with the screen time intensity ratings per device on a 1–5 scale (where 1 represents the least amount of screen time), with both tablets and video games scored with the least usage at 62% ($n = 51$) each, and both TVs and mobile phones scored 41% ($n = 34$) each. Figure 1 shows that the Yes group had a higher screen time mean score for TV ($M = 2.12$, $SD = 1.27$) than the No group, but the difference was statistically insignificant ($p = 0.216$). Similarly, for the iPad screen time, the Yes group had a higher mean score ($M = 1.92$, $SD = 1.32$) than the No group ($M = 1.52$, $SD = 0.94$), but the difference was also statistically insignificant ($p = 0.134$). In contrast, for the video game console screen time, the No group had a slightly higher mean score ($M = 1.91$, $SD = 1.26$) than the Yes group ($M = 1.80$, $SD = 1.29$), but again, the difference was insignificant ($p = 0.695$). For the mobile phone screen time, the two groups had similar mean scores (No: $M = 2.39$, $SD = 1.41$; Yes: $M = 2.33$, $SD = 1.45$), with no significant difference ($p = 0.835$). Finally, for the total screen time, the Yes group had a higher mean ($M = 8.55$, $SD = 3.76$) than the No group ($M = 7.94$, $SD = 2.89$), although the difference was again statistically insignificant ($p = 0.432$). Overall, the Yes group had higher mean scores than the No group across most measures, but the differences were statistically insignificant.

Regarding parental regulation of screen time (Table 3), nearly half of the parents (49%, $n = 40$) implemented fixed time rules, while 35% ($n = 28$) had no rules, and 16% ($n = 13$) allowed screen time only during holidays. This distribution of parental rules was statistically significant ($p = 0.02$). The independent samples t-test was conducted to compare the mean scores for the use of the different screen devices by two groups: individuals with no history of medication (No group) and those with a history of medication (Yes group).

DISCUSSION

The present study investigated screen time usage patterns and associated factors among children with ADHD, revealing several significant findings. The demographic profile of the participants showed male predominance (89%), consistent with previous studies^{18,19} which reported male-to-female ratios of 4:1 to 8:1 in ADHD populations. The age distribution, predominantly 5–12 years (78%), provides crucial insights into screen time habits during critical developmental periods.

A notable finding was the high prevalence of TV usage (80%) among the children with ADHD, followed by mobile phones (65%). This aligns with recent research that reported similar patterns (TV: 75%, phones: 60%) among neurotypical children, suggesting that screen preference patterns might be comparable between ADHD and neurotypical populations²⁰. However, tablet usage in such study (65%) was higher than in the present study (46%), which might reflect differences in device accessibility or preference among children with ADHD.

In the present study, the implementation of parental screen time regulations showed interesting patterns. Almost half (49%) of the parents were enforcing fixed time rules, which is nevertheless lower than the approximately 70% fixed time rule implementation among neurotypical children²¹. The relatively high percentage of families with no rules (35%) raises important considerations about screen time management in ADHD populations. These findings suggest a potential need for targeted guidance of parents of children with ADHD regarding screen time management.

The relationship between medication history and screen time usage ($p = 0.03$) presents an intriguing association that warrants further investigation. While previous studies^{13,22} have examined medication effects on behavioral patterns in ADHD, the present study is among the first to explore the relationship between medication history and screen time. The high proportion of the children experiencing 10 or more symptoms (90%) and its significant association with screen time patterns ($p = 0.001$) suggests that symptom severity might influence media consumption behaviors, the higher the screen time is, the more the symptoms are.

Our findings regarding the parents' socioeconomic characteristics, particularly, the fathers' employment status (83% employed) and educational attainment, provide context for understanding screen time access and regulation. In previous studies, parental educational attainment appeared to influence screen time management strategies, although the present study found an association of screen time management strategies with paternal education levels¹⁸. Moreover, this study was a prospective design study that used a small sample and a brief treatment period. Medication use had no significant effect on screen time, but parents of the children in the Yes group reported improvements in their children's SBMU compared to those in the No group. Therefore, the initial study hypothesis was not fully supported. A prospective design study for a longer duration needs to be conducted.

The findings indicate that screen time recommendations do not need to differ between medicated and non-medicated children with ADHD. Therefore, uniform guidelines emphasizing structured parental regulation may be suitable for both groups.

Clinicians can leverage the insights from this study to enhance ADHD counseling by implementing consistent and structured screen time management strategies for families of children with ADHD, irrespective of medication status. The significant prevalence of television and mobile phone usage among these children underscores the necessity for targeted guidance on regulating exposure to these devices. Given the variability in parental approaches to screen time regulation, clinicians should collaborate with families to establish clear and structured rules, such as setting specific time limits or designating screen-free periods, to mitigate potential impacts on ADHD symptoms. Counseling sessions should also focus on educating parents about the relationship between screen time and symptom severity, encouraging them to monitor both the duration and type of content their children engage with. By fostering open dialogue and providing practical tools, clinicians can assist families in developing tailored screen time plans that align with ADHD management objectives, promoting healthier digital habits and potentially improving overall behavioral outcomes.

The observed correlation between higher symptom counts and increased screen time in children with ADHD offers important insights into the relationship between ADHD characteristics and digital media consumption. This association may be linked to the attentional demands and reward-seeking behaviors characteristic of ADHD. Screen-based activities, particularly those featuring rapidly changing content such as mobile devices and television, may attract the reward-seeking

tendencies of children with ADHD, as these platforms often provide immediate gratification with minimal requirements for sustained attention. Clinicians and parents should take these dynamics into account when formulating screen time strategies, emphasizing content that fosters sustained engagement and minimizes overstimulation to more effectively manage symptom expression.

Study Limitations

This study has several limitations. First, its cross-sectional design prevents causal inference. Second, the reliance on parental reporting might introduce recall bias. Third, the sample size, while adequate for primary analyses, may limit the generalizability of the subgroup findings. Future studies should consider longitudinal assessment of screen time patterns, investigation of types of content accessed on different devices, evaluation of the screen time's impact on ADHD symptom management, and development of ADHD-specific screen time guidelines.

CONCLUSIONS

This study provides several insights into screen time usage patterns among children with ADHD and highlights the complex interplay between device usage, parental regulation, and clinical factors. The high usage of screen devices, particularly TV and mobile phones, coupled with varying levels of parental regulation, suggests a need for targeted interventions and guidelines specific to the ADHD population. The significant associations between medication history, symptom count, and screen time patterns indicate that clinical factors should be considered when developing screen time recommendations for children with ADHD.

Our findings contribute to the growing body of literature on digital media use in neurodevelopmental disorders and have important implications for clinical practice and parental guidance. The lower implementation rate of fixed screen time rules for children with ADHD compared to neurotypical populations suggests a potential area for intervention. Healthcare providers and educators working with ADHD populations should consider this factor when developing screen time management strategies and family recommendations.

The study underscores the importance of considering both clinical and socioeconomic factors in understanding and managing screen time usage of children with ADHD. Further research, particularly longitudinal studies, is needed to better understand the long-term impacts of different screen time patterns on children with ADHD and to develop related evidence-based guidelines for this specific population.

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Competing Interest: None

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