

Screen Time in Children Aged One to Eight Years: An Epidemiological Study

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Received: 15 June 2025; Accepted: 07 July 2025; Published: 16 July 2025

Citation: Karen Gabriela Teixeira De Queiroz, Patrícia Angélica Martins Cãnfora, Rodrigo Gonçalves Costa, et al. Screen Time in Children Aged One to Eight Years: An Epidemiological Study. *Nur Primary Care*. 2025; 9(4): 1-8.

ABSTRACT

Screen time, defined as the period of using electronic media, influences child development. Conscious use is beneficial, but excessive use negatively impacts physical and mental health. The study aims to identify the epidemiological profile of electronic media usage and analyze its effects on children aged one to eight years who were seen at an outpatient clinic in Belo Horizonte, MG, and Brazil. This cross-sectional, descriptive, prospective epidemiological study used probabilistic sampling, including parents/guardians of children attending a pediatric clinic at a private university in Belo Horizonte, MG. The results of the sample showed that screen time exceeded recommendations across all age groups, with early initiation of media use. Television, cell phones, and tablets were the most commonly used devices. Excessive screen time may lead to irritability, boredom, crying, and sleep disturbances. Given the widespread use of screens today, this study enhances our understanding of children's screen use patterns and informs the development of strategies to support their healthy development.

Keywords

Screen Time, Internet Addiction Disorder, Child Health, Child Development, Epidemiology.

Introduction

Screen time refers to the period spent using electronic media, and the use of screen time has increasingly become a part of children's everyday lives. This shift is prompting discussions about the emergence of a new childhood era: *cyber-childhood* [1-3].

The TIC KIDS – Brazil (2023) survey indicates that 24% of children and adolescents start connecting to the internet before age six. This early exposure occurs during a crucial stage for children's biopsychosocial development, which lays the foundation for

health, learning, and well-being throughout their lives. This marks an increase compared to 11% recorded in 2015. Additionally, the 2017, UNICEF report "*The State of the World's Children 2017: Children in a Digital World*" revealed that one in three internet users was a child (UNICEF, 2017). This trend has continued to rise, particularly in the post-pandemic context of 2020, when online video usage increased by 25%, social media rose by 76%, video game activity grew by 23%, educational content consumption climbed by 54% t, and communication content saw a 49% increase [4].

The digital environment offers opportunities for children's learning when used in moderation and under the supervision of caregivers [5]. Mindful media use can support cognitive development by

providing access to information, engaging with social issues, and fostering a sense of belonging to communities [6,7].

However, excessive screen time in childhood is associated with delays in biopsychosocial, cognitive, emotional, social, and motor development, as well as posing risks to physical and mental health [1,3,8]. According to the Brazilian Society of Pediatrics [9] and the American Academy of Pediatrics (AAP), excessive screen time can provoke or intensify mental disorders, while the sedentary lifestyle it encourages contributes to the development of chronic diseases [10-13]. Additionally, it increases the risk of early exposure to content related to violence, drugs, pornography, self-harm, suicide, eating disorders, and cyberbullying [8,14,15].

Given the role of parents or legal guardians in establishing habits during early childhood, it is up to them to decide the frequency of electronic device use [1]. However, it increases the risk of early exposure to harmful content related to violence, drugs, pornography, self-harm, suicide, eating disorders, and cyberbullying [12,14,16].

Although the risks and benefits of screen use are well documented and specific recommendations for healthy use exist [9,12,14,16,17], little is known about the epidemiological profile and factors associated with screen time in Brazilian children. The study aims to identify the epidemiological profile of electronic media usage and examine the effects of screen time on children aged one to eight years attending an outpatient clinic in Belo Horizonte.

Methods

This is a cross-sectional, descriptive, prospective epidemiological study of a quantitative nature, with probabilistic sampling. The study was approved by the Research Ethics Committee of the Faculty of Medical Sciences of Minas Gerais and the Teaching and Research Center (NEP) of the HUCM-MG, under the approval and ethical assessment certificate (CAAE) number: 70821623.7.0000.5134.

The sample size calculation was performed using the G*Power software, version 3.1.9.7. Based on the research hypothesis, the number of observations per group required for the ANOVA test was calculated to be 82 per group, with an effect size of 0.20, a significance level of 0.05, and a test power of 0.80. This resulted in a total sample size of 246 children.

Participants were invited based on the following inclusion criteria: parents and/or guardians of children aged between one and eight years and 11 months, who either had a waiting time for a consultation of more than 30 minutes or who had already completed a consultation. The chosen age range reflects the importance of media use impacts during early childhood, as well as the gap in Brazilian literature regarding media use profiles in this age group. Use. Exclusion criteria included refusal to complete the questionnaire during or after the interviews, and children with cognitive deficits.

Data collection occurred between September and December 2023. The study was conducted at the outpatient clinic of the Faculty of Medical Sciences of Minas Gerais, which provides pediatric care and other specialties for children referred by Basic Health Units in Belo Horizonte. After identifying potential participants, the researchers approached the parents and/or guardians, explained the study's objectives, and requested careful reading and signing of the Free and Informed Consent Form (TCLE). Following parental/guardian consent, the researchers approached the children to obtain their assent and collaboration through the Free and Informed Assent Form (TALE). The form also included age-appropriate pedagogical activities on the back to engage the children, and reduce stress during the waiting period. Interviews were conducted in a private space designated for data collection, with only one of the researchers and the parent/guardian present. The study subjects were identified using alphanumeric codes.

The data were organized in an Excel® spreadsheet to structure the database, and the research results were later exported to the R software, version 4.4.0, for statistical analysis. For data characterization, simple frequencies and percentage frequencies were used to represent the qualitative variables. The chi-square independence test was applied to assess the level of association between the variables of interest. The Wilcoxon signed-rank test detected differences between the group medians for quantitative variables that did not follow a normal distribution. A p-value < 0.05 was considered statistically significant.

Here is the full translation of the results section from the document:

Results

In this study, 262 children were included, divided into three groups according to the Brazilian Society of Pediatrics (SBP)'s recommendations on screen time usage.

- **Group 1 (G1):** Children aged 1 year to 1 year, 11 months, and 29 days.
- **Group 2 (G2):** Children aged 2 years to 5 years, 11 months, and 29 days.
- **Group 3 (G3):** Children aged 6 years to 8 years, 11 months, and 29 days.

Table 1 presents the main characteristics of the sample, considering the age ranges. It describes the children's gender, the educational institution they attend, the age at which they started using media, the time they spent using media daily, and their access to the internet at home.

There was a homogeneous distribution in terms of gender across the three age groups. The study found that regardless of age, most respondents were parents/guardians of male children. Regarding the educational institution attended, most children aged two to five years and six to eight years attended public school (69% and 88%, respectively).

In this study, 66% of the parents/guardians reported that their one-year-old children started using media in their first year. In the two-

to-five-year-old age group, 48% started between one and two years of age, while 50% started between two and three years. In the G3 group (six to eight years), 49% began using media between two and three years of age.

Regarding the daily screen time:

- 84% of the one-year-old children used media for 0.5 to 1 hour daily.
- Children aged two to five years used media for about 2 to 3 hours daily (45%).
- Children aged six to eight years used media for 2 to 3 hours per day (49%) or more than 4 hours per day (36%).

Considering access to the internet at home, a homogeneous and prevalent distribution was observed, with 98% of children in all groups having access. Concerning parental control, the study revealed that most parents reported limiting their children's screen time. Among children under two years old, 62% of parents limited screen usage. In groups two and three, 55% and 54% of parents also reported implementing time restrictions.

Figure 1 shows that television was the most commonly used medium among children across all age groups, with 81% of parents/guardians confirming this. Tablets and cell phones were the next most popular, with 60% of parents/guardians reporting

their use, particularly in groups G2 and G3. Computers and video games were not significantly used, accounting for only 5% of media usage.

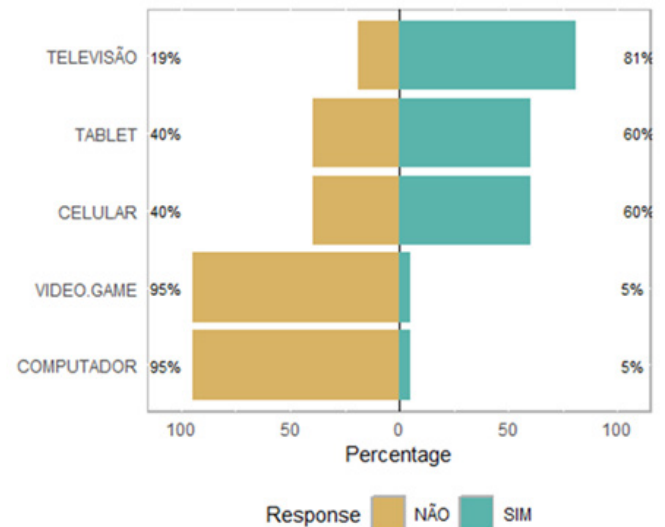


Figure 1: Characterization of responses attributed to media use.

Age Interval Sample Crossover

¹n (%); Median (AIQ)

Table 1: Sample Characterization by Age Range.

Attribute	AGE RANGE				p-Value ²
	Total, N = 262 ¹	G1, N = 83 ¹	G2, N = 99 ¹	G3, N = 80 ¹	
Child sex					0.8
Feminine	114 (44%)	38 (46%)	43 (43%)	33 (41%)	
Masculine	148 (56%)	45 (54%)	56 (57%)	47 (59%)	
Educational institution the child attends					<0.001
Does not attend	70 (27%)	54 (65%)	16 (16%)	0 (0%)	
Private School	43 (16%)	18 (22%)	15 (15%)	10 (13%)	
Public school	149 (57%)	11 (13%)	68 (69%)	70 (88%)	
Age at which interactive media use began					
< 1 year	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Between 1 and 2 years	89 (45%)	31 (66%)	39 (48%)	19 (27%)	
Between 2 and 3 years	76 (38%)	0 (0%)	41 (50%)	35 (49%)	
Between 5 and 6 years	17 (8.5%)	0 (0%)	2 (2.4%)	15 (21%)	
Above 7	1 (0.5%)	0 (0%)	0 (0%)	1 (1.4%)	
Never used	17 (8.5%)	16 (34%)	0 (0%)	1 (1.4%)	
Total time interval					<0.001
From 0.5 to 1 hour	99 (40%)	56 (84%)	31 (32%)	12 (15%)	
From 2 to 3 hours	90 (37%)	7 (10%)	44 (45%)	39 (49%)	
Greater than or equal to 4	56 (23%)	4 (6.0%)	23 (23%)	29 (36%)	
Home Internet Access					>0.9
Sometimes	3 (1.1%)	1 (1.2%)	1 (1.0%)	1 (1.3%)	
Never	3 (1.1%)	1 (1.2%)	1 (1.0%)	1 (1.3%)	
Always	256 (98%)	81 (98%)	97 (98%)	78 (98%)	
Parental media time limitation					0.013
Sometimes	50 (20%)	9 (12%)	23 (24%)	18 (23%)	
Often	36 (14%)	6 (8.2%)	14 (14%)	16 (20%)	
Never	23 (9.2%)	13 (18%)	7 (7.2%)	3 (3.8%)	
Always	141 (56%)	45 (62%)	53 (55%)	43 (54%)	

¹n (%); Median (AIQ)

²Chi-square test of independence; Fisher's exact test; Kruskal-Wallis test

Table 2 presents the correlation between total media usage per day and parental reports, showing statistical significance for all variables. The table's correlations were based on N=245, as 17 participants did not report media usage according to their guardians. The time spent using media increased with age, with 52% of children aged six to eight years using media for four or more hours per day, while 49% of children aged two to five years used media for two to three hours per day. Most parents/guardians reported always supervising (71%) or sometimes supervising (25%) their children's media use.

When analyzing daily media usage in relation to parental control over limiting screen time, 70% of parents of children who used media for 0.5 to 1 hour per day reported setting limits. On the other hand, as media usage increased, parental control decreased, with 57% and 31% of parents, respectively, limiting their children's screen time.

Regarding the type of media used, cell phones and tablets were equally distributed, with 81% and 88% of children using them for 2 to 3 hours or 4 or more hours per day, respectively. Children who used media for 0.5 to 1 hour per day generally started between one and two years of age, while those using media for 2 to 3 hours or 4 or more hours per day generally started between two and three years of age (50% and 60%, respectively). The study also revealed that 72% of parents of children using media for 0.5 to 1 hour per day did not notice any behavioral changes during media usage. However, among children who used media for 4 or more hours per day, 54% exhibited irritable and bored behavior, had poor academic performance, and were screen-dependent. When media usage was

restricted, 60% of children cried or complained, especially those aged six to eight years (89%) and two to five years (58%).

The study further found that children who used media for 4 or more hours per day had difficulty falling asleep (86%). Among children using media for 0.5 to 1 hour per day and 2 to 3 hours per day, 65% and 60%, respectively, did not report sleep difficulties. When correlating screen time with how often children woke up during sleep, 43% of children using media for 4 or more hours per day woke up frequently, and 39% woke up occasionally. In contrast, 49% of children using media for 2 to 3 hours per day reported occasional sleep disruptions.

The study also examined media usage right before bed. Among children using media for 0.5 to 1 hour per day, 53% of parents reported that their children never used screens before bed. In the group that used media for 2 to 3 hours per day, 41% used screens occasionally before bed. However, 89% of children who use media for 4 or more hours per day consistently use screens before going to sleep.

Finally, Table 3 presents the correlation between screen usage before bedtime and sleep-related difficulties such as falling asleep and waking up during the night. The study found that older children (aged six to eight years) consistently used media before bedtime (47%) or sometimes used it (37%). Similarly, 48% of children aged two to five years consistently used media before bed, while parents of younger children reported that 63% did not use screens before bed.

Table 2: Screen Time Interval.

Attribute	TOTAL TIME INTERVAL				p-Value ²
	Total, N = 245 ¹	From 0.5 to 1 hour, N = 99 ¹	From 2 to 3 hours, N = 90 ¹	Greater than or equal to 4, N = 56 ¹	
Age Range					<0.001
Group I	67 (27%)	56 (57%)	7 (7.8%)	4 (7.1%)	
Group II	98 (40%)	31 (31%)	44 (49%)	23 (41%)	
Group III	80 (33%)	12 (12%)	39 (43%)	29 (52%)	
Child's behavior when restricting screen use					<0.001
Accepts without problems	99 (40%)	55 (56%)	38 (42%)	6 (11%)	
Cries or complains	146 (60%)	44 (44%)	52 (58%)	50 (89%)	
Does not use screens	0 (0%)	0 (0%)	0 (0%)	0 (0%)	
Difficulties for the child to sleep					<0.001
No	126 (52%)	64 (65%)	54 (60%)	8 (14%)	
Always	118 (48%)	34 (35%)	36 (40%)	48 (86%)	
How often does the child wake up during the night					<0.001
Sometimes	119 (49%)	53 (54%)	44 (49%)	22 (39%)	
Never	76 (31%)	29 (29%)	37 (41%)	10 (18%)	
Always	50 (20%)	17 (17%)	9 (10%)	24 (43%)	
Using media before bed					<0.001
Sometimes	79 (32%)	39 (39%)	37 (41%)	3 (5.4%)	
Never	80 (33%)	52 (53%)	25 (28%)	3 (5.4%)	
Always	86 (35%)	8 (8.1%)	28 (31%)	50 (89%)	
¹ n (%); Median (AIQ)					
² Chi-square test of independence; Fisher's exact test; Kruskal-Wallis test					

Television, cell phones, and tablets were the most frequently used media before bed, with 84% and 77% of children using these devices in the “Always” group and 81% and 64% in the “Sometimes” group. The use of computers and video games before bed was not significant.

Among children who consistently used media before bed, 58% used screens for 4 or more hours per day. In contrast, 65% of children who never used screens before bed had a daily screen time of 0.5 to 1 hour.

Parental monitoring of media usage was consistent across all groups: 64%, 66%, and 70%, respectively, for “Sometimes,” “Never,” and “Always” groups. However, parental control over limiting media usage decreased as screen time increased, with 60% and 73% of parents limiting media usage among children who “Sometimes” and “Never” used screens before bed, compared to only 36% of parents of children who “Always” used screens before bed.

Children who always used screens before bed exhibited difficulty concentrating and were easily bored (47%), while those who never or sometimes used screens showed curiosity and enjoyed many activities (51% and 55%, respectively). When screen time was restricted, 56% and 78% of children who sometimes or always used screens before bed cried or complained, while 48% of those who never used screens accepted the restriction without issues. Regarding sleep difficulties, 71% of children who consistently used screens before bed reported having trouble falling asleep.

Discussion

In the present study, 93.6% of the parents/guardians reported that their children aged one to eight years used digital media. Similarly,

a survey conducted by the Núcleo de Informação e Coordenação do Ponto Br [18] found that 93% of children and adolescents use the internet and cell phones, with a quarter of them spending excessive time online and struggling to control their usage. The researchers identified that the majority of children began using media during their first year of life. According to the Brazilian Society of Pediatrics [9], the use of electronic media by children is starting at increasingly earlier ages. A 2020 meta-analysis conducted with 274 healthy children, followed for four years, found a correlation between screen time and learning and language skills. The earlier the exposure to screens and the more time spent on screens in the first two years of life, the less interaction the child has with their family, which negatively impacts their cognitive and socio-emotional development [19,20].

This sample revealed that in all age groups, children exceeded recommended screen time limits, despite most parents reporting that they tried to limit usage. The SBP [9], in alignment with the World Health Organization [17], has established age-based daily screen exposure limits to minimize harm. Recommendations include no screen exposure, both active and passive, for children under two years; limiting screen time to one hour per day for children aged two to five years, with supervision; and limiting screen time to two hours per day for children aged six to ten years, also with supervision [9,17].

A cohort study conducted in Japan, which followed children born between December 2007 and March 2012, found that screen time exceeding recommended limits for two-year-olds was associated with lower language and communication development at age four, as well as negatively affecting daily life activities. However, the authors pointed out that this impact was mitigated by time spent playing outdoors [21].

Table 3: Screen use before bed.

SCREEN USE BEFORE SLEEP					
Attribute	Total, N = 262 ¹	Sometimes, N = 81 ¹	Never, N = 95 ¹	Sempre, N = 86 ¹	p-Value ²
Age Range					<0.001
Group I	83 (32%)	18 (22%)	60 (63%)	5 (5.8%)	
Group II	99 (38%)	33 (41%)	25 (26%)	41 (48%)	
Group III	80 (31%)	30 (37%)	10 (11%)	40 (47%)	
Total time interval					<0.001
From 0.5 to 1 hour	99 (40%)	39 (49%)	52 (65%)	8 (9.3%)	
From 2 to 3 hours	90 (37%)	37 (47%)	25 (31%)	28 (33%)	
Greater than or equal to 4	56 (23%)	3 (3.8%)	3 (3.8%)	50 (58%)	
Parental Media Time Limitation					<0.001
Sometimes	50 (20%)	10 (13%)	13 (15%)	27 (32%)	
Often	36 (14%)	18 (23%)	3 (3.5%)	15 (18%)	
Never	23 (9.2%)	4 (5.0%)	7 (8.1%)	12 (14%)	
Always	141 (56%)	48 (60%)	63 (73%)	30 (36%)	
Difficulties for the child to sleep					<0.001
No	137 (52%)	48 (59%)	64 (68%)	25 (29%)	
Always	124 (48%)	33 (41%)	30 (32%)	61 (71%)	
¹ n (%); Median (AIQ)					
² Chi-square test of independence; Fisher's exact test; Kruskal-Wallis test					

Regarding the types of media used, television, cell phones, and tablets were the most common in this study. At the same time, video games and computers were not widely used across all age groups and educational institutions (public or private). A 2019 meta-analysis by Adelantado-Renau et al. revealed that television and video game usage was associated with poorer academic performance in children and adolescents due to declines in attention, language, behavior, and sleep [22]. Additionally, a mixed-methods on digital technology usage in children from families with high socioeconomic status found that excessive television use was common across all social classes, while children from higher-status families tended to exceed time limits on other technologies such as cell phones and tablets [23].

Irritable and bored behavior, declining academic performance, screen dependency, and losing concentration were observed among children who used screens for more than four hours a day. When their screen usage was restricted, these children cried and complained, which may signal potential screen addiction. The SBP emphasizes the need for studies to focus on understanding how screen usage influences emotional development in childhood [9,24]. A longitudinal cohort study also highlighted that excessive screen exposure can lead to memory and concentration problems during learning, contributing to decreased academic performance and symptoms of attention deficit hyperactivity disorder (ADHD) [24].

Muppalla et al. [25] also emphasized that excessive screen time can impair children's learning and cognitive development. Rocha & Nunes [26] noted that non-educational and antisocial content, as is prolonged screen time, are harmful. However, they pointed out that electronic devices used in educational settings with adult supervision can be beneficial, contributing to learning. Madigan et al. [20], in their meta-analysis, also found that moderate screen usage can positively impact language development in babies after 18 months of age.

In this study, children who consistently used screens before bedtime also had daily screen usage exceeding four hours. These children reported difficulties falling asleep and waking up during the night. Only 30% of parents in the group limited their children's media use. These findings highlight the importance of limiting screen usage before bed to promote healthy sleep in children, given the significant impact on sleep quality and child development. Wong et al. [27] in a study with 7, 555 respondents, demonstrated that screen usage significantly affected children's sleep, reducing both the total duration and quality of sleep, which are essential for proper development and overall quality of life.

The World Health Organization [17] highlights that the intensity of screens, particularly the blue light emitted by most devices, disrupts the production of the hormone melatonin, exacerbating difficulties in falling asleep and achieving deep sleep and increasing nightmares and night terrors. Another study that addressed the impact of screen time on development and strategies for limiting usage emphasizes that parents should restrict media usage, as it

influences the quality of children's sleep [28,29].

According to the SBP, parents increasingly need to plan and guide their children on screen time, serving as role models for their kids, as family experiences significantly influence a child's development [9]. Rocha & Nunes [26], in a systematic review exploring the positive and negative impacts of touchscreen devices on the development and behavior of children under five, that screen use should be tailored and limited by age group, and that parents should be informed about appropriate screen time limits.

Implications for Nursing Practice

The findings of this study are significant for nursing practice, particularly in child health care, due to the widespread use of media across all age groups and its impact on children's lifestyles and development. Understanding the profile of childhood screen usage is crucial for designing care strategies that improve children's quality of life and support their developmental progress. Based on these insights, nurses can develop preventive and educational interventions tailored to the family context, with the goal of minimizing the negative effects of excessive screen time and promoting healthy development.

Additionally, during routine consultations, nurses can provide clear and evidence-based guidance on the appropriate amount of screen time for each age group, emphasizing the importance of balancing screen use with other essential activities for child development, such as physical play, social interaction, and quality sleep. It is crucial for nursing professionals to encourage parents to adopt healthy habits at home, fostering an environment that supports the moderate and mindful use of electronic media.

Limitations

One limitation of this study is the challenge of fully capturing the social and cultural contexts, as well as accurately recording the individual and subjective experiences of the participants. Given the relevance of this topic, longitudinal studies are needed to better understand the impact of screen time on children's development.

Conclusion

The children in the sample exhibited screen time beyond the recommended limits across all age groups, despite parents reporting efforts to supervise and limit usage. Screen use began at younger ages than recommended with television, cell phones, and tablets being the most commonly used media. Children with excessive screen time tended to exhibit irritable, bored, and tearful behavior. They also used screens more frequently before bedtime and experienced sleep difficulties.

Parental control plays a crucial role in maintaining healthy media use habits. Guardians should promote child development by monitoring and limiting screen use in line with the recommended time and content for each age group. Effective parental management can help mitigate the negative impacts of excessive screen time, promoting a balance between digital activities and other forms of learning and entertainment.

The way childhood development is nurtured and stimulated has a lasting impact on the quality of life in adulthood. Therefore, these discussions are essential for guiding the planning of intersect oral actions aimed at health promotion and adopting healthy behaviors among children.

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