

Research Article

Effects of Prolonged Screen Time on Children Aged 1-5 Years – A Cross-sectional Study

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Abstract

Introduction: With the advancement of digital technology, people are enjoying the benefits of it in the context of information gathering, entertainment, saving physical time, and advertisement. Yet with good outcomes many undesirable side effects happen not only in adults but also in children. The prolonged use of screen time for children's physical, mental, and social health and development has now become a concern. Therefore, this study aimed to evaluate the effects of prolonged screen time and its impact on children aged 1-5 years. **Methods:** This was a cross-sectional study conducted in the Department of Pediatrics, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh from January, 2020 to July, 2020. This study included 150 children aged between 1 -5 years who used various screen devices daily. Children were divided into two groups – Group A (Children used screen time >2 hours/day) and Group B (Children used screen time <2 hours/day). **Result:** The mean age was 3.6 ±0.04 years and most of the children were male (60%). During meal time, 86% of children showed adverse effects like aggressiveness and stopped eating in group A, and 28 (37%) & 21 (28%) children demanded devices at sleep time in groups A & B respectively. Regarding nutritional effects, 26(35%) children of group A were overweight and 16(21%) were underweight. In group B, it is 28% and 20% respectively. **Conclusion:** The findings showed that using devices for more than 2 hours per day by children aged 1-5 years, was detrimental in regards to sleep disturbance, eating behavior, and nutritional condition.

Keywords

Children, Screen Time, Electric Device, Sleep Disturbance, Eating Behavior

1. Introduction

In today's society, digital media are integrated into the fabric of life with television, mobile phones, movies, videos, music, video games, and computers central to both work,

time, and play [1]. There are rapidly growing markets for early childhood television programming, computer software for toddlers, and video series for infants. Television and

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screen time media have become a common and popular pastime for many families. Screen time is defined as media accessed through television, cell phones, DVDs, computers, and video games. Although television continues to be the most commonly used form of media, cell phones, and tablets are quickly becoming a close second in overall usage [2].

The findings of a study conducted by Kabali et al. revealed that children between the ages of six months and four years watch television for 45 minutes per day, use mobile devices for 27 minutes to view videos or television shows, use apps for 22 minutes, and play video games for 15 minutes [3]. The American Academy of Pediatrics (AAP) recommended in 1999 that children under the age of two should not watch television and that children between the ages of two and three should only watch a limited amount of television [4]. The AAP also recommended that parents limit the amount of time children spend watching television to 1 to 2 hours of quality programs per day because of the side effects of such unlimited access, the American Academy of Pediatrics (AAP) also released a set of guidelines for the use of screen media by children to limit screen time for children aged 2 years and older to a maximum of 2 hours of screen time per day [5]. For instance, playing a violent video game can prime aggressive thoughts and cause physiological arousal [6]. Academically those children who spend a lot of time on screen devices may experience failure in school performance. Behavioral and attitudinal measures relating to internet use and video games are associated with a measure of violent delinquency and antisocial behaviors and as with dysfunction at home, increased aggression, depression, and psychological well-being [7].

Diet habits and physical activity are also negatively affected by sedentary screen time, as some children sit for long hours which may lead to several short or long-term health problems, especially obesity and heart disease [8]. Another adverse effect of prolonged screen time is the development of addictive behavior [9]. There is some specific evidence for an association between screens experienced around bedtime and sleep duration [10].

The American Academy of Pediatrics does include a few early childhood activities that can help support young children's overall typical development. By the age of five, ninety percent of the brain has developed. According to Sousa, a baby's brain has twice as many brain cells as an adult's despite being just one-third the size. The present study indicates that frequent exposure can affect language, cognitive, and social skills, even though prolonged exposure to television, films, and other electronic media can affect brain development [11].

Parents must understand the nature of the internet and screen gadgets, as not all of them are safe places for children and teenagers. Despite all of this media exposure and new technology, many parents appear to have few guidelines for their children's and teenagers' media use. In a recent survey, two-thirds of children and teenagers said their parents have

"no rules" about how much time they spend on social media [12].

In addition, as a secondary importance, it is necessary to provide educators and parents with current and accurate information regarding the relationship between the amount and the type of screen time and the effects on child development. Disseminating accurate information is especially critical since there seem to be multiple misunderstandings in the community at large as to whether screen time can be beneficial or detrimental to young children's overall development. Thus, this study aimed to evaluate the effects of prolonged screen time and its impact on children aged 1-5 years.

2. Methodology & Materials

This was a cross-sectional study conducted in the Department of Pediatrics, Shaheed Suhrawardy Medical College Hospital, Dhaka, Bangladesh during the period from January, 2020 to July, 2020. In our study, we included 150 children aged between 1 -5 years who used various screen devices daily. Children were divided into two groups – Group A (Children used screen time more than 2 hours per day) and Group B (Children used screen time less than 2 hours per day).

These are the following criteria to be eligible for enrollment as our study participants: a) Patients aged between 1-5 years; b) Children who used prolonged screen time minimum of half an hour per day; c) Children who are prolonged screen time users for more than 3 months were included in the study And a) Children who are physical and mentally challenged; b) Children with any history of acute illness (e.g., renal or pancreatic diseases, ischemic heart disease, asthma, etc.); c) Children of those guardian who were unwilling to participate were excluded from our study.

3. Data Collection

This is an observational study conducted in IPD and OPD of the Pediatrics department of Shaheed Suhrawardy Medical College Hospital and different schools near ShSMCH within the study period. After fulfillment of the selection criteria, 150 children were enrolled with unique IDs. Sample were selected by purposive sampling technique. Subjects were briefed about the objectives of the study, risks, and benefits, freedom for participating in the study, and confidentiality. Informed consent was obtained accordingly. The pre-structured Case Record Form (CRF) was filled up by the study physician. Patient data such as age, residence, occupation, clinical presentation, etc. were noted. This questionnaire was used for the collection of information by interviewing the guardians of children.

4. Statistical Analysis

All data were recorded systematically in preformed data collection form. Quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. The differences between groups were analyzed by unpaired t-test and chi-square (X^2) test. A p-value <0.05 was considered as significant. Statistical analysis was performed by using SPSS 23 (Statistical Package for Social Sciences) and MS Excel for graphs and charts. The Ethical Review Committee of Shaheed Suhrawardy Medical College Hospital approved the study.

5. Results

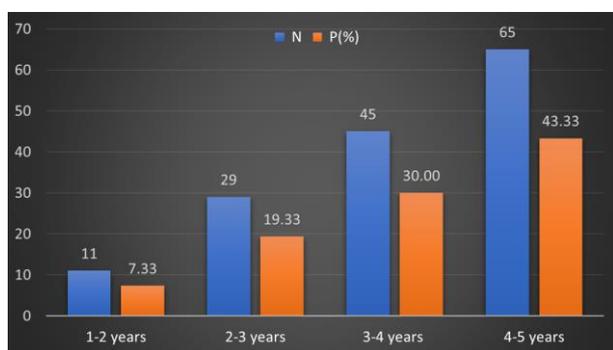


Figure 1. Age distribution of our study participants.

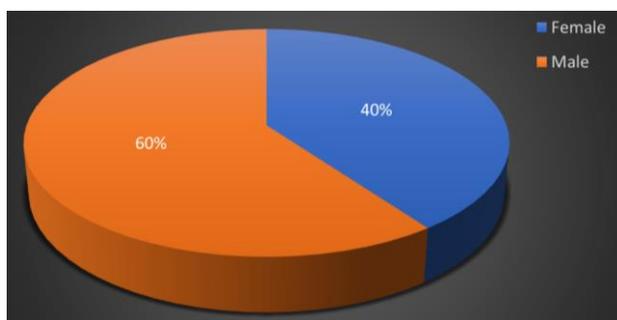


Figure 2. Gender distribution of our study respondents.

Figure 1 shows the majority (43.33%) of our children were aged 4-5 years, followed by 30% of children aged 3-4 years, 19.33% & 7.33% aged 2-3 & 1-2 years respectively. The mean age was 3.6 ±0.04 years.

The pie chart shows the gender distribution among children. Among 150 children, the majority (60%) of them were male and 40% were female. The male and female ratio was 1.5:1 in the study.

Table 1. Educational Qualification of the mother & father (n=150).

Educational Qualification	Group A n (%)	Group B n (%)
Mother's education		
Illiterate	4(5%)	5(7%)
Primary	12(16%)	13(17%)
Secondary	23(31%)	18(24%)
Higher Secondary	19(25%)	18(24%)
Graduate & above	17(23%)	21(28%)
Father's education		
Illiterate	5(7%)	4(5%)
Primary	10(14%)	12(16%)
Secondary	16(21%)	15(20%)
Higher Secondary	19(25%)	21(28%)
Graduate & above	25(33%)	23(31%)

In table 1 we found that most of mothers in group A had secondary (31%) education whereas in group B majority (28%) of them were graduated or above. Most of the fathers in group A & B were graduated or above (33% and 31%) respectively.

Table 2. Occupational status of parents (n=150).

Occupation	Group A n (%)	Group B n (%)
Both Employed	51(68%)	37(49%)
Father Employed	14(19%)	28(37%)
Mother Employed	6(8%)	7(10%)
Both Unemployed	4(5%)	3(4%)

Table 2 shows that both the father and mother of 68% of children were employed in group A and 49% in group B. Only the fathers of 19% and 37% of children were employed in groups A and B respectively. There were 4(5%) children in group A and 3(4%) in group B whose parents were both unemployed.

Figure 3 shows that most of the children (49%) of both groups used mobile as an electronic device, followed by 24% had tablet, and 20% watched TV. There were only 6% & 1% of children who used computer and laptop respectively.

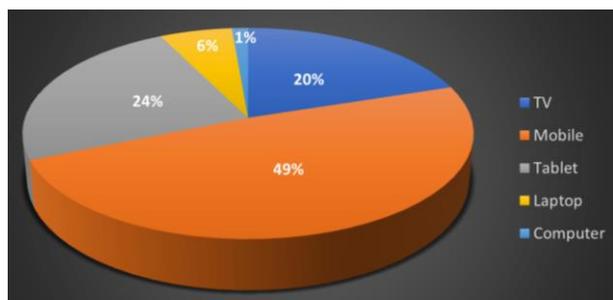


Figure 3. Types of devices used by children (n=150).

Table 3. Distribution of children having a personal device & by their first device usage (n=150).

Personal device	Group A n (%)	Group B n (%)	P Value
Yes	25(33%)	6(8%)	0.031
No	50(67%)	69(92%)	
Age group (year)			
1-2	52(69%)	43(57%)	0.042
2-3	16(21%)	22(29%)	
3-4	5(7%)	7(10%)	
4-5	2(3%)	3(4%)	

Table 3 shows that 33% of children in group A had their personal device and only 8% from group B had a personal device. The majority (69%) of children were introduced to a device at a very early age (1-2 years) in group A, whereas it was 57% in group B.

Table 4. Use of device during eating.

Use of device during eating	n	Percentage
Group A	75	100%
Group B	71	95%

Table 4 shows that all the children (100%) in group A used any sort of devices at mealtime, while in group B 95% of children used devices at mealtime.

Table 5. Effects of device use on eating behavior, sleep pattern & nutritional status (n=150).

Effects	Group A n (%)	Group B n (%)	P-value	OR
Eating behavior				
Aggressiveness	43(57%)	37(49%)	0.02	2.17
Stopped eating	22(30%)	17(23%)		
No effect	10(13%)	21(28%)		
Sleep pattern				
Demands during sleep time	28(37%)	21(28%)	0.05	2.8
Go to sleep lately	24(32%)	18(24%)		
Decreased duration	8(11%)	5(7%)		
No effects	15(20%)	31(41%)		
Nutritional status				
Overweight	26(35%)	21(28%)	0.33	1.38
Underweight	16(21%)	15(20%)		
Normal	33(44%)	39(52%)		

Table 5 shows that if devices were not given to them during mealtime, most of them showed adverse effects on eating behavior like aggressiveness (57% & 49%) and stopped eating (30% & 23%) in group A & B respectively (p-value of 0.02). Twenty-eight (37%) children demanded devices at sleep time in group A and 21 (28%) in group B (p-value of 0.05). Of all children, 32% & 24% of them in groups A & B respectively went to sleep late. The nutritional status of the study children shows that 26(35%) and 21(28%) children in groups A and B were overweight respectively. The number of underweight children in groups A & B was 16(21%) and 15(20%) respectively.

6. Discussion

The study was carried out by purposely taking 150 children who used different sorts of electronic devices in their daily lives to determine the impact of prolonged screens on their lives. In this study, more children (43.0%) were between the 4-5 years age group, mean ± SD age was 3.6±0.04 years. Male children were high in contrast to female groups.

The use of prolonged screen time and child health is now becoming a concern not only for the family but also for society. Now-a-days, children from a very young age are allowed unlimited access to a wide variety of screen devices such as computers, smartphones, video game consoles, and television. The presence of a computer and/or television in the child's bedroom and access to the internet has also increased:

the majority of children and adolescents own mobile phones [13]. The usage of mobile devices for communication and entertainment by younger children and infants is becoming more common [14].

Most of the children (49%) of both groups used mobile as an electronic device, 33% of children have their own devices and only 8% from group B have personal devices (p-value 0.031). Duch et al. demonstrated through a cross-sectional study of 119 Hispanic infants and toddlers that television was the most common form of media used with cell phones following closely as a second form of media [15]. These researchers also completed a longitudinal study, which revealed children who were exposed to more than two hours of television per day had delayed communication scores on the Ages and Stages Developmental Questionnaire. Our study demonstrated that children who had personal devices were prolonged screen time users.

On the other hand, it was discovered that screen media had more negative than positive effects on a young child's linguistic and cognitive development. After nine publications were reviewed, 34 of them had data based on studies about the relationship between screen usage and linguistic and cognitive development. The most popular theme of these nine articles was that content and context were the two most important influences on a child's development [16]. In a similar cross-sectional study conducted by Weerasak Chonchaiya, 56 children with diagnosed language delays were six times more likely to have a delay if they began watching television before the age of one and watched more than two hours per day [17].

In this study, 28 (37%) children demanded devices at sleep time in group A and 21 (28%) in group B. So as a cumulative result, the study showed 80% detrimental effects in group A and 59%, in B group with a significant Odds ratio (OR=2.8). Children in 2011 were estimated to sleep, on average, one hour less per night when compared with children of the early 20th century. In Britain, 20-30% of young children experience sleep problems [18]. Sleep is highly important for the neurodevelopment of infants and toddlers. Accumulating evidence indicates that adequate sleep, both in duration and quality may compromise youth's physical and mental health and psychosocial functioning. Additionally, risk-taking behavior and school performance are likely to be negatively affected by inadequate sleep [19]. An examination of all developmental stages found that sleep disturbances when they are a result of excessive screen time are linked to internalizing, externalizing, and peer problems. An additional study about how sleep affects theory of mind (ToM) and executive functioning [20]. In that study, they focused on preschoolers, it was discovered that prolonged exposure to background TV or watching TV at night was linked to shorter sleep duration, which in turn led to lower ToM. Crucially, excessive exposure to blue light from screens can prevent the release of the hormone melatonin, which promotes sleep. This may so hinder a child's cognitive development [20].

All the children (100%) in group A used any sort of devices at meal time if devices were not given to them during meal time, 80% of children showed adverse effects like aggressiveness and stopped eating.

From early childhood to school age, human eating behavior changes quickly. Appropriate weight gain during childhood but not excessive weight gain and lifelong healthy eating habits should result from normal development. Feeding can be stimulated or suppressed by physiological signals. The gastrointestinal tract, pancreas, hypothalamus, and brain stem are all regulated by neuroendocrine feedback loops in the neurophysiology of food regulation. The stomach releases a peptide called ghrelin during times of energy deficiency, which signals the hypothalamus to release neuropeptide Y and orexin to stimulate appetite [21]. Moreover, the development of eating behavior may be influenced by social variables even more so than by the sensory cues of the meals themselves.

The relation between screen time and obesity can be explained by reduced sleep and physical inactivity and by exposure to advertising which negatively affects youth's dietary choices [22]. Regarding nutritional effects, this study showed that 26(35%) children of group A were overweight and 16(21%) were underweight. In group B, it is 28% and 20% respectively. There were no statistical differences between the two groups. This might have been studied on children with little or no screen time. Another possible link between computer-related tasks and obesity is increased passive food consumption [23]. Thus, the study proposed an interactional link between sleep and obesity. A survey of 9 to 10-year-old children found that three hours or more of screen use per day was connected with obesity [24].

7. Limitations of the Study

We took a small sample size due to our short study period. Cost analysis was not included in the study. After evaluating those children, we did not follow up with them for the long term and did not know other possible interference that may happen in the long term with these children.

8. Conclusion and Recommendations

The potential adversity of screen time on a child's development has become a concern in the modern world. From this study, it is shown that using devices for more than 2 hours has statistically significant detrimental effects on eating behavior, demands during meal time, and sleep patterns but did not show any significant changes in nutritional status among Bangladeshi children aged 1-5 years. Bangladeshi parents seem to be little aware of the impact of screen time on their children and most of them introduced the devices to children at a very early age.

So further study with a prospective and longitudinal study

design including a larger sample size needs to be done to assess long-term effects and validate the findings of our study.

Abbreviations

AAP Academy of Pediatrics
DVD Digital Versatile Disc

Author Contributions

Jakiya Jesmine: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing

Ajmiri Sultana: Formal Analysis, Funding acquisition, Investigation, Resources, Software, Supervision

Farjana Afroze Jui: Formal Analysis, Funding acquisition, Methodology, Project administration, software, Supervision, Validation

Umme Qulsum Sonia: Investigation, Project administration, Resources, Supervision, Validation, Writing – review & editing

Mukta Thakur: Methodology, Resources, Software, Validation, Writing – original draft

Ethical Approval

The study was approved by the Institutional Ethics Committee.

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Conflicts of Interest

The authors declare no conflicts of interest.

References

- [1] Rideout VJ, Vandewater EA & Wartella EA. Zero to six: Electronic media in the lives of infants, toddlers and preschoolers (Report): The Henry J Kaiser Family Foundation 2003; Children's Digital Media Centers. 2013; 51(1): 90-122.
- [2] Barr R & Lerner C. Screen sense: Setting the record straight. Research-based guidelines for screen use for children under 3 Years old. 2015; 35(4): 1-10.
- [3] Kabali HK, Irigoyen MM, Nunez-Davis R, Budacki JG, Mohanty SH, Leister KP, Bonner RL. Exposure and use of mobile media devices by young children. *Pediatrics*. 2015; 136: 1044-50.
- [4] Barr R, Lauricella A, Zack E & Calvert SL. Infant and early childhood exposure to adult-directed and child-directed television programming. *Merrill-Palmer Quarter*. 2010; 56(1): 21-48.
- [5] Tamara TP, Page CM, Karen MR, James MR, Judith LW. Physical activity, screen time and pediatric health-related quality of life in the Mississippi Delta. *American Academy of Pediatrics. Children, adolescents, and television. Pediatrics*. 2001; 107: 423-26.
- [6] Prot S, Anderson C, Gentile DA, Brown SC & Swing EL. The positive and negative effects of video game play. *Media & the Well-Being of Children & Adolescents*. 2014; 109-28.
- [7] Jackson LA, Fitzgerald HE, Zhao YK, Eye AV & Harold R. Information technology (IT) use and children's psychological wellbeing. *Cyber Psychology & Behavior*. 2008; 11: 755-57.
- [8] Grontved A, Ried-Larsen M, Molier NC, Kristensen PL, Wedderkopp N, Froberg K et al. Youth screen-time behaviour is associated with cardiovascular risk in young adulthood: the European Youth Heart Study. *European Journal of Preventive Cardiology*. 2014; 21: 49-56.
- [9] Hawi NS, Blachnio A, Przepiorcka A. Polish validation of the Internet Addiction Test. *Computers in Human Behavior*. 2015; 48: 548-53.
- [10] Bruni O, Sette S, Fontanesi L, Baiocco R, Laghi F and Baumgartner E et al. Technology Use and Sleep Quality in Preadolescence and Adolescence. *J Clin Sleep Med*. 2015 Dec 15; 11(12): 1433-41.
- [11] Sousa DA. Engaging the rewired brain. West Palm Beach, FL: Learning Sciences International 2015; 48(3): 303-8.
- [12] Rideout V. Generation M2: Media in the Lives of 8- to 18-Year-Olds. Menlo Park: Kaiser Family Foundation. 2010; 3(12): 3-85.
- [13] Victor CS, Marjorie JH. COUNCIL ON COMMUNICATIONS, American Academy of Pediatrics Children, adolescents, and the media. *Pediatrics*. 2013; 132(5): 958-61.
- [14] Hinkley T, Verbestel V, Ahrens W, Lissner L, Molnár D, Moreno LA et al. Early childhood electronic media use as a predictor of poorer well-being: a prospective cohort study. *JAMA Pediatr*. 2014; 168: 485-92.
- [15] Duch H, Fisher EM, Ensari I, Font M, Harrington A, Taromino C & Rodriguez C. Association of screen time use and language development in Hispanic toddlers: A cross-sectional and longitudinal study. *Clinical Pediatrics*. 2013; 52(9): 857-865.
- [16] Jackson LA, Fitzgerald HE, Zhao Y, Kolenic A, Eye AV & Harold R et al. Information technology (IT) use and children's psychological wellbeing. *Cyber Psychology & Behavior*. 2008; 11: 755-57.
- [17] Chonchaiya WCP. Television viewing associates with delayed language development. 2008; 97: 977-982.
- [18] Cheung CHM, Bedford R, Saez De Urabain IR, Karmiloff-Smith A, Smith TJ. Daily touchscreen use in infants and toddlers is associated with reduced sleep and delayed sleep onset. *Sci. Rep*. 2017; 7: 1-7.

- [19] Falbe J, Davison KK, Franckle RL, Ganter C, Gortmaker SL, Smith L, Taveras EM. Sleep duration, restfulness, and screens in the sleep environment. *Pediatrics*. 2015; 135(2): 368-375.
- [20] Nathanson AI, Fries PT. Television exposure, sleep time, and neuropsychological function among preschoolers. *Media Psychol*. 2014; 17(3): 237-261.
- [21] Inui A, Asakawa A, Bowers CY, Mantovani G, Laviano A, Meguid MM et al. Ghrelin, appetite, and gastric motility: the emerging role of the stomach as an endocrine organ. *FASEB J*. 2004; 18: 439-56.
- [22] Mhrshahi S, Drayton BA, Bauman AE, Hardy LL. Associations between childhood overweight, obesity, abdominal obesity and obesogenic behaviors and practices in Australian homes. *BMC Public Health*. 2017; 18(44): 1-10.
- [23] Pérez-Farínós N, Villar-Villalba C, López Sobaler AM, Dal Re Saavedra AM, Aparicio A, Santos-Sanz S, Ortega Anta RM. The relationship between hours of sleep, screen time and frequency of food and drink consumption in Spain in the 2011 and 2013 ALADINO: a cross-sectional study. *BMC Public Health*. 17(3): 1-12.
- [24] Nightingale CM, Rudnicka AR, Donin AS, Sattar N, Cook DG, Whincup PH, Owen CG. Screen time is associated with adiposity and insulin resistance in children. *Arch. Dis. Child* 2017; 102(7): 612-616.