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Original Article

To Study the Association between Screen Time Exposure and Behavioral Health Problems among Children 6–10 years Age

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Abstract

Introduction: In the modern era, technological advancements have drastically transformed our daily life. These technological devices, collectively called electronic gadgets, have increased our screen time which has been linked to numerous adverse outcomes, particularly in children aged 6–7 years.

Aims: This study aims to investigate the association between screen time exposure and behavioral health problems among children aged 6–10 years.

Results: This study found a statistically significant association between increased screen time and behavioral health problems among children aged 6–10 years. Children with >2 h of daily screen exposure were more likely to exhibit behavioral issues like social difficulties emotional problems. These findings underscore the need for parental supervision, structured screen use, and public health interactions.

Conclusion: This study emphasizes the growing concern of excessive screen time among children and its potential impact on mental and social well-being along with the need for parental awareness for early intervention and structured screen use.

Key words: Electronic gadgets, Behavioral problems, Intervention, Screen time, Structured scree

INTRODUCTION

In the modern era, technological advancements have drastically transformed daily life, influencing how people communicate, entertain themselves, and acquire information. Over the last few decades, electronic devices have undergone significant evolution. The once widely used rotary dial telephones have been replaced by multifunctional smartphones capable of voice and video communication, internet browsing, and gaming. These technological devices, collectively referred to as electronic gadgets, are now integral to contemporary living, reshaping the lifestyle of not only adults but also children. This shift has been accompanied by a significant increase in the time spent engaging with these devices, a phenomenon commonly referred to as screen time.[1]

Screen time is defined as the total amount of time spent using electronic devices such as smartphones, tablets, computers, laptops, televisions, and gaming consoles for activities such as playing games, watching videos, streaming content, or browsing the internet.[2]

Types of screen-based activities and devices-screen-based activities can be categorized into three main types: Recreational: Activities focused on entertainment, including video gaming, watching movies, and browsing social media. Educational usage aimed at learning and skill development, such as attending online classes or accessing educational content. Harmful: Exposure to excessive or inappropriate content, including violent media, which may negatively impact behavior and mental health.[3]

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The devices contributing to screen time include Smartphones, Tablets, Laptops, Personal Computers, Handheld gaming consoles, Television-connected gaming consoles, Streaming platforms, and Internet-based content services. Increased irritability, hyperactivity, and symptoms of attention-deficit hyperactivity disorder. Mental health issues: Depression, reduced self-esteem, and heightened aggression. Physical health concerns: Obesity and unhealthy eating habits stemming from sedentary behavior, Cognitive delays, and Sleep disturbances.[4]

This study aims to investigate the association between screen time exposure and behavioral health problems among children aged 6–10 years. The findings are expected to inform policymakers, educators, and parents about effective strategies for managing screen exposure and fostering healthier developmental outcomes in children.[5]

Screen time can be categorized into three distinct types based on its purpose and content:[6]

1. Recreational screen time
2. Educational screen time
3. Harmful.

Aims and Objectives

Primary objective

The primary objective of this study was to investigate the association between screen time exposure and behavioral health problems among children aged 6–10 years attending follow-up visits under outpatient department (OPD) treatment at Northern Railway Central Hospital (NRCH), New Delhi.

Secondary objective

The secondary objective was to evaluate the association of socioeconomic status and family structure with screen time.

MATERIALS AND METHODS

Study Design

A prospective observational study was conducted to evaluate the association between screen time and behavioral health problems in children. The study focused on assessing screen usage patterns and identifying associated behavioral issues in children aged 6–10 years.

Study Setting

The study was carried out in the Department of Pediatrics, NRCH, New Delhi. The hospital caters to a diverse population, ensuring a representative sample.

Study Duration

The study was conducted over a period of 18 months, providing adequate time for data collection and analysis.

Sample Size

The sample size was determined based on a study by Nabanita Barman *et al.*, which reported a prevalence of abnormal behavior at 18%. Using Cochran's formula, the sample size was calculated as follows:

$$n = Z\alpha * p * q/\mathrm{d}^2$$

n = sample size
Zα at 95% confidence intervals [CI] = 1.96
p = Proportion = 18%
q = 100-p = 82%
d = Precision = 8%
n = (1.96*1.96*18*82)/(8*8) = 89

Thus, a minimum of 90 children was required for the study.

Inclusion Criteria

Children aged 6–10 years attending the pediatrics OPD for follow-up were included in the study if they and their parents consented to participation.

Exclusion Criteria

Children were excluded if they met any of the following criteria:

1. Known cases of autism spectrum disorder, neurological disorders, or other behavioral disorders
2. Children receiving medications affecting behavior
3. Children presenting during an acute illness that could temporarily affect behavior.

Data Collection

Demographic and family data

A structured performa was used to record:

- Demographic details (e.g., age, gender).
- Family background, including parental education, occupation, income, and socioeconomic status (as per modified Kuppuswamy classification).

Screen time assessment

Parents completed the SCREEN-Q questionnaire, which evaluated attached in the annexure:

- Screen media usage patterns
- Type and duration of screen exposure
- Context and parental rules surrounding screen media use.

Behavioral health evaluation

Behavioral health problems were assessed using the pediatric symptom checklist (PSC) attached in annexure:

The PSC included 35 items scored as Never (0), Sometimes (1), or Often (2). A cutoff score of 28 or higher indicated potential psychological impairment.

Procedure

1. Eligible participants were identified during their OPD visit
2. Parents were informed about the study objectives and written consent was obtained
3. Parents filled out the SCREEN-Q questionnaire to record the child's screen time habits
4. The PSC was administered to screen for behavioral health issues
5. The entire process for each participant took approximately 30 min.

Data Collection

All collected data were entered into Microsoft Excel for organization.

Data validation and cleaning were performed before analysis.

Statistical Analysis

Statistical analysis was done using the Statistical Package for the Social Sciences (SPSS) 25.0 to evaluate the association between screen time exposure, behavioral health problems, socioeconomic status, and family structure among children aged 6–10 years. Continuous variables (e.g., age, screen time) were summarized as mean ± standard deviation, and categorical variables (e.g., gender, socioeconomic status) as frequencies and percentages. Chi-square tests were used to assess relationships between screen time (<2 h vs. ≥2 h) and behavioral health problems, as well as socioeconomic status and family structure. Odds ratios (ORs) with 95% CIs quantified the strength of these associations. A $P < 0.05$ was considered statistically significant.

RESULTS

Age-wise Distribution in Study Population

The table presents the age-wise distribution of children in the study population, analyzing their screen time and PSC scores. The mean screen time is highest among children aged 6–7 years (3.2 ± 0.35 h), which corresponds with the highest PSC mean score of 28.08 (40.11%). A statistically significant difference ($P < 0.05$) is observed in this age group, suggesting a potential link between higher screen time and increased behavioral or psychological symptoms.

Gender Wise Distribution in Study Population

The table shows the gender-wise distribution of children in the study population, along with average screen time and PSC scores. Males constitute a slightly higher proportion of the sample (55.6%) compared to females (44.4%). Although both screen time and PSC scores appear slightly elevated in females, the $P = 0.09$ indicates that the observed differences are not statistically significant.

Screen Exposure Time in Study Population

The table outlines the distribution of children based on their daily screen exposure time and corresponding PSC scores. The majority of children fall within the 2–3 h (30.0%) and 3–4 h (27.8%) screen time categories, followed by those exceeding 4 h (18.9%). A clear upward trend is observed in PSC scores as screen time increases. Children with <1 h of screen exposure have the lowest PSC mean score of 10.78 (15.4%), whereas those exceeding 4 h (18.9%). A clear upward trend is observed in PSC scores as screen time increases.

Screen Q Interpretation in Study Population

The table presents the interpretation of Screen Q scores in relation to screen time and PSC scores among the study population (Screen Q score <10), who make up 25 of the participants and have the lowest mean screen time (1.50 ± 0.40 h) and the lowest PSC mean score of 7 (10%). In contrast, those in the high-risk category (score 20+) shows significantly higher screen time (4.50 ± 0.60 h) and the highest PSC score of 42.0 (60%).

PSC Score

The table presents the distribution of PSC scores among the study population, along with corresponding screen time data. Over half of the children (52.22%) fall into the moderate-risk category (PSC score 15–27) with an average screen time of 3.20 ± 0.45 h. A smaller proportion (22.22%) is classified as high risk (PSC score 28+), and this group shows the highest mean screen time at 4.50 ± 0.60 h [Tables 1-5].

DISCUSSION

In the present study, the 7–8-year age group comprised the highest proportion of children (34.4%), followed by 8–9 years (30%) and 6–7 years (27.8%), with the lowest representation from 9–10 years (7.8%). Interestingly, children aged 6–7 years had the highest mean screen time (3.2 ± 0.35 h) and mean PSC score (28.08; 40.11%), which was statistically significant ($P < 0.05$), suggesting a strong association between higher screen time and behavioral concerns in this age group. These findings are comparable to those of Chapagai *et al.* (2023),[7] who reported that children with >2 h of screen time had significantly higher internalizing, externalizing, and total problem scores on the Strengths and Difficulties Questionnaire.

In our study, males constituted 55.6% and females 44.4% of the total population. Mean screen time was slightly higher

in females (3.0 ± 0.16 h) compared to males (2.9 ± 0.07 h), and PSC scores were also higher in females (26.67; 38.1%) than males (24.64; 35.2%). However, this difference was not statistically significant ($P = 0.09$). This aligns with findings by Rashid *et al.*,[8] who also noted gender differences in screen time. However, other studies such as Roy *et al.*[9] did not emphasize gender as a significant modifier, which parallels our results, suggesting that gender may not play a major role in determining behavioral outcomes related to screen exposure.

Our results demonstrated a clear trend of increasing PSC scores with longer screen exposure. Children exposed to <1 h of screen time had the lowest PSC score (10.78; 15.4%), while those exposed to >4 h had the highest PSC score (42.42; 42.42%). This pattern is statistically significant and suggests a dose-dependent relationship between screen time and behavioral symptoms. These findings are highly consistent with Raju and Bharanidharan.[10]

According to our findings, children with Screen Q scores ≥20 (high risk) had the highest mean screen time (4.50 ± 0.60 h) and PSC scores (42.0; 60%), while low-risk children (Screen Q <10) had the lowest screen time (1.50 ± 0.40 h) and PSC score (7; 10%), with a statistically significant difference ($P = 0.02$). This reinforces the pattern seen in Tekeci *et al.*[11] Our findings support the same trend that higher Screen Q risk categorization is associated with higher emotional-behavioral problems. In our study, 22.22% of children had high-risk PSC scores (>28) with a mean screen time of 4.50 ± 0.60 h, whereas children with low-risk PSC scores (<15) made up 25.55% of the population with only 1.80 ± 0.35 h of screen time. This association was statistically significant ($P = 0.03$), affirming that screen time is strongly correlated with elevated behavioral.

In our study, behavioral health issues were identified in a considerable number of children, with social issues (11.11%) being the most prevalent, followed by emotional issues (7.78%), attention problems (5.56%), and hyperactivity/impulsivity (5.56%). These findings align with those of Hong *et al.*,[12] who reported high rates of emotional, hyperactivity, and peer interaction problems in children aged 2–6 years, particularly among those exposed to prenatal stress. Similarly, Chapagai *et al.* (2023)[7] noted significantly higher internalizing and externalizing scores in children with higher screen time, indicating a consistent global pattern of emotional and social difficulties emerging in early childhood.

Among children whose fathers held university degrees – a trend partially reflected in our study, where screen time was marginally higher among children whose fathers were graduates (3.29 ± 0.27 h) compared to postgraduates (3.15 ± 0.23 h), though not statistically significant ($P = 0.17$). A similar non-significant trend was seen with maternal education ($P = 0.23$). In our study, 11.11% of children had social issues, 7.78% had emotional problems, and both attention problems and hyperactivity/impulsivity were reported in 5.56% of the children. These results indicate that over one-fourth of the children displayed behavioral or emotional challenges. This finding aligns with the study by Roy *et al.*,[9] which reported that 37.7% of children

Table 1: Age-wise distribution in study population

Age Group (Years)	Number of Children	% of Total Children	Screen Time (Mean ± SD)	PSC Score Mean score (%)	P- Value
6–7	25	27.8%	3.2 ± 0.35	28.08 (40.11%)	**<0.05** (Significant)
7–8	31	34.4%	2.8 ± 0.31	24.52 (35.03%)	
8–9	27	30.0%	2.5 ± 0.25	21.01 (30.02%)	
9–10	7	7.8%	2.6 ± 0.39	24.58 (35.12%)	

Table 2: Gender-wise distribution in study population

Sex	Number of Children	% of Total Children	Screen Time (Mean ± SD)	PSC Score Mean score (%)	p-value
Male	50	55.6%	2.9 ± 0.07	24.64 (35.2%)	0.09
Female	40	44.4%	3.0 ± 0.16	26.67 (38.1%)	

Table 3: Screen exposure time in study population

Screen Exposure Time (hours/day)	Number of Children	% of Total Children	PSC Score Mean score (%)
< 1 hour	6	6.7%	10.78 (15.4%)
1–2 hours	15	16.7%	17.64 (25.2%)
2–3 hours	27	30.0%	28.07 (40.1%)
3–4 hours	25	27.8%	35.21 (35.21%)
> 4 hours	17	18.9%	42.42 (42.42%)

Table 4: Screen Q interpretation in study population

Screen Q Score Interpretation	Number of Children	Screen Time (Mean ± SD)	PSC Score Mean score (%)	P Value
Low Risk (<10)	25	1.50 ± 0.40	7 (10%)	**0.02** (Significant)
Moderate Risk (10–19)	45	3.00 ± 0.50	24.5 (35%)	
High Risk (20+)	20	4.50 ± 0.60	42.0 (60%)	

Table 5: Paediatric symptom checklist score in study population

PSC Score Range	Number of Children	% of Total Children	Screen Time (Mean ± SD)	P Value
< 15 (Low Risk)	23	25.55%	1.80 ± 0.35	**0.03** (Significant)
15–27 (Moderate Risk)	47	52.22%	3.20 ± 0.45	
28+ (High Risk)	20	22.22%	4.50 ± 0.60	

under 5 years were at risk of behavioral problems based on PPSC scores. Similarly, children of graduate mothers had longer screen time (3.26 ± 0.29) and higher PSC (24.92) than postgraduates (3.11 ± 0.27, PSC 23.03). Although the differences were not statistically significant, a trend was observed. This is in line with Chapagai *et al.* (2023),[7] who reported that children whose fathers had university degrees had significantly higher screen time. Our findings may reflect increased access to digital devices in homes of more educated parents, though their influence on screen regulation remains complex. Our results indicated that children of professional fathers had the highest screen time (3.38 h) but lowest behavioral concerns (PSC: 14.07), while children of skilled workers had highest PSC scores (18.97). Among mothers, children of homemakers had the highest screen time (3.19 h) and PSC score (19.11), while children of semi-professional mothers had the lowest screen time (2.04 h). This suggests that parental occupational roles and possibly time spent with children may impact behavioral outcomes.

In our study, children from middle-income families (INR 70,001–1,00,000) showed the lowest screen time (2.44 ± 0.30 h) and lowest PSC scores (18.97 or 27.1%), indicating better psychological well-being. In contrast, children from lower (INR 40,000–70,000) and higher income groups (>INR 1,00,000) had higher screen times (3.17 ± 0.45 and 3.14 ± 0.61 h) and higher PSC scores (33.81 and 34.65, respectively), suggesting greater emotional/behavioral concerns. The $P = 0.04$ indicates that these differences are statistically significant. These findings are consistent with Roy *et al.*[9]

Children in nuclear families had a significantly higher screen time(3.24 ± 0.50 h) compared to those in joint families (2.01 ± 0.30 h), with higher PSC scores (29.19 or 41.7% vs. 23.52 or 33.6%). The $P = 0.02$ confirms a significant difference. This may reflect that joint family setups offer greater social interaction, supervision, and possibly structured routines, reducing screen reliance and behavioral issues. Roy *et al.*[9] similarly observed that children who spent less time with parents(<3 h/day) had higher odds of behavioral problems (OR: 1.311; $P = 0.012$), suggesting that greater adult-child interaction – as might occur in joint families – can be protective.

SUMMARY

Background

The widespread use of electronic devices has significantly increased screen time among children, particularly those aged 6–10 years – a critical period for cognitive, emotional, and social development. Excessive screen exposure has been linked to arrange of behavioral health problems, including attention issues, hyperactivity, emotional disturbances, and social withdrawal. Despite existing guidelines by the World Health Organization and the American Academy of Pediatrics, adherence to recommended screen time limits remains low. This study aimed to investigate the association between screen time exposure and behavioral health problems in children aged 6–10 years and to assess the influence of socioeconomic status and family structure on screen usage.

Methods

A prospective observational study was conducted at the Pediatrics Department NRCH, New Delhi, over 18 months. A total of 90 children aged 6–10 years attending follow-up OPD visits were included. Screen time was assessed using the SCREEN-Q questionnaire, while behavioral health issues were evaluated with the PSC. Socioeconomic status was determined using the modified Kuppuswamy classification. Statistical analysis involved descriptive statistics, Chi-square tests, ORs, and regression analysis using SPSS v25. A $P < 0.05$ was considered statistically significant.

Results

Children aged 6–7 years demonstrated the highest average screen time (3.2 h/day) and elevated PSC scores. Females showed marginally higher screen time and PSC scores compared to males, though not statistically significant ($P = 0.09$). Overall, 76.6% of participants had screen exposure of two or more hours daily. A significant correlation was found between increased screen time and higher PSC scores ($P = 0.03$). Children with SCREEN-Q scores ≥20 had significantly greater screen exposure and behavioral symptoms ($P = 0.02$). Socioeconomic status was also associated with screen usage, with upper-middle and lower middle-class children exhibiting higher screen time ($P = 0.03$). Parental education and occupation did not show a significant association. The most common behavioral issues were social problems (11.1%), emotional concerns (7.78%), attention difficulties (5.56%), and hyperactivity (5.56%). The study found a statistically significant association between increased screen time and behavioral health problems among children aged 6–10 years. Children with ≥2 h of daily screen exposure were more likely to exhibit behavioral issues, including social difficulties, emotional problems, and hyperactivity. Socioeconomic status was also found to influence screen time. These findings underscore the need for parental supervision, structured screen use, and public health interventions to mitigate the behavioral impacts of excessive screen exposure in children.

CONCLUSION

This study comprehensively evaluated the relationship between screen time and behavioral health among children, using the PSC as a primary measure. The findings clearly indicate a significant positive correlation between increased screen time and elevated PSC scores, reflecting a greater prevalence of emotional and behavioral issues among children with prolonged screen exposure. Notably, children aged 6–7 years demonstrated the highest screen time and corresponding PSC scores, underscoring the vulnerability of younger age groups. While gender differences in screen time and behavioral symptoms were not statistically significant, socio-economic and familial factors played a notable role. Children from nuclear families, upper middle-class households, and families with moderate to high incomes exhibited higher screen exposure and associated behavioral concerns. Furthermore, the Screen Q scoring system highlighted that children in the high-risk group not only had the highest average screen time but also the highest PSC scores, reinforcing the predictive value of structured screen use assessments. Although parental education and occupation showed trends toward influencing screen time and behavioral outcomes, these were not statistically significant. However, a distinct pattern emerged where lower screen exposure (<2 h/day) was associated with a reduced risk of behavioral health problems. In conclusion, the study emphasizes the growing concern of excessive screen time among children and its potential impact on their mental and emotional well-being. These results underscore the need for parental awareness, guided screen usage, and early interventions to mitigate the adverse effects of prolonged digital exposure on child development.

Limitations of the Study

While this study offers valuable insights into the association between screen time exposure and behavioral health problems among children aged 6–10 years, several limitations must be acknowledged:

1. Reliance on parental reporting
   Data on screen time exposure and behavioral symptoms were obtained through parent-completed questionnaires (SCREEN-Q and PSC). This introduces the possibility of reporting bias, social desirability bias, and recall bias, as parents may under- or over-estimate their child's screen use or behavioral concerns.
2. Sample representativeness
   The study was conducted at a single tertiary care hospital (NRCH, New Delhi) and included only children attending follow-up OPD visits. This may not represent the broader population of children in different socioeconomic or geographical settings, limiting the generalizability of the findings.
3. Lack of Objective Screen Time Measurement:
   Screen time was assessed using subjective parental responses. The absence of objective tracking tools (e.g., digital logs or apps) may have led to inaccuracies in estimating actual screen exposure.
4. Small sample size:
   Although the calculated sample size was met, the study included only 90 participants, which may limit statistical power and the ability to detect subtler associations or interactions between variables.

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