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Impact of Screen Time on Preschool Development: A Cross-Sectional Study in Netrokona, Bangladesh

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ABSTRACT: ***Background:*** The growing prevalence of screen time among young children raises concerns regarding its potential effects on early childhood development, particularly in terms of cognitive, social, and behavioral functioning. ***Objective:*** This study aimed to evaluate screen time patterns in preschool children and assess their perceived effects on development from the perspective of caregivers. ***Methods:*** A cross-sectional study was conducted among 126 caregiver-child dyads in Netrokona, Bangladesh. Data was collected via structured questionnaires, covering demographic details, screen usage patterns, and caregivers' observations of developmental behaviors. Descriptive and inferential statistical analysis, including p-values and standard deviations, was used to assess relationships between variables. Pearson's correlation and t-tests were applied to examine associations between screen time duration and development variables. ***Results:*** Among the 126 children, 113 (89.7%) were screen users, with a mean age of 4.1 ± 0.6 years. The daily screen time was 2.7 hours (SD = 1.5). Notably, 36 children (28.6%) had 1–2 hours of screen time, and 13 children (10.3%) used screens for over 4 hours. Significant correlations were found between increased screen time and developmental concerns such as restlessness ($r = 0.32$, $p = 0.014$) and difficulty concentrating ($r = 0.29$, $p = 0.022$). Moreover, 42 children (33.3%) showed restlessness when screen time was reduced, and 25 children (19.8%) had trouble focusing on non-screen tasks. Only 35 caregivers (27.8%) were aware of recommended screen time limits for children. ***Conclusion:*** The study highlights significant developmental concerns linked to prolonged screen exposure. Increased awareness and education on screen time guidelines are essential for improving preschool developmental outcomes.

Keywords: Screen Time, Preschool Development, Caregiver Awareness, Child Behavior, Developmental Impact.

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INTRODUCTION

In recent years, the impact of screen time on preschool-aged children's development has garnered considerable attention from both researchers and policymakers.[1] Screen exposure, particularly to digital media, has become an inherent part of young children's daily lives, which has resulted in increased concerns regarding its effects on various developmental domains, including cognitive, language, social, and motor development. The rapid proliferation of smartphones, tablets, computers, and television in households has made it difficult for parents and caregivers to control the duration and quality of screen time. As digital devices become more prevalent, it is crucial to examine the impact of screen time on early childhood development to better understand its potential consequences and guide future educational practices, policy formulation, and health interventions. The early childhood years represent a crucial period in human development, as this is when the brain undergoes rapid development, particularly in areas related to language acquisition, cognitive skills, emotional regulation, and social interactions. Research has consistently demonstrated that early experiences shape the neural architecture of the brain, influencing lifelong learning, behavior, and health. Digital media consumption in early childhood, especially in excess, has been associated with various developmental concerns, including delayed language skills, impaired attention, and problematic social behaviors.[2] Despite widespread recommendations from health authorities like the American Academy of Pediatrics (AAP) and the World Health Organization (WHO) to limit screen time for children under five, adherence to these guidelines is often inconsistent, leading to concerns about the growing screen exposure in younger populations. The AAP recommends no screen time for children under 18 months, except for video

chatting, and no more than one hour per day for children aged 2 to 5 years. These guidelines emphasize that screen time should involve high-quality content that is age-appropriate and should be supervised to ensure that children are engaging with it in a meaningful way. However, despite these recommendations, global surveys and studies indicate that a significant portion of children exceed these recommendations, particularly in urban settings where access to digital devices is more widespread .[3] In Bangladesh, where the rapid growth of mobile phone usage and internet access is evident, screen time habits among young children remain an underexplored area in research.

Understanding the relationship between screen time and developmental outcomes in young children is critical, particularly in low and middle-income countries like Bangladesh, where limited research exists on the topic. Studies conducted in developed countries suggest that excessive screen time is associated with various negative outcomes, such as obesity, language delays, attention problems, and even issues with sleep regulation.[4] However, these findings may not fully apply to settings where children have different lifestyles, socio-economic conditions, and educational systems. This research thus aims to fill this gap by investigating the screen time habits of preschool children in Netrokona, a district in Bangladesh, and evaluating caregivers' perceptions of how screen use influences children's cognitive, social, and behavioral development. In recent years, there has been a growing body of literature investigating the effects of screen time on child development, focusing primarily on developed countries. A study by Westby *et al.,* found that increased screen time was significantly associated with lower scores on developmental screening tests, particularly in the areas of language development and executive function.[5] Furthermore, research by Oakes *et al.,* suggests that early exposure to screen time can negatively affect the development of essential skills like attention and memory, which are crucial for school readiness.[6] These studies emphasize the need for greater awareness of the potential consequences of excessive screen exposure and advocate for the implementation of effective interventions to reduce screen time in early childhood. While these findings are compelling, the implications of screen time for child development in non-Western, low-resource settings like Bangladesh remain unclear. In Bangladesh, where many children grow up in households with limited access to educational resources but widespread exposure to screens through mobile phones and television, understanding the impact of screen time on preschool development is critical. Limited research on this topic in Bangladesh has focused primarily on adult populations, leaving a gap in understanding how early exposure to screens might affect children's development in a cultural and socio-economic context that differs significantly from Western societies.

This study aims to bridge this gap by conducting a cross-sectional study in Netrokona, Bangladesh, to investigate preschool children's screen time habits and assess the developmental outcomes associated with these habits. By focusing on preschool-aged children aged 3 to 5 years, this study seeks to contribute to the growing body of research that examines how screen time influences early childhood development, particularly in developing countries. This research also aims to assess caregiver perceptions of screen time, as caregivers play a crucial role in mediating children's exposure to screens and are instrumental in shaping the development of children's screen habits. In addition to examining the frequency and duration of screen time, this study will explore the type of content children are exposed to, including educational versus non-educational content, and the context in which screens are used. Previous studies have found that the context in which children interact with screens—such as whether they are supervised, whether screens are used as a reward, or whether they are used during meals—can influence the developmental outcomes associated with screen exposure. For instance, Galetzka *et al*., found that when screen time is used to calm children or as a reward, it can negatively affect parent-child interactions and limit opportunities for children to engage in active play.[7] This study will also investigate the developmental domains that may be influenced by screen time, including language development, social interaction, attention, and behavior. Caregivers will be asked to report on their children's ability to follow instructions, engage in verbal communication, and participate in social interactions, as well as any signs of restlessness or difficulty concentrating when screen time is limited. These factors are critical indicators of healthy developmental progress and will help to provide a clearer understanding of the specific developmental areas that may be most affected by excessive screen exposure. Ultimately, the goal of this study is to provide evidence-based recommendations for policymakers and healthcare providers in Bangladesh, offering guidelines on how to manage screen time in a way that supports healthy development in young children. By increasing awareness of the developmental risks associated with excessive screen exposure, particularly in low-resource settings, this study aims to contribute to the global conversation on the importance of responsible screen time practices in early childhood.

Aims and Objective

The aim of this study is to investigate the impact of screen time on preschool children's development in Netrokona, Bangladesh. Specifically, the study will explore screen usage patterns, assess developmental outcomes across cognitive, social, and behavioral domains, and evaluate caregiver perceptions of how screen time influences early childhood development.

MATERIAL AND METHODS

Study Design

This study employed a descriptive cross-sectional design to investigate the impact of screen time on preschool children's development in Netrokona, Bangladesh. Data were collected from 126 caregiver-child days using convenience sampling. The study aimed to explore screen time habits and developmental outcomes, focusing on

cognitive, social, and behavioral domains. It was conducted over three months, with data being gathered via structured questionnaires filled out through face-to-face interviews. The study aimed to provide an in-depth understanding of how screen exposure correlates with children's developmental progress.

Inclusion Criteria

Children aged 3 to 5 years from Netrokona, Bangladesh, were included in the study. Participants had to be healthy, without any known developmental disabilities or chronic illnesses. Additionally, children whose primary caregivers were available to provide informed consent were eligible for inclusion. Both urban and rural populations were considered to account for any regional differences in screen usage patterns.

Exclusion Criteria

Children with diagnosed developmental disabilities, neurological disorders, or chronic illnesses were excluded from the study, as these conditions could confound the results. Children with a history of severe medical conditions that could affect their cognitive, motor, or social development were also excluded. Additionally, children whose caregivers did not consent to participate or did not meet the inclusion criteria were excluded from the study.

Data Collection

Data were collected through structured questionnaires administered via face-to-face interviews with the primary caregivers of participating children. The questionnaires included sections on demographics, screen usage patterns, caregiver-reported developmental observations, and the types of content children were exposed to. Information on screen time duration, context, and content was gathered. The data collection process was completed over a period of three months, ensuring that a representative sample of children was surveyed.

Data Analysis

The collected data were entered and analyzed using SPSS version 26.0. Descriptive statistics, including frequency distributions, means, and standard deviations, were used to summarize the data. Inferential statistics, such as chi-square tests and Pearson's correlation coefficients, were applied to identify associations between screen time and developmental outcomes. A p-value of less than 0.05 was considered statistically significant.

Procedure

The study began with obtaining ethical approval from the relevant institutional review board. Caregivers were provided with detailed information about the study, including its purpose and procedures. After obtaining verbally informed consent, participants were asked to complete the structured questionnaires. Caregivers provided demographic details, their child's screen time habits, and observed developmental behaviors, including language skills, social interaction, and attention span. Screen time was categorized by device type (smartphone, television, etc.) and duration, with specific questions about context (mealtime, bedtime, etc.). Data collected in both urban and rural areas of Netrokona to assess regional differences. Following data collection, responses were coded, cleaned, and analyzed for consistency. Statistical tests were conducted to explore correlations between screen time and developmental variables. The study ensured that data was anonymized and confidential. Participants' rights were respected throughout the process, ensuring their well-being and privacy.

Ethical Considerations

The study was approved by the Institutional Review Board (IRB) of the relevant institution. Informed consent was obtained from all caregivers, ensuring they were fully aware of the study's purpose and procedures. Participants were assured of confidentiality, and their data were anonymized.

RESULTS

The majority of children were between the ages of 4 to 5 years (61.1%), with 64 male and 62 female children, representing a balanced gender distribution. Urban participants accounted for 61.9% of the sample, while 38.1% were from rural areas. The age and gender distribution in the sample were well balanced, ensuring that both urban and rural settings were appropriately represented in the study.

Table 1: Demographic Characteristics

Variable	Frequency	Percentage (%)
Age Group		
3–4 Years	49	38.9%
4–5 Years	77	61.1%
Gender		
Male	64	50.8%
Female	62	49.2%
Residential Area		
Urban	78	61.9%
Rural	48	38.1%
Total	126	100%

The demographic breakdown shows that the study sample was diverse in terms of age, gender, and residential location. Nearly 62% of the children were from urban areas, with the rest from rural settings. Both male and female children were almost equally represented, and the age distribution was relatively even.

Screen Use Patterns

The results revealed that a significant proportion of children (89.7%) were screen users. Among the 113 screen users, smartphones were the most commonly used device (80.3%), followed by television (49.2%). Notably, 36 children began using screens before the age of one, indicating early exposure to digital media. The data analysis also showed variations in the type of content consumed, with a majority watching cartoons (83.3%), followed by educational content (31.7%).

Table 2: Screen Use Patterns

Variable	Frequency	Percentage (%)
Screen Usage		
Screen Users	113	89.7%
Non-Screen Users	13	10.3%
Device Type		
Smartphone	101	80.3%
Television	62	49.2%
Tablet	6	4.8%
Computer	6	4.8%
Early Exposure		
Before 1 Year	36	28.6%
1–2 Years	39	30.9%
Total	126	100%

A large proportion of children (89.7%) were exposed to screens. Smartphone use is dominated, with 80.3% of children using them, followed by television. Early screen exposure was evident, with nearly 29% of children starting before one year of age. These results underscore the prevalence of screen exposure in early childhood.

Duration and Context of Screen Use

The data indicated significant variations in the daily screen time of children. While 36 children (28.6%) had screen time of 1–2 hours, 13 children (10.3%) exceeded 4 hours of screen use daily. The context of screen use showed that 63 children (50%) used screens when caregivers were busy, and 80 children (63.5%) engaged with screens during meals.

Table 3: Duration and Context of Screen Use

Variable	Frequency	Percentage (%)
Daily Screen Time		
30–60 minutes	29	23.0%
1–2 hours	36	28.6%
2–4 hours	27	21.4%
More than 4 hours	13	10.3%
Context of Use		
During Meals	80	63.5%
Before Bedtime	30	23.8%
When Caregivers Busy	63	50.0%
As Reward/Calming Tool	48	38.1%
Total	126	100%

A substantial portion of children exceeded the recommended screen time, with 10.3% using screens for more than four hours daily. The context of use revealed that a significant number of children were exposed to screens during meals (63.5%) and when caregivers were occupied (50%).

Content Type and Supervision

The analysis of content types revealed that most children (83.3%) watched cartoons, followed by educational content (31.7%). Supervision practices varied, with 56 caregivers (44.4%) always supervising their child's screen time. However, a considerable portion (22%) of children were supervised only sometimes or rarely.

Table 4: Content Type and Supervision

Variable	Frequency	Percentage (%)
Content Type		
Cartoons	105	83.3%
Educational Content	40	31.7%
Music	30	23.8%
Games	20	15.9%
Supervision		
Always Supervised	56	44.4%
Often Supervised	27	21.4%
Sometimes Supervised	22	17.5%
Rarely Supervised	8	6.3%
Total	126	100%

Cartoons were the most common content type (83.3%), followed by educational material (31.7%). While 44.4% of caregivers always supervised their children's screen use, a significant proportion (23.8%) reported less frequent supervision, highlighting potential gaps in oversight.

Developmental Observations by Caregivers

Caregivers reported that 81 children (64.3%) could always follow instructions, and 80 children (63.5%) communicated verbally. Social interaction was consistently observed in 85 children (67.5%). However, restlessness when limiting screen time was reported by 42 children (33.3%).

Table 5: Developmental Observations by Caregivers

Variable	Frequency	Percentage (%)
Following Instructions		
Always	81	64.3%
Often	27	21.4%
Sometimes	15	11.9%
Rarely	2	1.6%
Verbal Communication		
Always	80	63.5%
Often	20	15.9%
Sometimes	19	15.1%
Rarely	4	3.2%
Social Interaction		
Always	85	67.5%
Often	24	19.0%
Sometimes	13	10.3%
Restlessness		
Always	12	9.5%
Often	21	16.7%
Sometimes	42	33.3%
Total	126	100%

Developmental observations by caregivers showed strong verbal communication and social interaction, with 64.3% and 67.5% of children demonstrating consistent skills in these areas. However, nearly one-third of children exhibited restlessness when their screen time was limited.

Caregiver Perceptions and Awareness

Results revealed that 72 caregivers (57.1%) believed screen time negatively impacted development, while only 28 caregivers (22.2%) adhered to the recommended screen time guidelines.

Table 6: Caregiver Perceptions and Awareness

Variable	Frequency	Percentage (%)
Perception of Screen Time		
Affects Development	72	57.1%
Does Not Affect	20	15.9%
Unsure	21	16.7%
Awareness of Guidelines		

Aware of Guidelines	35	27.8%
Adhere to Guidelines	28	22.2%
Total	126	100%

While 57.1% of caregivers were concerned about the developmental impact of screen time, only 27.8% were aware of the recommended guidelines, indicating a significant gap in caregiver education.

Concentration and Restlessness

The results indicated that concentration issues were prevalent in 25 children (19.8%). Similarly, restlessness was reported in 42 children (33.3%) when screen time was limited.

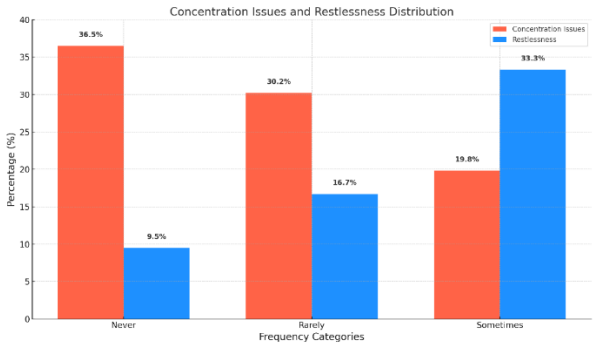

Figure 1: Concentration and Restlessness

Concentration issues and restlessness were common, with a significant proportion of children (19.8%) showing difficulties with concentration and a third of children (33.3%) becoming restless when screen time was reduced.

Sleep Disturbance

Results on sleep disturbances were minimal, with only 2 children (1.6%) reported having regular sleep disturbances related to screen time.

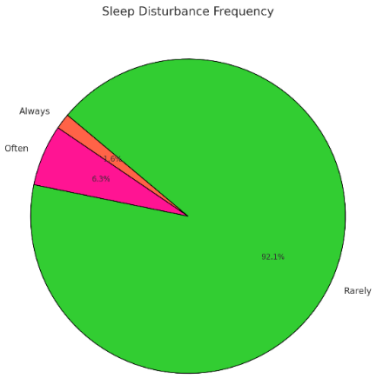

Figure 2: Sleep Disturbance

Sleep disturbance was rarely observed, with only a small percentage of children (1.6%) reporting regular issues.

DISCUSSION

In this study, we assessed the screen time habits of preschool-aged children in Netrokona, Bangladesh, and explored their developmental outcomes, including cognitive, social, and behavioral domains.[8] The findings of this study revealed several significant associations between screen time and developmental behaviors. This discussion aims to compare and contrast the results from our study with existing literature, draw conclusions about the impact of screen time on early childhood development, and suggest directions for future research.

Prevalence and Patterns of Screen Time Use

The results of this study revealed that 89.7% of children aged 3-5 years were exposed to screens, with smartphones being the most commonly used device (80.3%), followed by television (49.2%). This finding is consistent with the global trend that digital media usage is pervasive in children's lives, especially in urban settings. The prevalence of screen exposure in this study aligns with previous research that shows high rates of screen use among young children in both developed and developing countries. For instance, a study conducted by Sarfraz *et al.*, found that a significant proportion of Canadian children aged 2-5 years were exposed to screens regularly, with smartphones and tablets being the dominant devices.[9]

In Bangladesh, similar patterns of screen usage have been observed, with increasing access to mobile phones and television among children. In this study, 28.6% of children began screen exposure before the age of one, which is particularly concerning given the recommendations from health authorities such as the American Academy of Pediatrics (AAP) and the World Health Organization (WHO) that screen exposure for children under 18 months should be avoided.[10] Early exposure to screens has been associated with delays in language development, impaired cognitive skills, and negative social behaviors. This aligns with findings from Similar Study, who emphasized the potential long-term cognitive and developmental consequences of early screen exposure. The results of this study further demonstrated that screen time was not limited to passive viewing but was often integrated into daily activities such as mealtimes (63.5%) and bedtime (23.8%). This observation is in line with a study by Galetzka *et al*., which indicated that screen use during mealtimes could interfere with parent-child interactions, reducing opportunities for social bonding and active engagement.[7] Similarly, screen use before bedtime has been linked to poor sleep quality, which can have detrimental effects on cognitive functioning and emotional regulation in children.[11]

Duration of Screen Use and Developmental Implications

Our study revealed that 28.6% of children watched screens for 1–2 hours daily, while 10.3% of children exceeded 4 hours of screen time each day. These figures are concerning because research consistently shows that excessive screen time negatively impacts various developmental outcomes. The AAP recommends no more than one hour of screen time per day for children aged 2-5 years, yet many children in this study exceeded this guideline. The WHO also recommends limiting sedentary behavior, including screen time, to no more than one hour per day for young children.[12] Previous studies have consistently demonstrated that prolonged screen time is associated with a host of developmental issues, including language delays, attention problems, and impaired social interaction. For instance, a study by Takahashi *et al*., found that increased screen time in children aged 2-5 years was associated with lower scores on developmental screening tests, particularly in areas such as language development and executive function.[13] Similarly, the study by Oakes *et al.,* highlighted that children exposed to excessive screen time exhibited poorer attention skills and impaired memory, which are essential for school readiness.[6] In our study, although most children exhibited normal social and verbal communication skills, the observed issues of restlessness (33.3%) and difficulty concentrating (19.8%) align with these findings. Restlessness when limiting screen time, reported by 33.3% of children, may reflect the addictive nature of screen exposure, which has been associated with behavioral problems such as poor impulse control and emotional dysregulation.[14] The link between excessive screen time and attention difficulties was further reinforced by our findings, where a significant proportion of children (19.8%) demonstrated concentration issues. Studies have shown that extended screen exposure, especially to fast-paced content such as cartoons and video games, can impair attention span and hinder children's ability to focus on non-screen-related tasks.[15] This disruption in attention has long-term consequences on academic performance and cognitive development.

Impact on Social Interaction and Behavior

Social interaction is another critical area that is influenced by screen time exposure. Our study revealed that 67.5% of children consistently engage in social play with peers, which is generally a positive sign of healthy social development. However, 33.3% of children showed signs of restlessness when their screen time was limited, indicating that screen exposure may hinder emotional regulation and lead to behavioral issues. This finding is consistent with research by Galetzka *et al*., which reported that excessive screen use could lead to deficits in face-to-face social interactions and impair children's ability to regulate their emotions, particularly when they are asked to disengage from screens.[7] Additionally, 51 children (40.5%) in this study were observed to imitate characters from the content they consumed. This form of imitation can be beneficial if the content is educational and age appropriate. However, excessive exposure to violent or inappropriate content can lead to the internalization of problematic behaviors.The findings of this study are similar to those of Massaroni *et al*., who highlighted that children often imitate behaviors from the media they consume, which can influence both their social skills and moral development.[16] The fact that a significant proportion of children in this study were exposed to cartoons (83.3%) and entertainment media suggests that their social behaviors may be shaped by the content they watch.[17]

Caregiver Perceptions and Awareness

One of the most notable findings of this study was that 57.1% of caregivers believed screen time had an adverse effect on their children's development. However, only 27.8% of caregivers were aware of the recommended guidelines for screen time, and even fewer (22.2%) adhered to these guidelines. This discrepancy highlights a significant gap in caregiver education regarding appropriate screen use and its developmental implications. Previous studies have shown that caregivers' awareness of screen time guidelines is often inadequate, which contributes to the overuse of screens among young children. Galetzka et al., emphasized the importance of caregiver involvement in managing screen time to mitigate its negative effects. The study found that caregivers who are more knowledgeable about screen time guidelines are more likely to limit screen exposure, choose age-appropriate content, and monitor screen use during key developmental activities such as mealtimes and bedtime.[7] The low levels of caregiver awareness observed in this study suggest that there is a critical need for public health initiatives to educate caregivers about the risks of excessive screen exposure and the benefits of managing screen time in line with established guidelines.

Limitations and Future Directions

While this study provides valuable insights into the impact of screen time on preschool children in Bangladesh, it is not without limitations. First, the cross-sectional nature of the study means that it cannot establish causal relationships between screen time and developmental outcomes. Longitudinal studies are needed to examine the long-term effects of screen exposure on children's cognitive, social, and behavioral development. Second, the study relied on caregiver self-reporting, which may have introduced bias or inaccuracies in the data, particularly regarding screen time duration and content type. Future studies could incorporate objective measures, such as screen time tracking devices, to obtain more accurate data on children's media consumption. Furthermore, this study focused on a specific geographic area (Netrokona) in Bangladesh, which limits the generalizability of the findings to other regions with different socio-economic conditions or cultural practices. Future research should aim to explore screen time patterns and developmental outcomes in other regions of Bangladesh and other low- and middle-income countries (LMICs) to provide a broader understanding of how screen exposure affects children's development in diverse contexts.

CONCLUSION

This study highlights the significant prevalence of screen time among preschool children in Netrokona, Bangladesh, and its potential developmental implications. The findings suggest that excessive screen time is associated with difficulties in attention, social interaction, and emotional regulation. Given the increasing exposure to screens, especially in urban settings, it is essential for caregivers to be more aware of the recommended guidelines. Future research should explore the long-term impact of screen time on children's development in diverse cultural contexts. Public health initiatives and educational programs are crucial to mitigating the negative effects of excessive screen exposure.

Recommendations

Caregivers should limit screen time to recommended guidelines, especially for children under five years.
Healthcare providers should integrate discussions about screen time during regular well-child visits.
Future studies should investigate the impact of screen time across different socio-economic groups.

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