

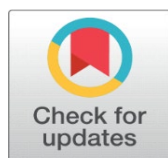
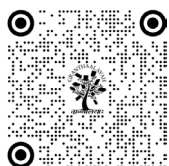
EFFECTS OF EXCESSIVE SCREEN TIME ON CHILDREN'S COGNITIVE AND COMMUNICATION DEVELOPMENT

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ABSTRACT

This study explores the repercussions of excessive screen time on the cognitive and communicative development of children under six years old. Screen time refers to the duration children spend interacting with electronic devices such as televisions, tablets, and smartphones. Cognitive development encompasses the processes through which children acquire knowledge, problem-solving skills, and memory, crucial for their learning abilities. Communication Development is the process through which children acquire skills to understand and express language. It includes receptive language (understanding), expressive language (speaking or writing), and pragmatic skills (social use of language). Effective communication is essential for social interaction, learning, and emotional expression. The aim of the research was to assess the impact of excessive screen time on these developmental areas among children in Raipur and Bilaspur, Chhattisgarh. A sample of 100 children was selected using random sampling techniques from therapy centers, hospitals, and schools. Data were collected through the "seven-in-seven screen exposure questionnaire" and the DP-3 developmental assessment tool. The reliability of the "seven-in-seven screen exposure questionnaire" was assessed using Cronbach's alpha, resulting in a score of 0.85, indicating high internal consistency. The DP-3 developmental assessment tool achieved a reliability score of 0.90, reflecting strong consistency across its items. Content validity for both instruments was ensured through expert reviews, while construct validity was confirmed by correlating scores with established benchmarks for cognitive and communication milestones, validating their effectiveness in measuring the intended constructs. The research employed a quantitative design, utilizing one-way ANOVA to analyze the data. Statistical analysis indicated a significant negative impact of prolonged screen exposure on cognitive development ($F=6.0219$, $p<.05$), particularly affecting attention span and memory retention. However, communication skills did not exhibit significant impairment ($F=2.8593$, $p>.05$). These findings highlight the importance of managing screen time effectively to support healthy cognitive development in young children.

Keywords: Screen time, Cognitive development, Communication skills in young children

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1. INTRODUCTION

The advent of the digital age has revolutionized children's interaction with their environment, with screens becoming ubiquitous in their daily lives (Guram & Heinz, 2017a). Excessive screen time has been linked to various developmental concerns, raising questions about its effects on young children's cognitive and communicative abilities. Cognitive development encompasses skills such as memory, problem-solving, and attention, all critical for learning (Vandewater et al. 2007). Communication development refers to the ability to express and comprehend language, crucial for social interactions and academic success (Grillo, 2017). This study aims to investigate the prevalence of excessive screen time among children in Raipur and Bilaspur, Chhattisgarh, and its potential impact on these developmental domains. By understanding the nuances of screen exposure, caregivers and policymakers can formulate strategies to optimize child development in the digital era. Research in this area is essential as it addresses a growing concern among parents and professionals regarding the potential negative effects of screen time on child development. With increasing screen usage

among children under six years old, identifying its implications can guide interventions and promote healthier digital habits. Furthermore, insights from this study can contribute to existing guidelines and recommendations, ensuring that they reflect current evidence and practices.

2. REVIEW OF RELATED LITERATURE

Previous research has highlighted both the benefits and drawbacks of screen exposure in early childhood. While some studies indicate that educational content can enhance learning and language skills, excessive screen time is often linked to cognitive delays and reduced attention spans (Hill et al. 2016; Gupta et al. 2021). The Indian Academy of Pediatrics has emphasized the need for moderation, recommending specific screen time limits to safeguard children's developmental milestones. Swider-Cios et al. (2023); Guellai et al. (2022) Studied and suggested that communication development may remain resilient despite screen exposure, as interactive media can promote social engagement and language use. However, the nuances of these relationships require further exploration, particularly in diverse contexts, to fully understand how screen time influences various aspects of child development.

3. STATEMENT OF THE PROBLEM

Effect of excessive screen time on the cognitive and communicative development of children under six years old.

OBJECTIVES

1. To examine the impact of excessive screen time on cognitive development in children under six years old.
2. To compare the communication development of children under six years old in urban and rural areas, examining whether differences in screen time exposure and other environmental factors affect communication levels
3. To assess the relationship between the age at which children are first exposed to screen time (onset of screen time) and their cognitive development, particularly the cognitive quotient.
4. To investigate the differences in cognitive development outcomes related to screen time exposure between urban and rural population.

HYPOTHESIS

1. There will be no significant differences in cognitive development between children with low screen time and those with high screen time exposure.
2. There will be no significant difference in communication development between children in urban and rural areas.
3. The age of onset of screen time will not significantly affect the cognitive quotient of children under six years old.
4. There will be no significant difference in cognitive development between different urban and rural population based on screen time exposure.

METHODOLOGY

Sample: The study included 100 children under the age of six from Raipur and Bilaspur, Chhattisgarh, India. The children were selected from therapy centers, hospitals, and schools. Guardians provided written informed consent for their children's participation.

Sampling Techniques: Random Sampling technique was used to select participants to minimize selection bias and ensure that every child in the target population had an equal chance of being included. The sample was drawn from various settings (therapy centers, hospitals, and schools) to capture a range of developmental backgrounds and screen time habits.

Tools: These tools were used to collect quantitative data on the children's screen time exposure and developmental outcomes, enabling a statistical analysis of the impact of screen time on cognitive and communication skills.

1. Seven-in-Seven Screen Exposure Questionnaire: Used to measure the duration and nature of screen time exposure among children. Reliability assessed using Cronbach's alpha, yielding a score of 0.85, indicating high internal consistency. Validated through expert reviews for content and correlating with established benchmarks.

2. Developmental Profile 3 (DP-3) Assessment Tool: Used to evaluate cognitive and communication development in children. Reliability score of 0.90, demonstrating strong consistency across its items. Content and construct validity were confirmed through expert reviews and comparisons with standard developmental milestones.

4. ANALYSIS AND INTERPRETATION OF RESULT

Quantitative analyses were conducted using one-way ANOVA to evaluate the differences in cognitive development scores based on screen time categories (low vs. high exposure). A two-tailed test was employed for cognitive development to determine whether screen time has a significant effect in either direction (positive or negative), while a one-tailed test could have been used if the hypothesis specifically predicted that increased screen time would only negatively affect development. The choice of a two-tailed test was made to allow for a comprehensive evaluation of the impact.

RESULTS

TABLE - 1
COMPARISON OF COGNITIVE DEVELOPMENT BETWEEN CHILDREN WITH LOW SCREEN TIME AND HIGH SCREEN TIME EXPOSURE.

Cognitive Development	SS	df	MS	F	P-Value
Between Groups	48400.9652	1	48400.9652	6.02194	0.0158
Within Groups	819818.8809	102	8040.1762		
Total	868219.8462	103			

Result of table shows, the F-ratio of 6.0219 with a p-value of 0.0158 ($p < 0.05$) indicates that there is a statistically significant difference in cognitive development between children with low screen time and high screen time exposure. This suggests that screen time may have an impact on cognitive development. Between groups refers to the variability in cognitive development scores that can be attributed to the different groups (low and high screen time). Within groups refers to the variability in cognitive development scores within each group, or the individual differences among children within the same screen time category.

TABLE - 2
COMPARISON OF THE COMMUNICATION DEVELOPMENT AMONG CHILDREN UNDER SIX YEARS OLD IN URBAN AND RURAL AREAS.

Communication Level	SS	df	F	P-Value
Between Groups	2201.6271	1	2.8593	0.0972
Within Groups	61591.9339	80		
Total	63793.561	81		

Result of table shows, the F-ratio is 2.8593 with a p-value of 0.0972. Since the p-value is greater than 0.05, the results are not statistically significant. Hence there is no significant difference in communication development between children under six years old in urban and rural areas, based on this data. Between groups refers to the variance in communication development scores due to the different settings (urban vs. rural areas), represents how much the differences between these groups explain the variation in communication development. Within groups refers to the variance within each

group, indicating the individual differences in communication development among children within the same area (urban or rural).

TABLE-3
RELATIONSHIP BETWEEN THE AGE AT WHICH CHILDREN ARE FIRST EXPOSED TO SCREEN TIME (ONSET OF SCREEN TIME) ON COGNITIVE QUOTIENT.

Cognitive Quotient	SS	df	F	P-Value
Between Groups	6893.3339	1	1.59952	0.209349
Within Groups	374938.1045	87		
Total	381831.438	88		

Result of table shows, the F-ratio is 1.59952 with a p-value of 0.2093. Since the p-value is greater than 0.05, the result is not statistically significant. This indicates that there is no significant relationship between the age at which children are first exposed to screen time (onset of screen time) and their cognitive quotient based on this data. Between groups refers to the variability in cognitive quotient that can be explained by differences in the onset of screen time (the age at which children are first exposed). It shows how much variation in cognitive scores can be attributed to this factor. Within groups refers to the variability in cognitive quotient within each group, capturing the individual differences in cognitive abilities among children who were first exposed to screen time at difference onset age.

TABLE - 4
DIFFERENCE IN COGNITIVE DEVELOPMENT BETWEEN DIFFERENT POPULATION TYPES (URBAN & RURAL) BASED ON SCREEN TIME EXPOSURE

Source	df	SS	MS	F	P-value
Factor A	1	2866526850	2866526850	0.7204	0.3972
Factor-B	1	1455363789	1455363789	0.3658	0.5461
Interaction AB	1	3081630908	3081630908	0.7745	0.38
Error	177	704286475000	3979019633		
Total	180	711689996600	3953833314		

Result of this table shows the difference in cognitive development between different (urban and rural) population, based on screen time exposure, analyzing two factors: Factor A (rural and urban population) and Factor B (screen time exposure). The F-ratio for Factor A (population type) is 0.7204 with a p-value of 0.3972, which is not statistically significant ($p > 0.05$). This suggests that there is no significant difference in cognitive development between urban and rural children, regardless of screen time exposure. The F-ratio for Factor B (screen time exposure) is 0.3658 with a p-value of 0.5461, which is also not statistically significant ($p > 0.05$). This indicates that screen time exposure alone does

not significantly affect cognitive development. Interaction AB examines the combined influence of both factors (population type and screen time exposure) impact on cognitive development and found, The F-ratio for Interaction AB is 0.7745 with a p-value of 0.38, which is not statistically significant. This means there is no significant interaction between urban, rural population and screen time exposure on cognitive development.

5. DISCUSSION

The findings align with prior research, highlighting the detrimental effects of excessive screen time on cognitive development. Specifically, prolonged exposure to screens can impair attention span, memory retention, and language acquisition (Hinkley et al. 2019). The lack of significant impact on communication development contradicts some previous studies, indicating the complexity of this relationship. Factors such as the content and context of screen exposure may play critical roles in these outcomes (Vandewater et al. 2007). The study's factorial design provides insights into the interplay between various factors and developmental outcomes, emphasizing the need for tailored interventions to mitigate the adverse effects of screen time. This study underscores the concerning influence of excessive screen time on cognitive development in children of 6 years and below. The resilience of communication skills amidst screen exposure suggests a nuanced relationship, challenging previous assumptions. The study emphasizes the importance of effective screen time management to safeguard cognitive development during critical early years. However, the failure to find significant impacts based on demographic factors like gender and location points to the complexity of screen time effects and indicates the necessity for further exploration (Gupta et al. 2021).

6. CONCLUSION

This study emphasizes the detrimental impact of excessive screen time on cognitive development in young children. While communication skills appear resilient to screen exposure, vigilance in managing screen time remains crucial. By implementing evidence-based guidelines and recommendations, parents, caregivers, educators, and policymakers can promote healthy child development amidst the digital revolution. Further research is warranted to elucidate the intricate relationship between screen time and developmental outcomes.

CONFLICT OF INTERESTS

None

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