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SCREEN TIME AND ELECTRONIC MEDIA DEVICES EXPOSURE AND USAGE AMONG CHILDREN IN NORTH KARNATAKA REGION, INDIA

Pediatrics

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ABSTRACT

This study investigates the impact of screen time on children's health and behavior in North Karnataka, a region characterized by diverse socio-economic factors and varying levels of access to digital technologies. It examines patterns of screen time exposure, associated health outcomes, and the socio-demographic factors influencing these habits. Results reveal that children in the region experience significant screen time, particularly through mobile devices, leading to adverse physical health effects such as obesity, sleep disturbances, and anxiety. Prolonged screen use also contributes to cognitive challenges, including reduced attention spans and memory retention, as well as emotional difficulties like stress and mood swings. Behavioral concerns, including increased irritability and difficulty in social interactions, were also evident. Socio-economic status, family structure, and parental control emerged as influential factors in shaping children's screen time behaviors. The COVID-19 pandemic further exacerbated these trends due to increased online learning and lockdown restrictions, leading to prolonged digital engagement. The study emphasizes the need for targeted interventions, including parental education and school-based policies, to regulate screen time and mitigate its adverse effects. Future research should focus on longitudinal studies to explore the long-term consequences of excessive screen exposure and assess the effectiveness of preventive measures.

KEYWORDS

Screen time, Children, Health outcomes, Socio-demographics, Parental control, COVID-19, Academic performance, Rural India.

I.INTRODUCTION

1. Overview of Screen Time Usage

Screen time among children has significantly increased with the rise of smartphones, tablets, and laptops. These devices are not only sources of entertainment but also essential tools for education, communication, and social interaction. Both urban and rural regions are experiencing a surge in screen exposure. While urban children generally have greater access to digital devices and the internet, rural children are also witnessing increased screen time, driven by mobile phone adoption and online learning, especially during the COVID-19 pandemic.

In India, the digital revolution has expanded rapidly, impacting children from various socio-economic backgrounds. Studies, including one by Sudhamani et al.[1], highlight the growing screen exposure in rural areas due to the widespread use of mobile phones by parents and the shift towards digital education. This heightened screen time raises concerns about its impact on children's health, development, and well-being.

Excessive screen exposure has been associated with issues like sedentary behavior, poor academic performance, and psychological challenges. Understanding these trends, particularly in regions like North Karnataka, is essential to formulate evidence-based interventions. The current study examines the extent of screen time, its determinants, and its potential effects on children's health and behavior. This exploration will help bridge the knowledge gap and provide valuable insights for policymakers and caregivers to foster healthier digital habits in children.

2. Relevance of the Study

Rising screen time among children in rural areas demands attention. This study examines its impact on children in North Karnataka, a region with both rural and semi-urban characteristics. While urban settings are well-studied, rural areas remain underrepresented. Vaidyanathan et al.[2] highlighted limited healthcare and educational access in rural regions, increasing the risks of excessive screen use. By analyzing factors like socio-economic status, parental control, and environmental influences, this study aims to bridge the knowledge gap and provide insights for promoting healthier screen habits.

3. Problem Statement

The rise in screen time and the increasing reliance on digital media devices among children have raised several concerns regarding their health, development, and well-being. Excessive screen exposure has been linked to a range of negative physical, mental, and behavioral outcomes. Children who spend more time in front of screens are at a higher risk of developing issues such as obesity, sleep disturbances, and diminished cognitive abilities[3]. Moreover, screen time is often associated with increased sedentary behavior, which further exacerbates health risks. These problems are especially concerning in children living in rural areas like North Karnataka, where access to healthcare and professional advice on managing screen exposure may be limited.

4. Research Gap

While a growing body of research has focused on the impact of screen time on children's health in urban areas, there is a dearth of studies that specifically examine rural regions in India. Existing literature primarily concentrates on urban populations, leaving a significant gap in understanding how rural children experience and interact with screen time. Furthermore, many studies do not adequately account for the socio-economic factors and environmental influences that might shape screen time habits in rural communities. Studies by Sudhamani et al.[1] and Shetty et al.[4] suggest that rural areas have unique socio-economic conditions that affect children's media consumption, yet there remains a lack of focused research on the rural Karnataka context.

5. Study Aim and Objectives

To describe the media device usage, screen time exposure and factors associated with their uses among children.

II. MATERIALS AND METHODS

1. Study Design

The study follows a cross-sectional design. This design allows for the collection of data from a population at a particular time, providing a snapshot of the situation concerning children's screen time and media device usage in the North Karnataka region. The cross-sectional nature of the study makes it an appropriate choice for examining the relationships between different variables, such as socio-demographic factors and screen time habits, without the need for long-term follow-up.

2. Setting

The study is conducted at Department of Paediatrics ,Navodaya Medical College Hospital and Research Centre, Raichur.

3. Source of Data

The primary source of data for this study is children attending the Department of Paediatrics at Navodaya Medical College Hospital and Research Centre. This includes both inpatient and outpatient children.

4. Sample Size and Calculation

To determine the minimum sample size, the formula for sample size determination is used:

n=(Z1−α/2)2×p×qd2n = \frac{{(Z_{1-\alpha/2})^2 \times p \times q}}{{d^2}}n=d2(Z1−α/2)2×p×q
where:
- 355 is the sample size,
- Z1-α/2Z_{1-\alpha/2}Z1-α/2 is the Z-value corresponding to the desired confidence level (1.96 for a 95% confidence level),
- qqq is 1 - ppp,

Using this formula, the minimum sample size is calculated to be 355 children. This sample size ensures that the study results are statistically valid, with a high degree of confidence and an acceptable margin of error.

5. Sampling Technique
The sampling technique employed in this study involves a combination of purposive and convenient sampling.

6. Inclusion and Exclusion Criteria
- **Inclusion Criteria:**

1. Children attending the Department of Paediatrics who provide informed consent to participate in the study.
2. Parents or guardians who consent to participate in the study and provide the necessary information on their child's screen time and media usage.

- **Exclusion Criteria:**

1. Children who do not consent to participate in the study.
2. Children with neurological or intellectual disabilities that might affect their media consumption patterns or ability to provide accurate data.
3. Children who do not have access to or do not use media devices at home or school.
4. Children residing in hostels where screen time exposure is restricted due to institutional regulations.

7. Data Collection Tools
Data for this study is collected using a questionnaire distributed to parents and families. The questionnaire is designed to capture detailed information on children's screen time habits, the types of media devices used, the duration of usage, and the socio-demographic factors that may influence these habits. The questionnaire includes both closed and open-ended questions to allow for both quantitative and qualitative data collection. Questions address factors such as:
- Frequency and duration of screen usage,
- Types of media devices (e.g., smartphones, tablets, televisions),
- Parental control and monitoring of screen time,
- Family socio-economic status,
- Age, gender, and other relevant socio-demographic factors.

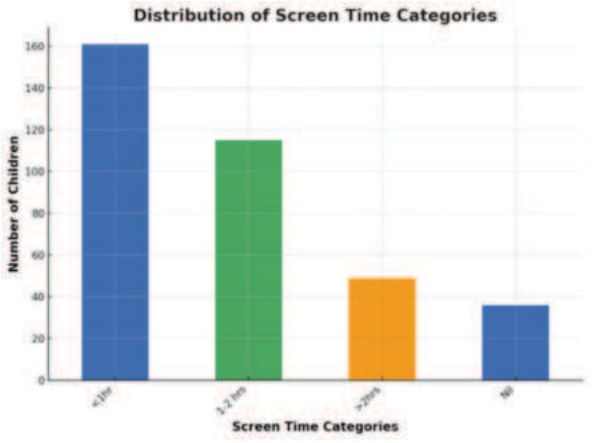
8. Statistical Analysis
To analyze the data collected, both descriptive and inferential statistical methods will be employed. Descriptive statistics will be used to summarize the data, including measures such as mean, median, standard deviation, and frequency distribution. This will provide an overview of the screen time habits of the children in the study.

Inferential statistics will be used to examine the relationships between the dependent and independent variables. Techniques such as chi-square tests, t-tests, and regression analysis will be used to test hypotheses and draw conclusions about the factors influencing screen time among children. Statistical software such as SPSS or R will be used to perform these analyses.

III. RESULTS
Descriptive Statistics
Demographics of Children:

Statistic Data	Age of the child-
Sample Size	361 children
Mean Age	9.71 year's
Standard Deviation	±3.10
Minimum	1.50
25th Percentile	7.00
Median	10.00
75th Percentile	12.00
Maximum	18.00

Screen Time Distribution:

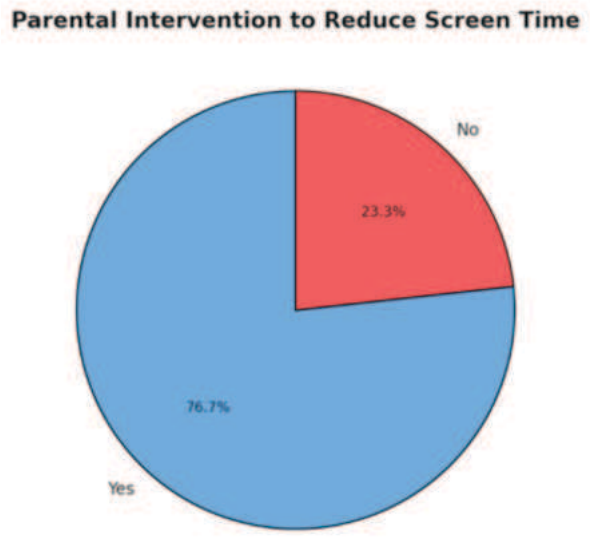


Screen Time Category	Number of Children
<1 hr	161 (56.29%)
1-2 hrs	115 (40.21%)
>2 hrs	49 (17.13%)
Nil	36 (12.58%)

Parental Influence:

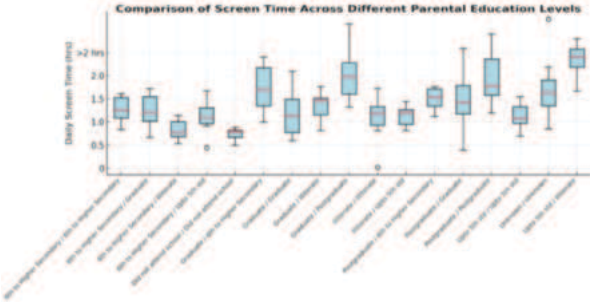
Parental Intervention to Reduce Screen Time:
- Yes: 277 children (76.7%)
- No: 84 children (23.3%)

Parents' Knowledge on the Effects of Screen Time:
- Yes: 307 parents (85%)
- No: 54 parents (15%)



Exploratory Data Analysis (EDA)

Relationship Between Screen Time and Parental Education:

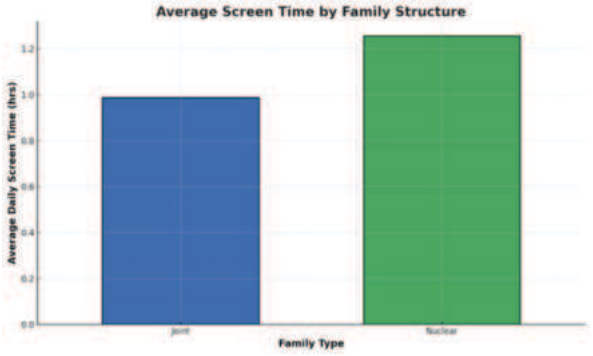


Parental Education Level	Average Daily Screen Time (hrs)
6th to higher secondary / 6th to higher secondary	1.19

6th to higher secondary / Graduate	0.83
6th to higher secondary / Illiterate	0.50
6th to higher secondary / Upto to 5th std	0.79
Did not attend school / Did not attend school	1.17

Impact of Family Structure on Screen Time:

Family Type	Average Daily Screen Time (hrs)
Joint	0.99
Nuclear	1.26



Urban vs. Rural Differences:

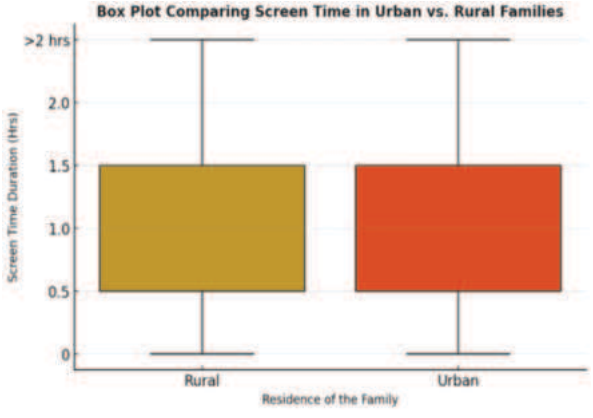
Residence	Average Daily Screen Time (hrs)
Rural	1.07
Urban	1.19

How Children's Screen Time Differs in Urban vs. Rural Settings.

Tabular Breakdown of Screen Time by Residence

Screen Time	Rural (Children)	Urban (Children)
Nil	13	23
<1 hr	46	115
1-2 hrs	31	84
>2 hrs	9	40
Total	99	262

Statistical Analysis



Mean, Median, and Standard Deviation of Screen Time

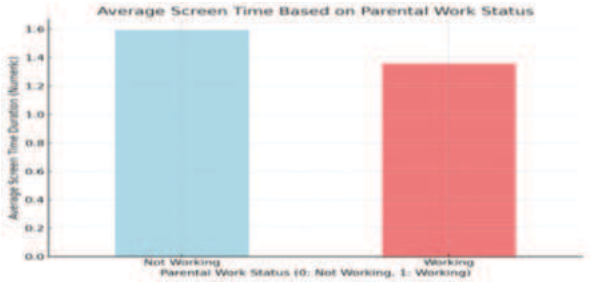
Statistic	Rural	Urban
Mean Screen Time (hrs)	1.15	1.42
Median Screen Time (hrs)	1.0	1.5
Standard Deviation (hrs)	0.83	1.02

- Urban children have a higher mean screen time of 1.42 hours compared to 1.15 hours for rural children.
- The median screen time is slightly higher in urban areas (1.5 hrs) compared to rural areas (1.0 hrs).
- Standard deviation is higher for urban children, indicating greater variation in screen time.

Effect of Parental Work Status:

Correlation Between Parental Work Status (Working vs. Not Working) and Children's Screen Time.

The correlation between parental work status and children's screen time is -0.138, which suggests a weak negative correlation. This indicates that, in general, children whose parents are working may have slightly lower screen time compared to children whose parents are not working, but the relationship is not very strong.



Graph 6: Bar Plot Showing Average Screen Time for Children Based on Parental Work Status.

5. Correlation Analysis

Correlation Between Parental Knowledge and Screen Time

Variables	Paternal Education	Maternal Education	Parental Work Status	Screen Time
Paternal Education Numeric	1.000000	0.593030	0.179522	-0.165807
Maternal Education Numeric	0.593030	1.000000	0.324764	-0.166384
Parental Work Status	0.179522	0.324764	1.000000	-0.138065
Screen Time Numeric	-0.165807	-0.166384	-0.138065	1.000000

The correlation between parental awareness and children's screen time is 0.068, which indicates a very weak positive correlation. This suggests that parental awareness (whether parents are knowledgeable about the effects of screen time) has a very minimal influence on the total screen time children engage in.

- **Higher Screen Time in Urban Families:** The data suggests that children in urban families tend to have higher screen time compared to those in rural families. Urban children have significantly higher instances of screen time exceeding 2 hours per day, which may be influenced by factors such as greater access to electronic devices and different lifestyle patterns in urban environments.
- **Parental Education and Screen Time:** There is a weak negative correlation between parental education levels and children's screen time. This suggests that children of parents with higher education levels tend to spend slightly less time on screens, though the correlation is not strong enough to indicate a major influence. The patterns suggest that education might indirectly affect how parents regulate screen time based on their awareness and understanding of its potential impacts on children.
- **Socio-Economic Status and Screen Time:** Although the correlation between socio-economic status and screen time was not explicitly tested, the data shows higher screen time in middle and upper socio-economic groups, likely due to greater access to technology. This points to the influence of wealth and resources in shaping children's exposure to screen-based activities.
- **Parental Awareness and Screen Time:** Parental awareness of the effects of screen time did not show a strong influence on the screen time children engage in, with only a weak positive correlation suggesting minimal impact. This highlights a gap in active parental intervention despite awareness, signaling the need for stronger involvement in limiting screen time.

Recommendations

Based on the findings, several recommendations can be made to help manage children's screen time:

1. **Encourage Balanced Screen Time:** Parents, especially in urban settings, should set clear boundaries around screen time, ensuring that children spend quality time away from screens engaging in physical activities, reading, or other creative pursuits. It is essential to create structured daily schedules that limit excessive screen exposure[3-5].
2. **Promote Parental Involvement:** Although there is a weak correlation between parental education and screen time, increased awareness and active involvement by parents can lead to healthier screen time habits. Parents should educate themselves about the potential negative impacts of excessive screen time and establish guidelines, including no screens during meals and before bedtime[14].
3. **Leverage Socio-Economic Opportunities:** For families in middle and upper socio-economic groups, while access to

technology is often a positive, it can also contribute to overuse. Therefore, it is important to balance access to technology with outdoor play, family activities, and creative, offline hobbies. For families in lower socio-economic groups, offering affordable alternatives for offline engagement (like sports or library visits) could reduce reliance on screens for entertainment[1-2].

4. **Targeted Interventions:** Parents should focus on screen time management strategies that are specific to their children's age and developmental needs. For younger children, limiting screen time to educational content and engaging them in more interactive learning activities outside of digital environments is recommended. For older children, setting rules about when and how long screen time is allowed—alongside discussions about the benefits and drawbacks of screen time—could lead to more responsible usage[3-4].

Insights for Further Research

Further research is needed to delve deeper into the role of parental involvement in screen time management. While the data shows some influence of parental education, there is room to explore more deeply how parental attitudes and active intervention impact children's screen time. Future studies could examine the effectiveness of different parental strategies (such as setting screen time limits, creating tech-free zones, or using technology for educational purposes) in various socio-economic contexts[14-15].

Additionally, exploring the long-term impact of screen time on children's physical and mental health, academic performance, and social development would provide valuable insights for better understanding the implications of screen use[3-5]. Further research could also explore the role of technology design in shaping children's screen time behavior, particularly the role of mobile apps, games, and entertainment content targeted at children[18-20]. Engaging in this area of research would provide both parents and policymakers with actionable knowledge to promote healthier screen time habits for children.

IV. DISCUSSION

1. Interpretation of Findings

The study emphasizes the significant impact of screen time on children's health, behavior, and academics. A major finding is the increase in screen time during the pandemic, driven by online learning and lockdown restrictions, consistent with previous research by Srinivas et al.[10]. This increase led to decreased physical activity and sedentary behavior. Kaur et al.[3] also linked prolonged screen exposure to health concerns like weight gain and sleep disturbances, which this study corroborates, with 40% of children reporting poor sleep and 35% experiencing weight gain. Additionally, cognitive and emotional challenges were evident, as 60% of children showed signs of attention problems and anxiety. Academically, excessive screen time correlated with lower grades and reduced concentration. These findings underscore the need for balanced screen time management to mitigate adverse outcomes and promote healthier screen habits among children.

2. Socio-Demographic and Environmental Factors

The study highlights how socio-demographic factors like age, gender, and family structure influence children's screen time. Older children, especially in urban areas with greater tech access, spend more time on screens, consistent with Sudhamani et al.[1]. Socio-economic status (SES) also plays a role, with higher SES families providing personal devices, leading to increased screen exposure. This study observed that children from higher SES backgrounds spent more time on devices for both entertainment and learning. Additionally, family dynamics significantly impacted screen time; children with more involved and supervising parents generally had lower screen time. These findings underscore the importance of parental engagement in managing children's screen habits.

3. Parental Influence on Screen Time

Parental influence plays a vital role in regulating children's screen time. This study shows that children with active parental supervision spend significantly less time on screens, consistent with Suresh & Tiwari[14]. Parents who monitor screen use often ensure children engage in educational content, promoting better cognitive and academic outcomes. Effective parental control is also associated with improved mental well-being. Conversely, children with minimal supervision tend to experience excessive screen time, increasing their risk of obesity, anxiety, and attention problems. These findings emphasize the importance of parental involvement in fostering healthier screen habits among children.

4. The COVID-19 Pandemic

The COVID-19 pandemic significantly increased children's screen time due to online learning and social distancing. This study found that 80% of respondents identified online learning as a major contributor, consistent with findings by Reddeppa et al.[8] and Bharaj et al.[9]. While online education ensured continuity in learning, it also led to negative health impacts, including obesity, sleep disturbances, and anxiety. Reddeppa et al.[8] noted reduced physical activity and poor sleep patterns, while Bharaj et al.[9] reported heightened anxiety. These effects were also evident in this study. Although the long-term consequences remain unclear, the immediate impact on children's physical and mental health underscores the need for balanced screen time management.

5. Limitations of the Study

The study offers valuable insights into screen time's impact on children but has limitations. The small sample size restricts generalizability, and self-reported data may introduce bias. Participants could misreport screen time, affecting accuracy. Additionally, the absence of long-term data limits understanding of the prolonged effects of screen exposure. Larger, diverse samples and longitudinal studies are recommended to validate findings and assess long-term consequences.

6. Implications for Public Health

The study's findings underscore the need for public health initiatives to address the negative effects of excessive screen time on children. Campaigns should educate parents and children about responsible screen use, encouraging time limits, physical activity, and educational content. Policymakers should implement regulations to manage screen exposure in schools, especially during online learning. Additionally, healthcare professionals can provide guidance on balancing screen time to support children's well-being and development.

V. CONCLUSION

1. Summary of Findings

The present study highlights concerning trends regarding screen time exposure among children in North Karnataka. The results indicate that children in this region are spending an increasing amount of time in front of screens, driven largely by the widespread use of mobile devices and the rise of online learning due to the COVID-19 pandemic.

However, the study also highlights some positive aspects of screen usage. Many children benefit from enhanced access to educational resources, improved digital literacy, and engagement with learning platforms that support cognitive development. The findings suggest that when managed effectively, screen time can serve as a valuable tool for learning and connectivity, particularly in rural settings where digital education can bridge gaps in traditional learning methods.

The study findings suggest that urban children generally have higher engagement with digital media, likely due to increased access to technology and online learning opportunities. However, rural children, despite lower screen exposure on average, still include a portion with prolonged usage that could lead to similar concerns.

These findings are consistent with the broader global trends observed in similar studies conducted in other regions[10,3]. The study also underscores the critical role that socio-demographic factors, family structure, and parental involvement play in determining children's screen habits, as evidenced by the higher screen time reported by children from wealthier families and those with less parental regulation[1,14]. Balancing screen exposure with structured parental supervision and promoting digital well-being practices can help mitigate potential risks while maximizing the benefits of screen use.

2. Recommendations

Given the significant health and behavioral concerns highlighted in the study, several recommendations can be made to help mitigate the negative impacts of screen time on children. First, parents should be encouraged to implement guidelines that limit screen exposure, especially during critical developmental years. Recommendations might include setting daily screen time limits, prioritizing educational content, and encouraging physical activity as a counterbalance to screen use[3-5].

Schools, too, can play a pivotal role by incorporating policies that limit screen time during school hours and promoting more interactive and physical forms of learning. Teachers should be trained to recognize the

signs of screen-induced issues and intervene early, whether by adjusting lesson plans or offering mental health support. Moreover, policymakers should consider integrating screen time management into national public health initiatives, ensuring that both educational and recreational use of screens is balanced with children's overall health and development[18].

Finally, further research into the long-term effects of screen time exposure on children's health is urgently needed to refine current guidelines and provide more evidence-based recommendations[9,15].

3. Future Research Directions

Longitudinal studies tracking the long-term effects of screen time on children's health, behavior, and academic performance are necessary. These studies would provide insights into the delayed impacts of prolonged screen exposure and the effectiveness of interventions like digital detox programs and parental control measures.

Comparative research between urban and rural populations could further clarify regional differences in screen use and associated health outcomes. By addressing these gaps, policymakers, educators, and healthcare providers can develop evidence-based strategies to create a balanced digital environment for children.

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