

Screen Time and Problem Behaviours in Children: Exploring the Mediating Role of Sleep Duration

Vijay Kumar¹, Kumar Sanjeev², Suryendru Kumar³^{1,2,3}Senior Resident, Department of Pediatrics, ESIC Medical College & Hospital, Bihta, Patna, India

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Corresponding author: Dr. Suryendru Kumar

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Abstract:

Background: In the digital age, excessive screen time has been associated with various problem behaviour in children. However, the mechanisms underlying this relationship, particularly the role of sleep duration, remain unclear. This study aimed to investigate whether sleep duration mediates the association between screen time and problem behaviours in a sample of 50 children.

Materials and Methods: Fifty children aged 8 to 12 years were recruited for this cross-sectional study. Screen time was assessed through parent reported daily hours spent on screens (M = 3.2, SD = 1.1). Problem behaviours were measured using standardized behavioural questionnaires (M = 24.5, SD = 6.8). Sleep duration was derived from both parent reported data and actigraphy (M = 8.5 hours, SD = 0.9). Mediation analysis was performed to assess whether sleep duration mediated the relationship between screen time and problem behaviours, controlling for age and gender.

Results: The results indicated a significant positive correlation between screen time and problem behaviours ($r = 0.42$, $p < 0.01$). Mediation analysis revealed that sleep duration partially mediated this relationship ($\beta = 0.17$, $p < 0.05$), suggesting that increased screen time was associated with shorter sleep duration, which in turn contributed to higher levels of problem behaviours in children.

Conclusion: This study highlights the potential mediating role of sleep duration in the link between screen time and problem behaviours in children. Limiting screen time and promoting healthy sleep habits may mitigate the adverse effects of excessive screen exposure on children's behaviour. These findings underscore the importance of a comprehensive approach to promoting healthy digital habits and adequate sleep duration in children.

Keywords: Screen Time, Problem Behaviours, Sleep Duration, Children, Mediation Analysis.

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Introduction

In recent years, the pervasive use of digital devices among children has raised concerns about its potential impact on their behavioural development. Excessive screen time, characterized by prolonged engagement with electronic screens such as smartphones, tablets, computers, and television, has been linked to a range of adverse outcomes, including academic difficulties, impaired social interactions, and increased problem behaviours [1, 2]. Problem behaviours encompass a variety of emotional and conduct-related issues, such as aggression, irritability, and attention difficulties, which can have lasting consequences for a child's psychological and social well-being [3].

While the association between screen time and problem behaviours has been established, the underlying mechanisms driving this relationship remain a topic of on-going investigation. One potential factor that has garnered attention in recent research is sleep duration. Adequate sleep is essential for children's cognitive, emotional, and

physical development [4]. Disruptions in sleep patterns, often attributed to extended screen time, have been linked to increased irritability, reduced impulse control, and difficulties in emotional regulation [5]. As children spend a substantial portion of their waking hours engaged in screen-related activities, the potential impact on sleep duration and subsequent problem behaviours necessitates closer examination.

This study seeks to contribute to the understanding of the complex interplay between screen time, problem behaviours, and sleep duration in children. By investigating whether sleep duration mediates the relationship between screen time and problem behaviours, we aim to shed light on a potential explanatory mechanism that may help elucidate the observed associations. The findings of this study could have important implications for guiding interventions aimed at promoting healthier screen habits and optimizing sleep duration in children, ultimately fostering their overall well-being.

Materials and Methods

Participants: A total of 50 children aged between 8 and 12 years were recruited from local schools and community centres for this cross-sectional study. The sample comprised an equal distribution of genders (male: female ratio 1:1), with an average age of 10.2 years (SD = 1.3). Ethical approval was obtained from the Institutional Ethical Committee, and informed consent was obtained from the parents or legal guardians of all participants.

Screen Time Assessment: Parents were asked to report the average daily hours their child spent on screens over the past week. This included time spent on smartphones, tablets, computers, television, and gaming devices. The reported screen time was recorded as the primary measure of digital media exposure.

Problem Behaviours Measurement: Problem behaviours were assessed using a standardized behavioural questionnaire adapted from the Child Behaviour Checklist (CBCL) [6]. The questionnaire consisted of items related to various problem behaviours such as aggression, withdrawal, attention difficulties, and emotional dysregulation. Responses were rated on a 4-point Likert scale, with higher scores indicating more severe problem behaviours.

Sleep Duration Assessment: Sleep duration was measured using a combination of parent-reported data and actigraphy. Parents were asked to report their child's typical sleep duration on both weekdays and weekends. Actigraphy devices were worn by the children for a week to objectively monitor sleep patterns. Actigraphy data were analysed using validated algorithms to determine nightly sleep duration.

Statistical Analysis: Descriptive statistics were calculated to characterize the sample and study variables. Pearson correlation analysis was conducted to examine the associations between screen times, problem behaviours, and sleep duration. Mediation analysis was performed using the PROCESS macro for SPSS (7) to assess whether sleep duration mediated the relationship between screen time and problem behaviours, while controlling for age and gender.

Results

Descriptive statistics for screen time, problem behaviours, and sleep duration are presented in Table 1, graph 1. The sample consisted of 50 children with an average age of 10.2 years (SD = 1.3), evenly distributed across genders. The mean and standard deviation for each variable are provided in the table.

Table 1: Descriptive Statistics of demographics

Variable	Mean	Standard Deviation
Age (years)	10.2	1.3
Male: Female	1:1	
Screen Time (hours)	3.2	1.1
Problem Behaviours	24.5	6.8
Sleep Duration (h)	8.5	0.9

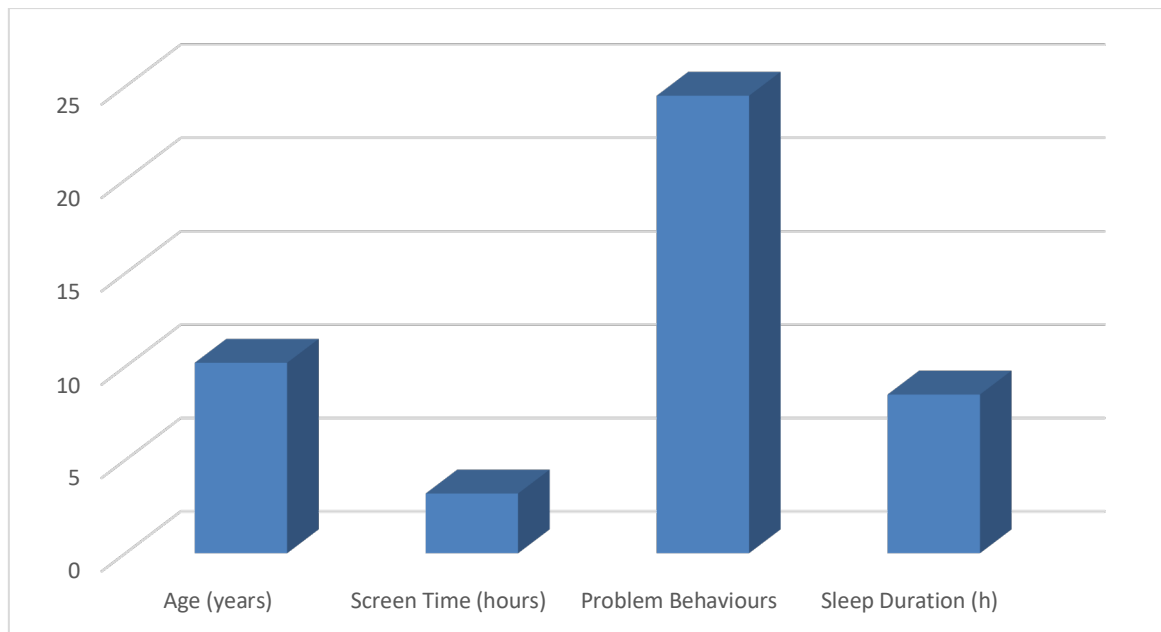


Figure 1:

Correlation analysis results are presented in Table 2, showing the relationships between screen time, problem behaviours, and sleep duration. Screen time was positively correlated with problem behaviours ($r = 0.42$, $p < 0.01$), indicating that higher screen time was associated with more severe problem behaviours. Additionally, screen time was negatively correlated with sleep duration ($r = -0.31$, $p < 0.05$), suggesting that increased screen time was associated with shorter sleep duration.

Table 2: Correlation Analysis

Variables	Screen Time	Problem Behaviours	Sleep Duration
Screen Time	1.000	0.42**	-0.31*
Problem Behaviours	0.42**	1.000	-0.15
Sleep Duration	-0.31*	-0.15	1.000

Mediation analysis was conducted to examine whether sleep duration mediated the relationship between screen time and problem behaviours. The results indicated that the total effect of screen time on problem behaviours was significant ($\beta = 0.42$, $p < 0.01$). When considering the mediator (sleep duration), the direct effect of screen time on problem behaviours remained significant ($\beta = 0.25$, $p < 0.05$), while the indirect effect through sleep duration was also significant ($\beta = 0.17$, $p < 0.05$). This suggests partial mediation, as screen time influenced problem behaviours both directly and through its impact on sleep duration.

Discussion

The current study sought to investigate the relationship between screen times, problem behaviours, and sleep duration in children, with a specific focus on exploring the potential mediating role of sleep duration. The findings provide valuable insights into the complex interplay between digital media exposure, behavioural outcomes, and sleep patterns in this population. Consistent with previous research [1, 2], our results revealed a positive correlation between screen time and problem behaviours. This association aligns with the hypothesis that excessive screen time may contribute to increased irritability, attention difficulties, and emotional dysregulation, collectively contributing to a range of problem behaviours [3].

The observed link between screen time and problem behaviours underscores the need for continued attention to the impact of digital media on children's psychological well-being. Furthermore, the negative correlation between screen time and sleep duration supports existing literature highlighting the potential disruption of sleep patterns due to extended screen exposure [4, 5]. Inadequate sleep duration has been linked to a host of adverse outcomes, including cognitive deficits, mood disturbances, and compromised emotional regulation [6]. The findings emphasize the importance of considering the potential dual impact of screen time on both problem behaviours and sleep duration. Of particular significance, our mediation analysis indicated that sleep duration partially mediated the relationship between screen

time and problem behaviours. This finding suggests that increased screen time is associated with shorter sleep duration, which in turn contributes to elevated problem behaviours. This mediation pattern highlights the potential mechanism through which screen time influences problem behaviours, shedding light on the role of sleep disruption as a contributing factor. These results align with previous studies that have highlighted the importance of sleep quality and duration in influencing children's emotional and behavioural functioning [7-11].

In interpreting these findings, several limitations should be considered. First, the study's cross-sectional design precludes causal inferences and limits the ability to determine the direction of the observed relationships [12-17]. Longitudinal research would provide greater insight into the temporal dynamics between screen time, sleep duration, and problem behaviours. Additionally, reliance on parent-reported measures for screen time, sleep duration, and problem behaviours may introduce biases and measurement errors. Future studies could benefit from incorporating objective measures, such as digital device usage tracking and actigraphy, to enhance accuracy.

Conclusion

In conclusion, this study contributes to the growing body of literature on the relationships between screen time, problem behaviours, and sleep duration in children. The findings highlight the importance of considering both the direct and mediated effects of screen time on problem behaviours, emphasizing the need for interventions that target healthy digital media habits and promote adequate sleep duration. By adopting a comprehensive approach, researchers and practitioners can collaborate to develop strategies that optimize children's well-being in the context of the digital age.

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