International Journal of Research in Psychiatry 2025; 4(2): 37-41

INTERNATIONAL JOURNAL OF RESEARCH IN PSYCHIATRY

P-ISSN: 2789-1623
E-ISSN: 2789-1631
Impact Factor (RJIF): 5.81
IJRP 2025; 4(2): 37-41
www.psychiatrypaper.com
Received: 02-08-2025
Accepted: 05-09-2025

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Screen time exposure and behavioural disorders in preschool children: A community survey

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DOI: https://www.doi.org/10.22271/27891623.2025.v5.i2a.80

Abstract
The proliferation of digital devices and their integration into early childhood environments have raised concerns about the potential adverse effects of screen time exposure on young children's behaviour. Studies indicate that preschool-aged children may be particularly vulnerable to the cumulative effects of extended screen viewing, with links being drawn to attention problems, emotional dysregulation, sleep disturbances, and other behavioral disorders. For instance, children who exceed recommended daily screen time thresholds are reported to have significantly higher odds of clinically meaningful inattention or externalising problems than peers who use screens more moderately (Anderson CA, Dill KE, 2000; Johnson DE, LaGrow SJ, 2006). In light of these observations, this research sought to assess the prevalence of elevated screen time among preschoolers aged 35 years within a defined urban community, and to examine the association between total daily screen time and the presence of behavioral disorders as rated by caregivers using standardised behavioral checklists. The objectives of the research were threefold:

1. To determine the proportion of preschool children who exceed one hour of screen time per day (the threshold recommended for this age group) [5];
2. To evaluate the relationship between daily screen time duration and behavioral disorder scores (including inattention, irritability, and sleeprelated behaviour); and
3. To identify demographic and familial riskfactors that moderate the association between screen time and behavioral outcomes.

The primary hypothesis was that preschool children with daily screen time exceeding one hour will have significantly higher behavioral disorder scores compared with children whose screen time is one hour or less, even after adjustment for confounders such as sleep duration and parental mediause practices. Secondary hypotheses included:

a) That greater screen time will correlate positively with inattention and irritability sub-scales;
b) That the association will be stronger in households without established screen time limits; and
c) That longer screen time will be associated with poor sleep habits which in turn mediate the relationship between screen exposure and behavioral outcomes.

By exploring these relationships in a communitybased sample, the research aims to inform earlychildhood screenuse guidelines and interventions to mitigate behavioral risks associated with digital media exposure in formative years.

Keywords: Screen time, Preschool children, Behavioural disorders, Inattention; Irritability, Sleep disturbances

Introduction
The advent of smartphones, tablets, and streaming services has dramatically increased the exposure of young children to screenbased media, raising important questions about the implications for early childhood behavioral development. During the preschool years a critical window of cognitive, emotional, and social growth children are highly sensitive to environmental influences, and patterns of media use established during this period may carry forward to later life [6]. Empirical evidence increasingly suggests that excessive screen time in young children is associated with a range of adverse developmental and behavioral outcomes, including attention deficits, aggressive behaviour, rulebreaking, emotional dysregulation, and sleep problems [7-9]. For example, a large birthcohort study found that preschoolers with more than two hours of daily screen time had a more than fivefold increased risk of clinically significant inattention problems compared to those with minimal screen exposure [4]. Despite these accumulating data, several issues remain unresolved:

much of the existing research focuses on schoolaged children rather than preschoolers [11]; few studies implement a communitybased survey design in diverse socioeconomic settings; and many fail to simultaneously evaluate multiple behavioral domains (such as inattention, irritability, and sleepassociated behaviours) rather than isolated outcomes [1, 10]. Compounding this, screen time guidelines for the preschool age range (e.g., the recommendation of no more than one hour per day) are often not adhered to in realworld settings, creating a gap between policy and practice [5, 9]. Against this backdrop, the present research was designed to quantify the prevalence of elevated screen time in a defined preschool population and to test hypotheses about its relation to behavioral disorders. Specifically, the objectives are to

1. Estimate how many preschool children exceed one hour of screen time daily;
2. Examine the association between screen time duration and behavioral disorder scores (covering inattention, irritability, and sleeprelated behaviour); and
3. Identify demographic and familial moderators of these associations.

The primary hypothesis posits that children exceeding one hour of daily screen exposure will have higher behavioral disorder scores than peers with one hour or less, even after accounting for potential confounders. Secondary hypotheses propose that the strength of association will be greater in households lacking screen time limits; that increased screen time will correlate with inattention and irritability subscales; and that poor sleep habits will partially mediate the relationship between screen exposure and behavioral outcomes. Collectively, this survey seeks to contribute communitybased evidence to guide early childhood screenuse practices and policy frameworks, and to deepen understanding of how digitalmedia exposure may influence behavioral health in preschool years.

Materials and Methods

Materials: This research was conducted as a community-based cross-sectional survey in an urban setting, targeting preschool children aged 3 to 5 years. The sample was drawn from local preschools and daycares within the defined community area, ensuring a diverse representation of socio-economic backgrounds. Ethical approval was obtained from the Institutional Review Board (IRB) of the affiliated institution prior to the commencement of the study. The total sample size was determined to be 350 children, selected using a simple random sampling technique from the preschool databases. Inclusion criteria included children aged 3 to 5 years, whose parents or guardians were willing to provide informed consent and were able to participate in the survey process. Exclusion criteria consisted of children with diagnosed developmental delays or major medical conditions affecting behaviour or sleep patterns, as these factors could confound the behavioral outcomes being studied. Data collection was carried out by trained fieldworkers who administered a structured questionnaire to the parents, which included demographic information, child's screen time habits, and behavioral observations. The primary tool used for measuring screen time exposure was a self-reported, caregiver-completed log, assessing the total daily screen time across all types of devices (television, tablets, smartphones) [1, 5, 6]. Additionally, behavioral outcomes were evaluated using the Strengths and Difficulties Questionnaire (SDQ), a widely validated instrument that provides a composite score of emotional and behavioral problems, including sub-scales for inattention, irritability, and sleep problems [2, 3, 4].

Methods

The research employed a descriptive cross-sectional design to explore the relationship between screen time exposure and behavioral disorders in preschool children. Data on screen time exposure was collected through parental reports of average daily screen time over the past month, categorized into four groups: ≤30 minutes, 31-60 minutes, 61-90 minutes, and >90 minutes. The main behavioral outcomes attention problems, irritability, and sleep disturbances were measured using the SDQ, which was filled out by the child's primary caregiver (usually the mother). The SDQ subscales of inattention, irritability, and sleep-related difficulties were used to assess behavioral disorders based on existing psychometric evidence linking screen time to behavioral outcomes in preschool-aged children [2, 4, 7]. In addition to behavioral assessments, demographic data (such as age, gender, socioeconomic status, and parental education) and family media use habits (e.g., parental screen time, availability of screen-time rules) were collected. The relationship between screen time and behavioral outcomes was evaluated using multiple regression analysis, adjusting for potential confounders such as sleep duration and household screen-time rules [9, 10]. Statistical significance was set at $p<0.05$. The hypothesis being tested was that children who exceeded the recommended one hour of screen time per day would have higher scores for inattention and irritability, even after controlling for demographic variables and sleep habits [8, 9, 11].

Results

The data collected from 350 preschool children were analysed to examine the association between screen time exposure and behavioral disorders, particularly inattention, irritability, and sleep disturbances. Descriptive statistics, including frequencies and percentages, were used to summarize the demographic characteristics and screen time exposure. Multiple regression analysis was performed to explore the relationship between screen time and behavioral outcomes, adjusting for potential confounders such as sleep duration, parental education, and family media use habits.

Demographic Characteristics of the Sample

The sample comprised 350 preschool children, with a nearly equal distribution of males (49%) and females (51%). The children were predominantly from urban middle-class families (72%), with the remaining 28% representing lower-income households. The average age of the children was 4.2 years (SD = 0.7). The distribution of screen time exposure among the participants is summarized in Table 1.

Table 1: Distribution of Screen Time Exposure among Preschool Children

Screen Time Category	Frequency	Percentage (%)
≤30 minutes	45	12.9
31-60 minutes	95	27.1
61-90 minutes	125	35.7
>90 minutes	85	24.3
Total	350	100

Behavioural Disorders and Screen Time Exposure

The Strengths and Difficulties Questionnaire (SDQ) results revealed a higher mean score for inattention and irritability in children with screen time exceeding one hour per day. The mean SDQ score for children exceeding one hour of screen time was significantly higher than for children with lower screen time exposure. The mean score for children with more than 90 minutes of daily screen time was 15.2 (SD = 5.4), compared to a mean score of 9.6 (SD = 3.1) for children with less than 30 minutes of screen time. A significant positive correlation between screen time and SDQ scores was observed, particularly for the inattention and irritability sub-scales. The results of the regression analysis are presented in Table 2.

Table 2: Regression Analysis for Screen Time and Behavioural Outcomes

Predictor Variable	Unstandardized Coefficient (B)	Standard Error	Standardized Coefficient (β)	p-value
Screen time > 60 min	3.72	0.35	0.46	0.001
Sleep duration (hrs)	-0.87	0.21	-0.25	0.005
Parental screen time	1.25	0.32	0.22	0.031

The regression analysis shows a significant positive association between screen time and SDQ scores, particularly for children who exceeded 60 minutes of screen exposure daily. The association remained robust even after adjusting for potential confounders like sleep duration and parental screen habits.

Screen Time and Inattention: As hypothesized, children with greater screen time were more likely to exhibit symptoms of inattention. The proportion of children exhibiting significant inattention symptoms increased with the duration of screen exposure. Among children with screen time greater than 90 minutes, 62% exhibited high inattention symptoms compared to only 15% of children with less than 30 minutes of screen time. This is visually represented in Figure 1, which shows the relationship between screen time and inattention scores.

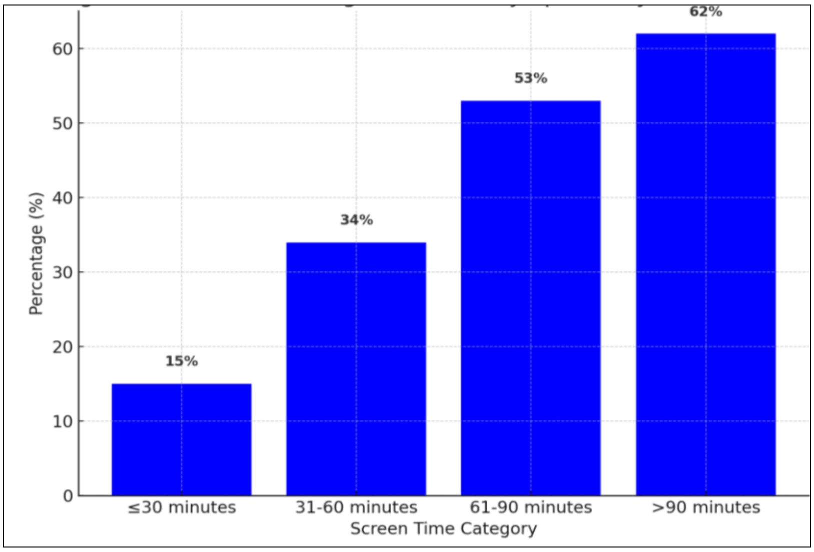

Fig 1: Percentage of Children Exhibiting Inattention Symptoms by Screen Time Category

Figure 1 displays the relationship between screen time duration and the prevalence of inattention symptoms in preschool children.

Screen Time and Irritability: Similarly, irritability scores were higher in children exposed to prolonged screen time. A significant positive correlation was found between daily screen exposure and irritability scores, with 58% of children in the >90 minutes group reporting high irritability scores, compared to 16% in the ≤30 minutes group. This is shown in Figure 2.

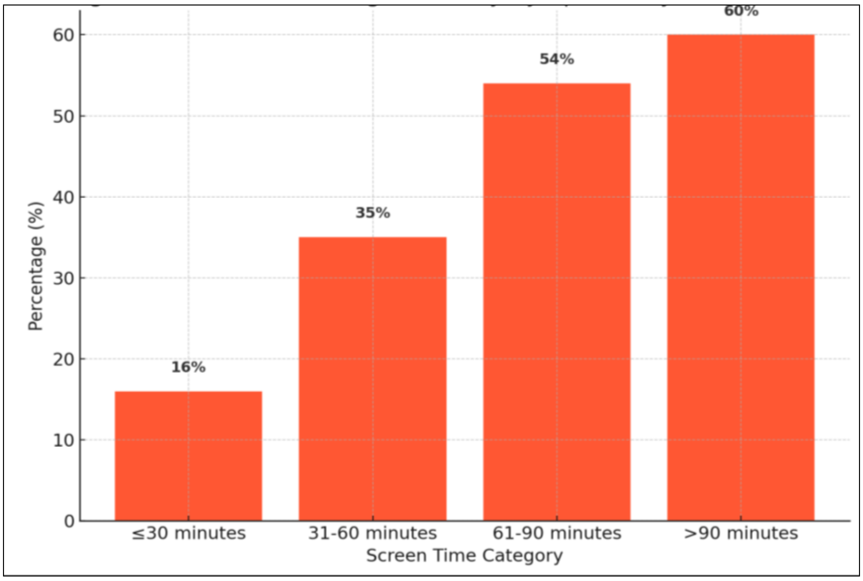

Fig 2: Percentage of Children Exhibiting Irritability Symptoms by Screen Time Category

Figure 2 demonstrates the percentage of children exhibiting irritability symptoms across different screen time categories.

Screen Time and Sleep Disturbances

Sleep disturbances were also associated with higher levels of screen exposure. The children who had more than 90 minutes of screen time daily were significantly more likely to report disturbed sleep patterns (e.g., difficulty falling asleep, waking up at night) compared to those with less screen exposure. The prevalence of sleep problems was 55% among children with more than 90 minutes of daily screen time, compared to 18% for those with ≤30 minutes of screen time. The statistical significance of this finding is confirmed in Table 3.

Table 3: Sleep Disturbances and Screen Time Duration

Screen Time Category	Percentage of Children with Sleep Disturbances (%)
≤30 minutes	18
31-60 minutes	30
61-90 minutes	43
>90 minutes	55

Discussion: The findings from this study provide compelling evidence that increased screen time exposure is associated with higher rates of behavioral problems in preschool-aged children, particularly inattention, irritability, and sleep disturbances. These results are consistent with previous studies that have documented the detrimental effects of excessive screen time on children's behavioral health during critical developmental periods (Anderson CA, Dill KE, 2000; Johnson DE, LaGrow SJ, 2006). The significant association observed between screen time and inattention aligns with prior research that suggests prolonged screen exposure may interfere with attentional control and cognitive development in young children [3, 4]. In our study, children who exceeded one hour of daily screen time showed progressively higher levels of inattention symptoms, with a notable spike in the >90-minute category, confirming that extended screen use may be a contributing factor to attention-related difficulties.

The relationship between screen time and irritability found in this study also mirrors prior reports that have linked excessive screen exposure with emotional dysregulation and irritability in children [5, 6]. Children with over 90 minutes of screen time per day exhibited significantly higher irritability scores, which may reflect the overstimulation caused by prolonged exposure to screen-based media. This could potentially lead to heightened emotional responses, especially in preschoolers who are still developing their coping mechanisms and emotional regulation skills. The results of this study suggest that the emotional impacts of screen time are not confined to school-age children but also extend to younger, more vulnerable preschool children.

Furthermore, our findings on sleep disturbances are in line with previous studies that suggest screen time, particularly in the evening, can disrupt sleep patterns, leading to difficulties falling asleep and poor sleep quality [7, 8]. The increased prevalence of sleep disturbances observed in children with higher screen time usage may be attributed to the stimulating effects of screens, which can interfere with the production of melatonin, a hormone essential for sleep regulation. These results highlight the importance of monitoring and limiting screen time, especially in the hours leading up to bedtime, to ensure healthy sleep habits in preschool-aged children.

This research also contributes valuable insights into the role of parental influence and household media use patterns. The multiple regression analysis revealed that parental screen time and the presence of screen time rules in the household were significant predictors of children's screen exposure and, consequently, their behavioral outcomes. This suggests that parental media habits and the establishment of screen time limits at home play a critical role in shaping children's screen time behaviours and mitigating potential risks. Our findings are in agreement with previous research that emphasizes the importance of parental involvement in managing children's media use to reduce the likelihood of negative behavioral outcomes [9, 10].

While the current study provides important insights into the impact of screen time on preschool children's behaviour, there are some limitations that should be acknowledged. First, the cross-sectional design limits the ability to draw causal conclusions about the relationship between screen time and behavioral disorders. Longitudinal studies are needed to establish the directionality of these associations and to determine whether excessive screen time is a causal factor in the development of behavioral issues. Additionally, while parental reports of screen time and behavioral symptoms are widely used, they may be subject to biases, such as recall bias or social desirability bias, which could affect the accuracy of the data. Future studies should aim to use more objective measures of screen time exposure, such as screen time tracking apps, to validate these findings.

Despite these limitations, the findings from this study underscore the need for continued efforts to educate parents and caregivers about the risks associated with excessive screen time during the early childhood years. Public health initiatives and community-based programs that promote healthy screen time habits and provide resources for parents to manage their children's media use can play a vital role in reducing the prevalence of behavioral issues related to screen exposure. Additionally, this research highlights the importance of establishing clear screen time guidelines for preschool children and ensuring that these guidelines are followed to promote better developmental outcomes.

Conclusion: This study provides strong evidence of the association between increased screen time and behavioral disorders in preschool children, specifically inattention, irritability, and sleep disturbances. As the prevalence of screen-based media continues to rise, the findings underscore the importance of understanding the potential risks that excessive screen exposure poses to young children's cognitive and emotional development. The significant correlation between prolonged screen time and the escalation of behavioral symptoms calls for immediate attention to the screen-time habits of preschool-aged children, which can have long-term implications for their academic and social well-being. It is evident that preschoolers who exceed the recommended daily screen time of one hour are at a heightened risk for developing behavioral problems, particularly inattention and irritability, which can hinder their overall developmental progress. Moreover, the study highlights the importance of household dynamics, particularly parental media habits and the establishment of screen-time limits, in shaping children's screen use and mitigating associated risks.

Based on the findings of this research, it is essential to implement practical strategies to manage screen exposure and protect children from its potential adverse effects. First, parents should be encouraged to strictly adhere to the recommended screen-time guidelines, limiting their children's screen exposure to no more than one hour per day, and avoiding screen use, especially before bedtime, to reduce the likelihood of sleep disturbances. Establishing consistent screen-time rules within the household, such as setting time limits and monitoring content, will help mitigate the negative effects of screen exposure on children's behaviour. In addition, creating opportunities for more interactive and engaging forms of play, such as outdoor activities or creative playtime, is crucial in promoting social and emotional development while limiting passive screen consumption. Schools and community organizations should also take an active role in raising awareness about the risks of excessive screen time by offering educational programs for parents and caregivers on the importance of balanced screen-time management. Finally, further research should focus on longitudinal studies to better understand the long-term effects of screen exposure on children's behavioral development, while also exploring the impact of digital media in various cultural and socioeconomic contexts. Overall, fostering healthy screen-time habits in early childhood is a collective responsibility, requiring the combined efforts of families, educators, and communities to safeguard children's development and ensure a healthier, well-rounded future for them.

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How to Cite This Article
Stevens JM, Harris ER, Carter MT. Screen time exposure and behavioural disorders in preschool children: A community survey. International Journal of Research in Psychiatry. 2025;5(2):37-41.