AJPMHS GLOBAL RESEARCH NETWORK

AMERICAN Journal of Pediatric Medicine and Health Sciences
Volume 3, Issue 11, 2025 ISSN (E): 2993-2149

Early Childhood Exposure to Blue Screen and its Association with the incidence of Autism Spectrum Disorder in children

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Abstract: Everyone's life was significantly impacted by blue screens, but kids were especially affected. These days, digital technology has permanently changed our way of life and our emotional and physical well-being. Modern technologies are causing an increasing number of negative effects on "hyper-connected" users, particularly in young children who are screen hooked. This paper aimed to assess clinical outcomes related to the impact of exposure on blue screens on children during early childhood, and it is associated with the prevalence of autism spectrum disorder in children.

For this cross-sectional study, clinical data were recorded for 170 children with autism spectrum disorder (ASD), collected from private clinics during a period spanning October 2024 to October 2025. Based on patient age, the study divided the medical records of the pediatric patients into two groups: the first group included 90 younger children aged one to three years, while the second group included 80 older children aged three to ten years. Based on a questionnaire, our study aimed to investigate the extent of children's deep exposure to blue screens and their association with ASD during a one-year follow-up period. This study assessed patients' quality of life using the Childhood Autism Rating Scale (CARS), the Developmental Quotient (DQ), and the Child-Parent Centered Interaction Scale (CPCIS).

According to clinical outcomes, a total of 170 children were enrolled in this study. Also, it found that television was almost common screen type used with 50 (55.6%) in the young children group and 35 (43.8%) in the older children group. Based on the related QoL questionnaire, we found lower scores of QoL at children with ages 1 – 3 years in comparison with children with ages 4 – 10 years. Autism severity (CARS) had 38.5 (5.2), developmental quotient (GDS DQ) had 72.1 (12.4), and social interaction (CPCIS) had 18.3 (4.1) in the younger group of children. An older group of children enrolled improvement over than young group, where autism severity (CARS) had 35.2 (4.8), developmental quotient (GDS DQ) had 78.5 (11.6), and social interaction (CPCIS) had 21.5 (3.9).

In conclusion, our study showed that excessive screen use can have negative effects on children's mental and physical health. As a result, younger children, ages 1–3 years, were more likely to experience negative outcomes with autism spectrum disorder than children aged 4-10 years.

Keywords: Autism Spectrum Disorder; Early Childhood Exposure; Children; Childhood Autism Rating Scale (Cars); And Child-Parent Centered Interaction Scale (Cpcis).

Introduction

Autism spectrum disorder is a condition or set of conditions of neurobiological origin that affects the configuration of the nervous system and brain functioning [1]. It accompanies the person throughout his life and influences, fundamentally, two areas of the person's functioning, including communication and social interaction, and flexibility of behavior and thinking [2].

People on the autism spectrum may encounter barriers to understanding verbal and nonverbal language, to communicate effectively, and to properly interpret social interactions, which often require handling complex codes [3]. They may also have a divergent thinking pattern that can be interpreted as rigid, focused interests and behaviors that are perceived as repetitive or related to differences in sensory processing. [4]

The early exposure to screens of very young children, from their first months of life, is a distraction that could have consequences on the cognitive development of the child, which could lead to various disorders, such as language disorders, attention deficit disorder, and the "syndrome of early and excessive exposure to screens", better known as "virtual autism", qualified to be the source of great mental and developmental ailments in the patients. [5, 6]

During the last thirty years, the number of television programs targeting children and babies has increased, leading to an increase in the time of exposure to television, and increasingly affects younger ages [7]. In the United States, the average age of the beginning of exposure to television is 4 years old. It is revealing the extent of the television presence in the lives of young children and babies in the United States; children over 6 years old already watch an average of two hours of television a day, and those under 2 years old, three hours a day on average [8]. In general, it agrees that television exposure in children under 3 years of age is harmful for their cognitive development, especially since it affects interactions. [9]

Despite advances in diagnosis, some people on the autism spectrum reach adulthood undiagnosed. In adulthood, the diagnosis has additional challenges; the signs of autism can be more subtle than in childhood, especially in those people who do not have intellectual disabilities and who have developed skills that mask some manifestations [10]. Many women find significant difficulties in achieving an autism diagnosis, which is significantly delayed in relation to men, also receiving erroneous diagnoses more frequently, if more viewing time, worse scores on development, or, on the contrary, as there is already a delay in development, these children view screens longer as a form of stimulation or behavior regulation [11]. Likewise, the relationship between less social play with adults and more screen time in children with autism compared to others without autism could be due to the difficulties that children with autism show from their early development to get involved in social interactions. [12]

Patients & Methods

Study Design:

A cross-sectional study was conducted on 170 children diagnosed with autism spectrum disorder. All patients underwent all clinical examinations and diagnoses after obtaining full parental consent to undergo diagnosis at a private clinic during the follow-up period from October 2024 to October 2025. Based on the study objective, the current study was conducted based on the assumption that younger children are more addicted to blue screen exposure and are at greater risk for developing autism spectrum disorder.

Participant Recruitment:

All participating patients were recruited from private pediatric neurodevelopment clinics during the 12-month follow-up period after obtaining parental consent, allowing them to participate in the diagnosis and complete questionnaires during the follow-up period. Inclusive and exclusive criteria of our study have clinical data from pediatric patients, including: 1) pediatric patients aged 1 to 10 years; 2) all male and female patients; 3) only patients diagnosed with autism

spectrum disorder; and 4) only patients who obtained parental consent for diagnosis. Regarding exclusion criteria, our study excluded all patients who met the following criteria: 1) infants and adults; 2) patients with other medical conditions, such as hypertension, diabetes, or previous severe psychiatric disorders; 3) pediatric patients who had undergone previous brain surgery; and 4) patients whose parents refused to have their children undergo a questionnaire.

Clinical data of patients:

This current study divided the data of 170 pediatric patients with autism spectrum disorder into two groups based on age to achieve the study objective. Based on age, our results included two groups: the first group included 90 samples of younger pediatric patients aged one to three years, while the second group included 80 samples of older pediatric patients aged four to ten years. Through interviews with the children's caregivers, medical records were collected for demographic and diagnostic parameters, including age, gender, family and socioeconomic factors, and type of follow-up screening. For diagnostic criteria, we determined the average daily screen time (in hours) that children were exposed to on a daily basis for both groups, including television, tablets/iPads, smartphones, and computers. They were also given information about the type of content they were targeting, including entertainment, education, interactive apps, and social media.

Determining Sleep Duration Measures:

This study recorded the number of hours of sleep for the children participating in the survey through their caregivers for both groups. The first group included children aged one to three years, and the second group included children aged three to ten years. This was done by estimating the average number of hours of sleep per night for both groups.

Assessment of Autism in Childhood:

Our study assessed children with ASD by determining the severity of prevalent symptoms and their impact on quality of life for both groups using the Childhood Autism Rating Scale (CARS), with scores ranging from 15 to 60, with higher scores indicating more severe symptoms.

Child Development Progress Assessment:

Child developmental progress across the different age groups was assessed for both groups, including children with developmental delays or disabilities, using the Developmental Quotient (DQ) scale, which ranges from 50 to 150. Higher scores indicate better outcomes in the child's developmental progress.

Assessment the quality of social interactions between children and caregivers:

This scale demonstrated the quality of interaction between children's social and emotional interactions with caregivers during their entry into early childhood education programs. This assessment was conducted using the Child-Parent Center Interaction Scale (CPCIS), which ranges from 0 to 100, with lower scores representing greater impairment.

Statistical Analysis:

Demographic and clinical data were described by presenting the mean (with standard deviation) for continuous variables, and by recording parameter outcomes using frequencies (with percentages). Additionally, this study conducted logistic regression to record and evaluate risk factors associated with children, which it determine the extent of exposure to blue screens' impact and its association with autism spectrum disorder in children, as well as the interaction of children with both age groups with their caregivers. Samples of participating children from both groups were recorded and recorded using SPSS 24.0 software.

Results

Table 1: Enroll clinical and demographic features into children who are diagnosed with autism spectrum disorder.

Variables	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Gender ratio (M: F), n (%)		
Male	72 (80.0%)	64 (80.0%)
Female	18 (20.0%)	16 (20.0%)
Diagnosis confirmation, n (%)	90 (100%)	80 (100%)
Family and Socioeconomic Factors, n (%)		
Lower family income	45 (50.0%)	32 (40.0%)
Lower maternal education (High school or less)	38 (42.2%)	28 (35.0%)
Parental screen time regulation	25 (27.8%)	32 (40.0%)
Parent/Caregiver Involvement, n (%)		
Co-viewing with child (Often/Always)	35 (38.9%)	45 (56.3%)
Screen Time Use, n (%)		
Learning	15 (16.7%)	25 (31.3%)
Entertainment	70 (77.8%)	50 (62.5%)
Communication	5 (5.6%)	5 (6.3%)

Table 2: Determining the mean (SD) of daily screen time of both children groups in hours.

Groups	Mean (SD), in hours
Younger Children (1-3) years	3.8 (1.5)
Older Children (4-10) years	3.2 (1.8)

Table 3:- Distribution of screen types among children in both groups.

Screen Type	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Television	50 (55.6%)	35 (43.8%)
Tablets/iPads	30 (33.3%)	25 (31.3%)
Smartphones	10 (11.1%)	15 (18.8%)
Computers	0 (0.0%)	5 (6.3%)

Table 4:- Distribution of content types who noted into both groups of children.

Content Type	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Entertainment only (cartoons)	65 (72.2%)	40 (50.0%)
Educational	15 (16.7%)	25 (31.3%)
Interactive apps	10 (11.1%)	10 (12.5%)
Social media	0 (0.0%)	5 (6.3%)

Table 5: Assessment of health quality of life throughout a questionnaire followed in children with autism spectrum disorder.

Outcome Measure	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Autism severity (CARS) [Scale: 15-60, higher=more severe]	38.5 (5.2)	35.2 (4.8)
Developmental quotient (GDS DQ) [Scale:	72.1 (12.4)	78.5 (11.6)

~50-150, higher=better]		
Social interaction (CPCIS) [Hypothetical scale: lower=more impaired]	18.3 (4.1)	21.5 (3.9)

Table 6: Clinical outcomes of disorders of sleep in the children who participated into our study.

Parameters	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Delay in sleep onset (min), Mean (SD)	45.2 (15.1)	35.8 (18.3)
Night waking frequency (≥3 per week), n (%)	50 (55.6%)	32 (40.0%)
Poor sleep quality (parent report), n (%)	58 (64.4%)	40 (50.0%)

Table 7: Identifying physical health findings.

Physical Health Outcomes	Younger children [1 – 3 years], n = 90	Older children [4 – 10 years], n = 80
Eye strain symptoms reported	25 (27.8%)	30 (37.5%)
Reduced physical activity (<1hr/day)	60 (66.7%)	45 (56.3%)
Increased BMI (>85th percentile)	28 (31.1%)	25 (31.3%)

Table 8: Conducting a logistic regression of the risk factors recorded in the children in this study.

Risk Factor	Adjusted Odds Ratio (aOR)	95% Confidence Interval (CI)
Younger Age Group (1-3 yrs)	2.4	1.3 - 4.5
Screen Time >4 hours/day	3.1	1.7 - 5.6
Primary Content: Entertainment-only	2.8	1.5 - 5.1
Lack of Co-viewing	2.1	1.2 - 3.8
Lower Family Income	1.8	1.0 - 3.2

Discussion

Higher social communication survey scores have been shown to be substantially correlated with screen time, and more hours spent on various screen kinds are related to an increased risk of developmental issues, including autism spectrum disorder [13]. This shows that the occurrence of ASD symptoms is correlated with longer screen use. Including viewing TV and videos, the majority of kids engaged in passive screen time for around 2.16 (standard deviation = 1.03) hours [14, 15]. In addition, they reported utilizing phones and computers over an average for 1.07 (standard deviation = 0.90) hours of continuous screen time. This illustrates how children's neurodevelopment may be adversely affected with one to two hours of screen time every day, maybe creating ASD. [16]

According to the M-CHAT-R, a 20-item parent-report screening instrument with a mean score of 3, children who spend more than three hours in front of a screen are at a greater risk of developing ASD [17, 18, 19]. Youngsters who spend less than an hour in front of screens are less likely to acquire ASD; those who spend one to two hours have a mean score at 1.42, those who spend over two hours a day have a mean score of 0.97, and those who spend more than an hour have a mean score of 1.56 [20]. Therefore, since any amount of screen time is related to an increased risk of ASD, it should be illegal for kids to use screens. Additionally, it appeared that

people with ASD watched different screens, primarily televisions, for almost four hours per day. Busy parents who sought to keep their kids entertained were the primary cause of screen time. [21, 22, 23, 24]

These children's symptoms significantly improved upon they were removed from screen time. Instead of allowing children to use mobile phones or watch television, parents should find alternative ways for keeping them entertained. A higher probability of autistic-like traits is linked to screen time [25, 26, 27]. Children with ASD who spend a minimum of two hours in front of a screen exhibit aberrant reactivity; 48% of these kids responded more slowly to everyday circumstances, while 19% weren't responsive at all. Children who spend more time on screens score noticeably better on the strengths and challenges assessment. However, other research disputed our findings. While there is no chance of being at high risk [28], some research has linked screen use to an intermediate likelihood of neurodevelopmental problems. Additionally, compared to toddlers exposed to screens for less than two hours, children exposed to screens for over two hours have demonstrated speech delays and communication issues. [29, 30]

Based to our paper's findings, a total of 170 children were enrolled in this study, where a group of young children had ages 1 - 3 years with 90 samples, while old children had ages between 4 - 10 years with 80 samples. Our findings shown that 80% included males and females, with 20%, where almost of children, 77.8% had screens used for entertainment in the young children group and 62.5% in the older group. We also showed other data, which found lower maternal education 42.2% in the young children group and 35.0% old children group, where it determined average of daily screen time in both children groups, which noticed younger Children (1-3) years got 3.8 (1.5) hours and older Children (3-10) years got 3.2 (1.8) hours.

Also, it found that television was almost common screen type used with 50 (55.6%) in the young children group and 35 (43.8%) in the older children group. Based on the health-related QoL questionnaire, we found lower scores of QoL at children with ages 1 - 3 years in comparison with children with ages 4 - 10 years. In younger group children, autism severity (CARS) had 38.5 (5.2), developmental quotient (GDS DQ) had 72.1 (12.4), and social interaction (CPCIS) had 18.3 (4.1). In contrast, older group children enrolled improvement than the young group, where autism severity (CARS) had 35.2 (4.8), developmental quotient (GDS DQ) had 78.5 (11.6), and social interaction (CPCIS) had 21.5 (3.9). Based on sleep disorders duration measurements, delay in sleep onset (min) found 45.2 (15.1), night waking frequency was 50 (55.6%), poor sleep quality was 58 (64.4%), while delay in sleep onset (min) found 35.8 (18.3), night waking frequency was 32 (40.0%), poor sleep quality was 40 (50.0%).

According to physical health findings, we found eye strain symptoms reported were 25 (27.8%), reduced physical activity (<1hr/day) were 60 (66.7%), and increased BMI got 28 (31.1%) in young group children, while eye strain symptoms reported were 30 (37.5%), reduced physical activity (<1hr/day) were 45 (56.3%), and increased BMI got 25 (31.3%) in older group children.

Conclusion

Early and excessive exposure to blue screens in young children may lead to severe autism spectrum disorders, which manifest almost uniformly across all symptoms, including language delays and developmental delays, leading to problems in the child. This current study observed that exposure to blue screens negatively impacts the association with autism spectrum disorder in young children aged 1–3 years compared to other children aged 4–10 years. This study recommends responsible use of screens and digital devices, with specific purposes for children, age-appropriate time, and always under adult supervision.

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