

Association Between Daily Screen Time Duration and Developmental Milestones Achievement In Children Aged 2-5 Years and Autism-Like Symptoms in India: A Comparative Study

Ms. Yashna David¹, Dr. Shikha Srivastava²

¹PhD Scholar, Department of Psychology, School of Liberal Education, Galgotias University.

²Professor, Department of Psychology, School of Liberal Education, Galgotias University.

Abstract

The research study compared the developmental milestones of children in foundational years with excessive screen time, and their similarity with those of children diagnosed with autism. The sample consisted of 325 parents of children aged between two and six years old in India. The Child Developmental Inventory (CDI) was used to assess developmental milestones for the current study as a tool for collecting data from parents. The findings demonstrated that there was a significant difference in the developmental milestones of children with high screen time and low screen time. The study also found that a similar result was observed for children diagnosed with autism, where a significant difference in developmental milestones was observed with low and excessive use of screen time. However, in both groups, academic capabilities were not affected and showed no significant difference. The study also compared typically developing children and autistic children concluding that there was similarity in the developmental milestones of typically developing children with high screen time and autistic children with low screen time which indicated that there is a need for an in-depth study on the similarity of the developmental milestones as they may mislead clinicians towards a misdiagnosis of autism and might be leading to autism-like symptoms in typically developing children.

Keywords: developmental milestones, screen time, autism, typically developing children

1. INTRODUCTION

1.1 Developmental Milestones and Associated Factors

The early years of life, particularly the first six to eight years, are widely acknowledged as the most crucial phase for a child's long-term development. This period is characterized by exceptionally rapid developmental progress, making it foundational for future outcomes (ECCE NCERT, 2006). Early childhood, defined as the age range from birth to eight years, plays a pivotal role in shaping a child's social, emotional, cognitive, and physical capacities. During this stage, the brain exhibits a high degree of plasticity, as complex neural networks are formed through continuous interactions among genetic factors, lived experiences, and environmental influences. For healthy brain maturation and overall development, children require enriched surroundings, adequate nutrition, and consistent, positive engagement with primary caregivers. Conversely, exposure to unsafe environments, adverse social experiences, or limited access to learning opportunities in these formative years may result in lasting and irreversible consequences, significantly impacting a child's developmental trajectory and life potential (UNICEF, 2019, p. 2).

During the foundational years, children undergo rapid development across cognitive, social, emotional, and physical domains. This phase is widely regarded as the most critical period for learning, as essential abilities such as speech and motor skills emerge and mature substantially during this time. Contrary to the common belief that motor development occurs early while cognitive development unfolds later, research indicates that both domains follow extended and overlapping developmental trajectories. When cognitive development is disrupted, as seen in neurodevelopmental disorders, motor development is frequently affected as well (Diamond, 2000). Research on early cognition has revealed that the developing mind is remarkably capable, active, and perceptive even in infancy. For instance, infants demonstrate an ability to detect statistical patterns in speech sounds, a foundational process in language acquisition (Saffran, 2003). Communication skills are largely acquired through observation and imitation of parents and other significant adults. Children learn by modelling the behaviors, language, and actions of family members and caregivers. By the preschool years, children become increasingly adept at discerning which adult sources are trustworthy and likely to provide accurate information, reflecting their reliance on social

learning (Harris, 2012; Jaswal, 2010). The strong association between social relationships and cognitive development aligns with current understanding of brain maturation and mental growth.

Childhood also marks the beginning of formal learning, during which foundational literacy, numeracy, and cognitive competencies are established, forming the basis for later academic achievement. It is during this stage that children encounter challenges and gradually develop essential life skills such as problem-solving, creativity, resilience, and decision-making. Neural connections are formed at a faster rate during these early years than at any other point in the lifespan. According to UNICEF (2005), early childhood represents the most influential stage of human development, as experiences and learning during this period have lasting effects throughout life. The early years are particularly decisive in shaping a child's psychosocial and cognitive development.

In 2021, the Centers for Disease Control and Prevention's Learn the Signs. Act Early. program supported the American Academy of Pediatrics (AAP) in assembling an expert panel to update developmental surveillance checklists. The panel emphasized that early detection and timely intervention significantly improve outcomes for the approximately one in six children identified with developmental delays during their foundational years. Despite this, findings indicated that most children begin receiving intervention after the age of five, rather than before the age of three, a period during which interventions are known to have the greatest developmental impact.

1.2 The Present Study

The present study sought to investigate the association between screen time and developmental milestones in children aged 2–6 years, including both typically developing children and those diagnosed with or showing a prognosis of autism spectrum disorder (ASD). There is a notable gap in Indian research examining the relationship between screen exposure, developmental quotients, and autism-like symptoms among preschool-aged children. International evidence suggests a growing concern in this area. A study conducted in Japan (2022) reported that longer screen exposure at one year of age was significantly associated with a diagnosis of ASD at three years, particularly among boys. Similarly, a Chinese study (2021) found that increased screen time was linked to greater severity of autism-like symptoms and more pronounced developmental delays, especially in younger children and in the language domain. Sensory symptoms were found to be particularly affected among children with ASD who experienced prolonged screen exposure (Dong et al., 2021). These findings also indicated that younger boys may be at heightened risk for developing autism-like features associated with excessive screen use (Kushima et al., 2022). Limited evidence from India suggests a similar trend, with one study reporting that toddlers exposed to high levels of screen media exhibited autistic-like traits that could potentially progress into autism (Dikkala et al., 2022).

Given these findings, the present study aims to examine developmental milestones in typically developing children and compare them with children diagnosed with ASD within the same age range during the foundational years in India. This comparison is crucial, as overlapping developmental features may contribute to misdiagnosis or delayed diagnosis, underscoring the need for clearer diagnostic guidelines and additional assessment criteria for the early identification of autism in young children.

1.3 Objectives of the Study

The main objective of the study is to examine the relationship between developmental milestones and screen time of typically developing children and children diagnosed with autism spectrum disorder in foundational years in India. The specific objectives are listed below.

- 1) To assess the difference in the developmental milestones of typically developing children with higher screen time and limited or no screen time.
- 2) To assess the difference in the developmental milestones of autistic children with higher screen time and limited or no screen time.
- 3) To assess the difference in the developmental milestones of autistic children with higher or limited screen time with typically developing children with higher screen time.

1.4 Related Literature

1.4.1 Developmental Milestones in the foundational years in India

In 2017, the National Institute for the Empowerment of Persons with Intellectual Disability (NIEPID), formerly known as the National Institute of Mentally Handicapped, released a comprehensive document outlining developmental milestones in children and their clinical relevance. This framework categorizes child development into five key domains: gross motor, fine motor, speech and language, cognitive, and

social-emotional development. The document provides age-specific expectations for milestone attainment and highlights indicators that may signal developmental concerns. It addresses developmental progress from birth to five years of age. Additionally, between 2010 and 2014, NIEPID played a pivotal role in implementing the District Disability Rehabilitation Centre (DDRC) program, a collaborative initiative with central and state governments. This program aimed to establish rehabilitation centers nationwide for a three-year period, offering services such as early identification and intervention for children, disability screening, and therapeutic support including speech and language therapy.

1.4.2 Impact of screen time in foundational years

In 2016, Jenny et al. examined the effects of increased screen exposure during the foundational years and reported several adverse outcomes, including disrupted sleep patterns, physical health concerns such as visual strain, and behavioral issues, particularly increased aggression associated with exposure to violent media. At the same time, the study acknowledged certain benefits of electronic media use, particularly its role in supporting social communication during periods of restricted outdoor activity. The authors also highlighted how digital technology has transformed learning by providing children with easy access to educational resources. In recent years, children's exposure to electronic devices has increased substantially, driven by the widespread availability of interactive smart devices that have become integrated into daily life, often with minimal regulation or safety guidelines. Further evidence from a 2022 study by McArthur et al. demonstrated a significant association between prolonged screen time and suboptimal developmental outcomes. Children with higher levels of screen exposure were more likely to exhibit behavioral difficulties, delays in reaching developmental milestones, and poorer vocabulary development. The COVID-19 pandemic, spanning from 2020 to 2023, further accelerated children's reliance on digital devices due to prolonged indoor confinement and remote learning demands.

In 2019, the World Health Organization issued guidelines outlining recommended levels of physical activity, sleep, and sedentary behavior for children under five years of age to promote optimal health and well-being. These recommendations included limits on screen-based sedentary activities and time spent in restraining devices. The guidelines strongly advise against any screen exposure for infants under one year of age and recommend restricting screen time to no more than 60 minutes per day for children aged two to four years. Beyond physical health and sleep disruption, excessive screen exposure has also been shown to negatively affect social skill development in preschool-aged children (Hinkley et al., 2018). Supporting this, a longitudinal study conducted in Japan found that higher screen exposure at one year of age was associated with delays in communication and problem-solving abilities at two and four years of age (Takahashi et al., 2023).

1.4.3 Autism and Screen Time

According to a study published in the Indian Journal of Pediatrics in 2021, the estimated prevalence of autism spectrum disorder (ASD) in India is approximately one in 68 children (Singhi & Malhi, 2023). The prevalence was found to be significantly higher among children aged four to ten years with mild autism, while moderate autism was more commonly identified during earlier developmental stages between one and seven years of age. Delayed recognition by families, often until noticeable delays in motor or speech development emerge, may contribute to this pattern. Although ASD can be reliably diagnosed as early as two years of age, many children in practice do not receive a diagnosis until after the age of four (CDC, 2024).

The relationship between screen exposure and the severity of autism-related symptoms in toddlers has been the focus of increasing research attention. A study conducted in Iran reported that greater exposure to both foreground and background screen media was associated with heightened ASD symptoms and repetitive behaviors in toddlers. The study further noted that increased screen time reduced opportunities for social interaction, leading children to rely more on non-social coping mechanisms, which in turn exacerbated symptom severity (Sadeghi et al., 2023). In the Indian context, research exploring maternal experiences prior to an autism diagnosis revealed that mothers often relied on screen media as a coping strategy driven by helplessness rather than informed decision-making. This reliance was attributed to a lack of guidance and support in managing their child's behavior (Lal et al., 2023).

In 2018, Marius Teodor Zamfir investigated cases of excessive engagement with virtual environments among children recently diagnosed with ASD. The findings suggested that prolonged exposure to virtual media, exceeding four hours per day, may result in sensory-motor and socio-affective deprivation, triggering behaviors that closely resemble those observed in children with autism. Based on these

observations, Zamfir introduced the concept of “virtual autism” to describe autism-like presentations associated with excessive digital media exposure. This concept has since gained acknowledgment in academic discourse. A letter published in the Journal of Education and Health Promotion recognized “virtual autism” as an emerging phenomenon linked to excessive gadget use and discussed its underlying causes and preventive strategies, emphasizing the importance of balanced developmental experiences in the digital era (Garg et al., 2024). Although empirical evidence directly linking screen exposure to ASD-like features—such as delayed language development, atypical social engagement, unusual play behaviors, and impaired communication—remains limited, behavioral addictions such as internet gaming disorder are formally recognized in the DSM-5-TR (2022). Notably, several studies have reported a significant association between excessive screen exposure and autism spectrum disorder-like symptoms in children aged four to six years.

2. METHODS

2.1 Study Design and Subject Characteristics

In the current study, multivariate sample means were compared using the multivariate analysis of variance to determine whether the means of developmental milestones of typically developing children and children diagnosed with Autism Spectrum Disorder differ significantly across the usage of high and low screen time. The Child Development Inventory was used to examine the developmental milestones. The target population for this study is parents or primary caregivers of children in foundational years aged between two and six years in India. This is due to the increasing concern about developmental delays in children. On the other hand, children who are not staying together with their parents and children who are diagnosed with other neurodivergent disorders except Autism Spectrum Disorder were excluded.

2.2 Sampling Procedure and Sample Size

The sample in this study consists of 325 children aged 2-6 years. 68 children with diagnosed condition of ASD or proposed diagnosis of ASD were included, whereas 257 typically developing children’s data was included for the study. Parents’ feedback was taken to determine the developmental milestones of the children.

The inclusion criteria were children between the ages of 2-6 years. The exclusion criteria were-

- a. children who had no access or availability of gadgets (rural areas),
- b. children diagnosed with level 2 and 3 severities in autism spectrum disorder,
- c. typically developing home-schooled children,
- d. children with any birth defects (spina bifida, down syndrome, etc) leading to delayed developmental milestones and,
- e. children diagnosed with other neurological disorders such as epilepsy, Alzheimers, dyslexia, dyspraxia, etc.)

2.3 Instrumentation

Some parents filled out the form through the Google Form link whereas most parents were assisted in filling the Child Development Inventory in person. Different special needs schools and NGOs were contacted to reach out to parents of children diagnosed with Autism. The children were diagnosed by RCI-certified clinical psychologists; however, the reports were kept confidential by either the parents or the organization. The authenticity of the diagnosis was based on the declaration by the parent and the organization. The Child Development Inventory was used for this study.

2.3.1 Developmental Milestones

The Child Development Inventory (CDI), completed by parents at home, assesses the development of social, self-help, motor, language, letter, and number skills, and the presence of symptoms and behavior problems in children between the ages of 15 months and 6 years 0 months precisely. The results provide the pediatrician with a profile of the child's development, problems, and strengths and aid comprehensive assessment. CDI norms and validity were determined for a community sample of 568 children. The CDI developmental scales correlate closely with age ($r = 0.84$). CDI results identified all the normative group children enrolled in early childhood/special education ($N = 26$) and correlated with academic achievement for children in kindergarten ($N = 132$). CDI scales correlated with reading achievement in kindergarten as follows: general development 0.69, letters 0.56, language comprehensive 0.42, expressive language 0.36, and self-help 0.35.

2.3.2 Screen Time

A section was included on the Google Form's first page with demographic details shared with the Child Development Inventory. The screen time was divided into four categories: No screen time/the child does not have access to any gadgets, Less than 2 hours, Between 2-4 hours, and More than 4 hours. High screen time (HST) was considered when parents selected between 2-4 hours and More than 4 hours, whereas Low screen time (LST) was considered when parents selected Less than 2 hours and No screen time/the child cannot access any gadgets.

2.4 Hypothesis Development

To ensure that the varied objectives of the study are fulfilled with understanding the development of children with respect to screen time while also catering to the aspects of Autistic children, the study developed three critical hypothesis,

Hypothesis 1 - There will be a significant difference in the developmental milestones of typically developing children with higher screen time and typically developing children with limited or no screen time.

Hypothesis 2 - There will be a significant difference in the developmental milestones of autistic children with higher screen time and autistic children with limited or no screen time.

Hypothesis 3 - There will be no difference in the developmental milestones of typically developing children with higher screen time and autistic children with limited or no screen time.

2.5 Data Analysis

The data collected in this study are analyzed using JAMOVI software. The general linear model was used for this study as it required multiple linear regression, as there was more than one dependent variable. MANOVA- Multivariate analysis of variance was employed to analyze the data for the Child Development Inventory. It included descriptive statistics, estimates of effect size, and a homogeneity test at a 95% confidence level. A power analysis was conducted for the multivariate analysis of variance (MANOVA). With a total sample size of 325 participants (257 typically developing children and 68 autistic children), an alpha level of 0.05, and assuming a medium effect size ($f^2(V) = 0.25$), the study achieved a statistical power greater than 0.95. This indicates that the study was sufficiently powered to detect significant multivariate differences between groups.

3. RESULTS AND DISCUSSION

3.1 Descriptive statistics

The findings in this study consist of 54.8% male and 45.2% female children in foundational years. The study included 79% of typically developing children and 21% of children diagnosed with Autism Spectrum Disorder. 87% of mothers took the initiative to participate in the study whereas only 6% of fathers were interested. 7% of participants were Aunts and Uncles of the children. Regarding parent's education level, 58% of participants were graduates and 25% were post-graduates. 8% of the participants held a Doctorate as well.

Table 1 Descriptive Statistics

Child Gender	Frequency	Percent	Cumulative Percent
Boy	178	54.8	54.8
Girl	147	45.2	100.000
Missing	0	0.000	
Total	325	100.000	

Frequencies for Diagnosis			
Diagnosis	Frequency	Percent	Cumulative Percent
TDC	257	79.1	79.1
ASD	68	20.9	100.000
Missing	0	0.000	
Total	325	100.000	

3.2 Developmental Milestones and Typically Developing Children Aged between 2 and 6 years old

Developmental milestones of typically developing children between the ages of two and six years were compared to determine the possible impact of screen time. The findings indicate that there was a significant difference in the developmental milestones of typically developing children with high and low screen time in all areas (social, $p < .001$; self-help, $p < .001$; gross-motor, $p < .001$; fine-motor, $p < .001$; expressive language, $p < .001$; language comprehension, $p < .001$; general development, $p < .001$) except the areas of letters ($p = 0.009$) and numbers ($p = 0.005$) (Table 2). It indicates that children with higher screen time have delayed developmental milestones compared to children with lower screen time. However, the ability to learn letters and numbers was not as significantly different, indicating that exposure to high screen time does not significantly affect the ability to learn letters and numbers.

Table 2 Multivariate Analysis of Variance for Typically Developing Children Aged between 2 and 6 years old

Dependent Variable	Group	Mean Square	df	F	p
Social	TDC_High screen time TDC_Low screen time	19134.8	1	314.68	<.001
Selfhelp	TDC_High screen time TDC_Low screen time	10900.9	1	195.91	<.001
Gross motor	TDC_High screen time TDC_Low screen time	2095.7	1	54.76	<.001
Fine motor	TDC_High screen time TDC_Low screen time	2958.4	1	63.53	<.001
Expressive language	TDC_High screen time TDC_Low screen time	21087.5	1	175.87	<.001
Language comprehension	TDC_High screen time TDC_Low screen time	7730.2	1	66.57	<.001
Letters	TDC_High screen time TDC_Low screen time	124.3	1	6.86	.009
Numbers	TDC_High screen time TDC_Low screen time	139.4	1	7.96	.005
General development	TDC_High screen time TDC_Low screen time	23989.7	1	135.97	<.001

3.3 Developmental Milestones and Autism Spectrum Disorder

Developmental milestones of children diagnosed with autism with high screen time were compared with those of children diagnosed with autism of ages between two and six years with low screen time to assess the effect of screen time using one-way MANOVA analysis. The findings indicate that there was a significant difference in most areas of developmental milestones (social, $p < .001$; self-help, $p < .001$; gross-motor, $p < .001$; fine motor, $p < .001$; expressive language, $p < .001$; language comprehension, $p < .001$; general development, $p < .001$) in autistic children with high screen time and low screen time. However, there was no significant difference in the ability to learn letters ($p = 0.002$) and numbers ($p = 0.002$) (Table 3). This indicates that screen time impacts the developmental milestones of children diagnosed with autism as well, and that children with high screen time have delayed developmental milestones. Though the ability to learn numbers and letters was not impacted significantly.

Table 3 Multivariate Analysis of Variance for Autistic children Aged between 2 and 6 years old

Dependent Variable	Group	Mean Square	df	F	p
Social	ASD_High screen time ASD_Low screen time	1100.3	1	32.3	<.001
Self-help	ASD_High screen time ASD_Low screen time	1209.6	1	13.5	<.001
Good motor	ASD_High screen time ASD_Low screen time	805.9	1	18.3	<.001
Fine motor	ASD_High screen time ASD_Low screen time	1132.5	1	21.6	<.001
Expressive language	ASD_High screen time ASD_Low screen time	2660.8	1	20.5	<.001
Language comprehension	ASD_High screen time ASD_Low screen time	8824.3	1	75.0	<.001
Letters	ASD_High screen time ASD_Low screen time	236.8	1	10.6	.002
Numbers	ASD_High screen time ASD_Low screen time	214.4	1	10.2	.002
General development	ASD_High screen time ASD_Low screen time	6535.5	1	42.6	<.001

3.4 Developmental Milestones of Typically Developing Children and Autism Spectrum Disorder children

Developmental milestones of typically developing children with high screen time were compared with developmental milestones of children diagnosed with autism spectrum disorder with low screen time. The children were of ages between two and six years. The findings of between tests showed that there is no significant difference in the development milestones of social skills, $p=0.699$; self-help skills, $p=0.281$; gross motor skills, $p=0.004$; expressive language, $p=0.645$; letters, $p=0.004$; numbers, $p=0.003$; general development, $p=0.005$ of children diagnosed with Autism with low screen time and typically developing children with high screen time except for fine motor skills, $p<.001$ and language comprehension skills $p<.001$ where there was a significant difference (Table 4). This indicated that the developmental milestones of children diagnosed with autism with low screen time and typically developing children with high screen time are similar, and that there is not much difference when they are compared, except for the ability of language comprehension and fine motor skills.

Table 4 Multivariate Analysis of Variance for Developmental Milestones of Typically Developing Children and Autistic Children

Dependent Variable	Group	Mean Square	df	F	p
Social	TDC_High screen time ASD_Low screen time	13.7	1	0.150	.699
Self-help	TDC_High screen time ASD_Low screen time	112.9	1	1.168	.281
Gross motor	TDC_High screen time ASD_Low screen time	473.5	1	8.607	.004
Fine motor	TDC_High screen time ASD_Low screen time	1152.1	1	17.450	<.001
Expressive language	TDC_High screen time ASD_Low screen time	41.8	1	0.213	.645
Language comprehension	TDC_High screen time ASD_Low screen time	3409.1	1	22.537	<.001
Letters	TDC_High screen time ASD_Low screen time	175.2	1	8.778	.004
Numbers	TDC_High screen time ASD_Low screen time	176.2	1	8.917	.003

General development	TDC_High screen time ASD_Low screen time	2113.3	1	8.200	.005
---------------------	---	--------	---	-------	------

3.5 Discussion

The Child Development Inventory (CDI) was used in this study to examine the developmental milestones, as it includes 9 areas of development, which are similar to the developmental milestones mentioned by the National Institute for the Empowerment of Persons with Intellectual Disability in India. The data for typically developing children with high and low screen time indicated a notable difference across most developmental milestones, except for letters and numerical abilities, suggesting that elevated screen time may hinder children's developmental progress. However, the absence of a significant impact on letters and numerical skills implies that cognitive abilities related to academics may remain unaffected by screen exposure. This provides a strong case for the acceptance of Hypothesis 1, as discussed.

The data for children diagnosed with autism showed significant differences in four developmental areas, while letters and numbers showed no difference. The consistency in letters and numbers aligns with findings in data for typically developing children as well, implying that screen time does not impact academic abilities. However, it is essential to note that autism, a disorder related to communication and social skills, showed a negative correlation with screen time in areas like social skills and expressive language. This suggests that screen time could aggravate difficulties in social interaction and emotional expression in autistic children, who are already vulnerable in these areas. The foundational years are crucial for autistic children to make significant progress, and as they age, learning new skills becomes increasingly challenging. From these results it could be seen that Hypothesis 2 also stands significant for 5 areas but lacks in the rest 2 which are the academic abilities.

The comparison between typically developing children with high screen time and autistic children with limited or no screen time was aimed at exploring whether their developmental milestones correspond. The hypothesis posited that high screen time might delay developmental milestones in typically developing children, making them similar to those of autistic children. The findings suggested this, with no significant differences observed in any developmental areas, implying similar developmental outcomes between the two groups. The decision to not compare autistic children with high screen time was based on the expectation of pronounced developmental delays, which could reduce the likelihood of the purpose of the study. Instead, comparing children with limited screen time provided a clearer picture. This increases the possibility that typical children may be at risk of misdiagnosis due to screen time-induced developmental delays, implying that with reduced screen time and early intervention, these children might avoid such delays and achieve typical developmental milestones or that there is a need for current more accurate data for developmental milestones with the current generation that is more exposed to the screen time than the previous ones. All these results point to the fact that Hypothesis 3 is also significant, and thus, there is no difference in all the areas under observation.

4. IMPLICATIONS AND LIMITATIONS

4.1 Implications

The findings emphasize the evident delay in developmental milestones attributed to screen time, highlighting the necessity for rigid screen time regulation to mitigate its impact on both typically developing children and those diagnosed with autism spectrum disorder. The similarities in developmental delays between these groups suggest a pressing need for more precise diagnostic tools to prevent the possibility of misdiagnosis of autism in early childhood, as overlapping features may obscure accurate assessments. This emphasizes the importance of early intervention strategies tailored to address these delayed milestones, enabling the affected children to align more closely with the peers of their age. While the data suggest that screen time does not necessarily affect academic abilities and may even offer some cognitive benefits, the overall negative effects on other developmental areas render unregulated screen time impractical. Therefore, strict immediate oversight is recommended. Furthermore, the study's detailed assessment of developmental milestones offers a sturdy foundation for crafting personalized intervention plans, which were shared with individual parents to address specific concerns and enhance

their child's developmental trajectory. Parents were also provided with a comprehensive review of the child development inventory, which served as an incentive for their participation. This review offered a refined understanding of each child's progress and included personalized intervention strategies based on parental concerns and the areas where their child displayed lower scores. This approach not only promotes the child's development but also includes parents in a collaborative process aimed at optimizing their child's potential and growth.

4.2 Limitations

The study, while comprehensive in its exploration of screen time's effects on developmental milestones, acknowledges that the scope was limited to typically developing children and those diagnosed with autism. It did not extend to other special needs or diagnoses, such as ADHD or learning disabilities, where the impact of screen time might be different. This presents an opportunity for future research to broaden the understanding of how screen time influences a wider spectrum of neuro-developmental disorders. Although the study did not directly include an early intervention plan, the findings offer a valuable foundation for developing such plans. The comprehensive review report provided recommendations for parents to intervene for themselves, which would be more impactful for the children as they spend the majority of their time at home. The study also acknowledges that the data is limited, particularly for the autistic children, and justifies its use with power analysis. The data collected could be instrumental in building intervention strategies tailored to the specific needs of children with delayed milestones, guiding future efforts in this area. The study also highlighted the challenges faced by parents in completing the extensive 300-questionnaire. While the process was demanding and required significant motivation, the resulting detailed reports on their children's developmental milestones provided parents with meaningful insights and a deeper understanding of their children's progress. This outcome emphasizes the importance of parental involvement in research and the possible benefits that such comprehensive data collection can offer. Moving forward, there is an opportunity to streamline data collection methods while maintaining the richness of the data and information gathered, thereby enhancing both parental engagement and the overall efficacy of research in this crucial area of child development.

5. CONCLUSION

The study's findings highlight the possible significant impact of screen time on children's developmental milestones during their formative years, specifically in light of the observed parallels between typically developing children with high screen time and those diagnosed with autism spectrum disorder (ASD). The results revealed a strong association between excessive screen time and developmental delays, driving comparisons with the developmental patterns characteristic of children with ASD. This connection between the two implies that extended screen exposure may contribute to or intensify developmental delays, raising important considerations regarding early childhood interactions with digital devices. Additionally, the study brings attention to the potential for misdiagnosis or delayed diagnosis of autism, given the overlapping symptoms that excessive screen time can induce. These symptoms, which may resemble those of autism, such as social, self-help, and language skills, highlight the necessity of distinguishing between screen time-induced developmental delays and those intrinsic to ASD. Accurate differentiation is essential to ensure that children receive the appropriate interventions and support tailored to their specific needs. While screen time can offer educational value when carefully managed, the study advocates for controlled usage, particularly during early childhood when the brain is most susceptible to environmental factors. In conclusion, the study underscores the importance of raising awareness among parents, educators, and healthcare professionals about the potential risks associated with excessive screen time. It calls for the development of comprehensive guidelines and early intervention strategies to address these concerns, contributing to the ongoing discourse on child development in the digital era.

REFERENCES:

- American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR). American Psychiatric Publishing, 2022.
- Bahrami, H., Bagherpour, S., Fathi, A., & Ahmadi, A. A. (2009). Study of relationship between parenting patterns and mental health and educational achievement of children. *Journal of Psychology & Education*, 38(4), 87-100.
- Baumrind, D. (1991). The Influence of Parenting Style on Adolescent Competence and Substance Use. *The Journal of Early Adolescence*, 11(1), 56-95.

- CDC. *Data and Statistics. Autism Spectrum Disorder. Resource Document.* (2024) Available from: https://www.cdc.gov/autism/data-research/?CDC_AAref_Val=https://www.cdc.gov/ncbddd/autism/data.html .
- CDC's developmental milestones. (2021). Accessed: October 14, 2021: <https://www.cdc.gov/ncbddd/actearly/milestones/index.html>.
- Detnakintra, K., Trairatvorakul, P., Pruksananonda, C., & Chonchaiya, W. (2020). Positive mother-child interactions and parenting styles were associated with lower screen time in early childhood. *Acta Paediatrica*, 109(4), 817-826.
- Diamond, A. (2000). Close interrelation of motor development and cognitive development and of the cerebellum and prefrontal cortex. *Child development*, 71(1), 44-56.
- Dikkala, V. P., Murthy, P. S., Prasad, R. V., Sharma, V., & Chaudhury, S. (2022). Amount of screen time and occurrence of autistic-like symptoms in toddlers in a tertiary care hospital. *Medical Journal of Dr. DY Patil University*, 15(4), 538-543.
- Dong, H. Y., Wang, B., Li, H. H., Yue, X. J., & Jia, F. Y. (2021). Correlation between screen time and autistic symptoms as well as development quotients in children with autism spectrum disorder. *Frontiers in Psychiatry*, 12, 619994.
- Garg, R. K., Garg, P., Sharma, P., Kumar, Y., Niwas, R., Singh, J., & Singh, S. (2024). Virtual autism among children: A leading hazard of gadget exposure and preventive measures. *Journal of Education and Health Promotion*, 13(1), 76.
- Harris PL. *Trusting what you're told: How children learn from others.* Cambridge, MA: Belknap Press of Harvard University Press; 2012.
- Hinkley, T., Brown, H., Carson, V., & Teychenne, M. (2018). Cross-sectional associations of screen time and outdoor play with social skills in preschool children. *PLOS ONE*, 13(4), e0193700. <https://doi.org/10.1371/journal.pone.0193700>
- Jaswal VK. Believing what you're told: Young children's trust in unexpected testimony about the physical world. *Cognitive Psychology*. 2010;61(3):248-272.
- Jenny S. Radesky MD, and Dimitri A. Christakis MD, MPH (2016) Increased Screen Time. *Pediatric Clinics of North America*, 2016-10-01, Volume 63, Issue 5, Pages 827-839, Copyright © 2016 Elsevier Inc.
- Kushima, M., Kojima, R., Shinohara, R., Horiuchi, S., Otawa, S., Ooka, T., ... & Katoh, T. (2022). Association between screen time exposure in children at 1 year of age and autism spectrum disorder at 3 years of age: the Japan Environment and Children's Study. *JAMA pediatrics*, 176(4), 384-391.
- Lal, S. G., Syurina, E., González, L. P., Bally, E. L., Gopikumar, V., & Bunders-Aelen, J. G. F. (2023). Vulnerabilities Prompting Use of Technology and Screen by Mothers of Autistic Children in India: Lived Experiences and Comparison to Scientific Literature. *Culture, Medicine, and Psychiatry*, 47(4), 1022-1042.
- McArthur, B. A., Tough, S., & Madigan, S. (2022). Screen time and developmental and behavioral outcomes for preschool children. *Pediatric Research*, 91(6), 1616-1621.
- National Early Childhood Care and Education (ECCE) Policy. Ministry of Women and Child Development, Government of India. Retrieved from <https://wcd.nic.in/sites/default/files/National%20Early%20Childhood%20Care%20and%20Education-Resolution.pdf>
- National Institute for the Empowerment of Persons with Intellectual Disability- (NIEPID) (2017) Developmental milestones in children and their significance. Available from: <https://www.niepid.nic.in/NIMH%20E-%20learning/Development%20of%20milestone%20in%20Children%20and%20its%20significance.pdf>
- National Institute for the Empowerment of Persons with Intellectual Disability- (NIEPID) (2010-2014) District Disability Rehabilitation Centre. Available from: <https://www.niepid.nic.in/DDRCs.php/1000>
- Olivari, Maria & Tagliabue, Semira & Confalonieri, Emanuela. (2013). Parenting Style and Dimensions Questionnaire: A Review of Reliability and Validity. *Marriage & Family Review*. 49. 465-490. 10.1080/01494929.2013.770812.
- Sadeghi, S., Pouretamad, H. R., Badv, R. S., & Brand, S. (2023). Associations between symptom severity of autism spectrum disorder and screen time among toddlers aged 16 to 36 months. *Behavioral Sciences*, 13(3), 208.
- Saffran JR. Statistical language learning: Mechanisms and constraints. *Current Directions in Psychological Science*. 2003;12(4):110-114.
- Shah, R. R., Fahey, N. M., Soni, A. V., Phatak, A. G., & Nimbalkar, S. M. (2019). Screen time usage among preschoolers aged 2-6 in rural Western India: A cross-sectional study. *Journal of Family Medicine and Primary Care*, 8(6), 1999-2002. https://doi.org/10.4103/jfmpc.jfmpc_206_19
- Singhi, P., Malhi, P. Early Diagnosis of Autism Spectrum Disorder: What the Pediatricians Should Know. *Indian J Pediatr* 90, 364-368 (2023). <https://doi.org/10.1007/s12098-022-04363-1>
- Takahashi, I., Obara, T., Ishikuro, M., Murakami, K., Ueno, F., Noda, A., ... & Kuriyama, S. (2023). Screen time at age 1 year and communication and problem-solving developmental delay at 2 and 4 years. *JAMA pediatrics*, 177(10), 1039-1046.
- UNICEF (2019). During the formative years, UNICEF's work on measuring early childhood development. The promise of investing in young children.
- UNICEF (2005). Early Childhood Development Kit. Guideline for Caregivers. Available: <http://www.crin.org/docs/early%20childhood%20development%20kit.pdf>.
- World Health Organization. (2019). Guidelines on physical activity, sedentary behavior, and sleep for children under 5 years of age. World Health Organization. <https://iris.who.int/handle/10665/311664>. License: CC BY-NC-SA 3.0 IGO
- Zamfir, M. T. (2018) The Consumption Of a Virtual Environment for More Than 4 hours/Day, In The Children Between 0-3 Years Old, Can Cause A Syndrome Similar With The Autism Spectrum Disorder. *Journal of Romanian Literary Studies, Issue No. 13/2018.*