



IMPACT OF SCREEN TIME ON DEVELOPMENTAL OUTCOMES IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND THE MODERATING EFFECTS OF PARENTAL INTERVENTIONS

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ABSTRACT

Background: Children with Autism Spectrum Disorder (ASD) are uniquely vulnerable to the developmental effects of excessive screen exposure due to pre-existing deficits in social communication, joint attention, and sensory processing. The present study examined the relationship between screen time, autism symptom severity, and adaptive functioning in children with ASD, and explored whether parental mediation moderates this relationship in the Indian socio-cultural context. **Methods:** A cross-sectional correlational design was adopted. Ninety-five children aged 3–12 years with a confirmed diagnosis of ASD and their primary caregivers were recruited from autism intervention centres in Chennai, India, using purposive sampling. Autism symptom severity was assessed using the Childhood Autism Rating Scale (CARS), adaptive functioning using the Vineland Adaptive Behaviour Scales – Third Edition (Vineland-3), parental mediation using the Parental Mediation Scale, and caregiver stress using the Autism Parenting Stress Index (APSI). Average daily screen time was computed using a weighted weekday weekend formula and categorised per Indian Academy of Paediatrics (2021) guidelines. Data were analyzed using Pearson correlations, multiple regression, and hierarchical moderation analysis. **Results:** Screen time correlated strongly with autism severity ($r = .831, p < .001$) and inversely with adaptive functioning ($r = -.728, p < .001$). Regression models indicated that screen time significantly predicted higher autism severity ($B = 3.29, p < .001$) and lower adaptive behaviour ($B = -5.53, p < .001$), while parental mediation independently predicted reduced severity ($B = -0.058, p < .001$) and improved adaptive behaviour ($B = 0.239, p < .001$), explaining 91.9% of the variance in adaptive functioning. Parenting stress was non-significant. Moderation analysis was non-significant ($p = .287$), suggesting that parental mediation acts as an independent promotive factor rather than a buffer. **Conclusion:** Findings support a dual-pathway model in which screen exposure is an independent developmental risk factor and parental mediation an independent protective factor for Indian children with ASD. Clinical and educational interventions should simultaneously target screen reduction and active parental involvement.

KEYWORDS : Autism Spectrum Disorder; Screen Time; Adaptive Functioning; Parental Mediation; Child Development; India.

INTRODUCTION

Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterised by persistent deficits in social communication and interaction, together with restricted, repetitive patterns of behaviour, interests, or activities (American Psychiatric Association, 2022). The global prevalence of ASD has risen markedly over the last two decades; the Centers for Disease Control and Prevention (2025) estimates that 1 in 36 children in the United States is now identified with ASD, and comparable upward trends have been reported across Europe, Asia, and Australia (Maenner et al., 2023; Zeidan et al., 2022). Although improved case ascertainment partly explains this rise, contemporary developmental psychopathology frameworks emphasize that ASD trajectories arise from dynamic gene environment interactions, drawing attention to modifiable environmental influences on symptom expression and adaptive outcomes (Geschwind & State, 2015; Modabbernia, Velthorst, & Reichenberg, 2017).

One of the most pervasive environmental exposures in early childhood today is the consumption of digital media. The proliferation of smart phones, tablets, and streaming platforms has transformed children's everyday ecology, with average daily screen exposure now far exceeding the limits recommended by the World Health Organization (2019), the American Academy of Pediatrics (2016), and the Indian Academy of Pediatrics (2021). Epidemiological data from India indicate that even preschool children routinely accumulate two to four hours of screen time per day, with higher exposure among urban families and children of working parents (Chandrasekaran et al., 2022; Kumar et al., 2020). Excessive screen exposure has been linked to delay in language, attention, social, and executive functioning in the general pediatric population (Christakis et al., 2004; Madigan, Browne, Racine, Mori, & Tough, 2019; Tamana et al., 2019).

Children with ASD appear especially vulnerable to these effects. Several studies report disproportionately high screen use among children with ASD, often reflecting the structured, predictable, and visually engaging qualities of digital content that align with autism related sensory and cognitive preferences (Heffler, Sienko, Subedi, et al., 2020; Ophir et al., 2023). Theoretical accounts including the displacement hypothesis (Vandewater, Bickham, & Lee, 2006), the joint-attention disruption hypothesis (Mundy & Neal, 2001), and the visual hyper stimulation hypothesis (Heffler & Oestreicher, 2024) all

converge on the prediction that high screen exposure during sensitive developmental periods may exacerbate core ASD symptoms and impair the acquisition of adaptive behaviours.

Parental mediation encompassing active, restrictive, and co-viewing strategies has emerged as a key contextual variable that shapes the quality and quantity of children's media engagement (Livingstone & Helsper, 2008; Nathanson, 2015). Empirical work in neurotypical samples demonstrate that active parental involvement during screen use enhances learning outcomes and reduces behavioural risks (Hirsh-Pasek et al., 2021; Domoff, Radesky, Harrison, Riley, & Lumeng, 2020). The role of parental mediation for children with ASD; however, has been comparatively neglected, particularly within non-Western, lower-resource settings where extended-family care giving, parental stress, and limited access to professional services may all modify parent child media interactions (Daley, Singhal, & Krishnamurthy, 2013; Divan, Vajaratkar, Desai, Strik-Lievers, & Patel, 2021; Gupta & Arora, 2022).

Existing literature tends to examine screen exposure in relation to single developmental endpoints rather than considering ASD symptom severity and adaptive functioning simultaneously. Parenting stress, consistently elevated in ASD caregivers (Silva & Coutinho, 2008), is often analysed in isolation from parenting behaviour, leaving uncertainty about its independent contribution. Moreover, although parental mediation is widely assumed to buffer the developmental effects of heavy screen use, this moderating role has rarely been formally tested in an ASD sample. The present study addresses these gaps by examining, in an Indian clinical sample, (a) associations between screen time, autism severity, and adaptive functioning; (b) the independent contributions of parental mediation and parenting stress; and (c) whether parental mediation moderates the screen-time–development relationship.

METHODOLOGY

A cross-sectional correlational design was adopted to examine the interrelationships among screen time exposure, parental mediation, autism symptom severity, and adaptive functioning in children with ASD. The study was conducted in autism intervention and rehabilitation centres in Chennai, Tamil Nadu, India, with primary

recruitment from the outpatient services of SRM Medical College Hospital and Research Centre, Kattankulathur.

Ninety five children aged 3–12 years who are already diagnosed with ASD by a qualified clinician and their primary caregivers were included in the study. The sample size was estimated using the standard proportion formula $n = Z^2 \alpha \cdot p \cdot q / d^2$, ensuring adequate statistical power for bivariate and regression analyses. Purposive sampling was used to maximise variability in screen exposure and parental mediation while retaining diagnostic homogeneity. Inclusion criteria were: (1) Children aged 3–12 years; (2) Children should be already diagnosed with ASD for at least six months' duration; (3) Mild to moderate level of autism severity and (4) Parents cohabiting together and should be the primary caregiver to report child's screen use and parental practices. Children with severe comorbid neurological or sensory impairments (e.g., blindness, profound deafness), severe medical illness, or severe ASD presentations that precluded reliable caregiver reporting were excluded. The tools used for assessment were Childhood Autism Rating Scale, Vineland Adaptive Behaviour Scales, Parental Mediation scale, and Autism Parenting Stress Index. The screen time was noted as per the caregivers report, which measures the child's average non-academic screen exposure on weekdays and weekends. Average daily screen time was computed using the weighted formula: $(\text{Weekday usage} \times 5 + \text{Weekend usage} \times 2) / 7$. In line with the Indian Academy of Paediatrics (2021) recommendations, children with > 2 hours/day were categorised as excessive users and those with ≤ 2 hours/day as minimal users.

Procedure

After obtaining Institutional Ethics Committee approval, the participants were explained in detail about the purpose of the study and informed consent was obtained, the tools were administered subsequently. Then, structured questions were used to gather information about the screen time use of their children.

RESULTS

The correlation study showed that the screen time correlated strongly and positively with CARS scores ($r = .831, p < .001$) and negative correlation with Adaptive Behaviour Composite scores ($r = -.728, p < .001$). CARS scores also correlated negatively with adaptive behaviour ($r = -.797, p < .001$). A simultaneous multiple regression with parental mediation, parenting stress, and average screen time predicting CARS scores produced an excellent overall fit, $R^2 = .781$, adjusted $R^2 = .773$. The screen time was found to be the strongest positive predictor ($p < .001$), and parental mediation was a significant negative predictor ($p < .001$). Parenting stress did not contribute uniquely once mediation was accounted for ($p = .765$). A parallel regression predicting the Adaptive Behaviour Composite yielded an exceptionally strong fit, $R^2 = .919$, adjusted $R^2 = .916$. Screen time was a large negative predictor of adaptive functioning ($B = -5.53, SE = 0.24, t = -23.37, p < .001$), and parental mediation was a large positive predictor ($B = 0.239, SE = 0.012, t = 20.75, p < .001$), but the parenting stress was again non-significant ($B = -0.006, t = -0.74, p = .462$). Further, the moderation analysis showed that the interaction was non-significant ($B = -0.010, Z = -1.07, p = .287$), indicating that parental mediation did not alter the strength or direction of the relationship between screen time and adaptive functioning. Both main effects remained large and significant. Thus, parental mediation operated as an independent promotive factor rather than a buffer against screen-related risk.

Table2. Pearson Correlations among Screen Time, Autism Severity, and Adaptive Functioning

Variable	1	2	3
1. Average Screen Time	—		
2. CARS Score	.831***	—	
3. Adaptive Behaviour Composite	-.728***	-.797***	—

Note. *** $p < .001$.

Table 3. Multiple Regression Predicting Autism Symptom Severity (CARS)

Predictor	B	SE	T	P
Intercept	24.57	1.20	20.47	< .001
Parental Mediation	-0.058	0.010	-5.98	< .001
Parenting Stress	-0.002	0.007	-0.30	.765
Average Screen Time	3.29	0.20	16.60	< .001

Note. $R^2 = .781$; Adjusted $R^2 = .773$.

Table 4. Multiple Regression and Moderation Analysis Predicting Adaptive Behaviour Composite

Predictor	B	SE	95% CI	t / Z	P
Intercept	103.56	1.43	—	72.30	< .001
Average Screen Time	-5.48	0.23	[-5.94, -5.02]	-23.32	< .001
Parental Mediation	0.239	0.011	[0.217, 0.261]	21.52	< .001
Parenting Stress	-0.006	0.008	—	-0.74	.462
Screen Time $\times$ Parental Mediation	-0.010	0.010	[-0.030, 0.009]	-1.07	.287

Note. $R^2 = .919$; Adjusted $R^2 = .916$. The interaction term was entered in a hierarchical step after the main-effect predictors.

DISCUSSION

The present study examined the joint contributions of screen time and parental mediation to autism symptom severity and adaptive functioning in a clinical sample of Indian children with ASD. The study results found that screen time exposure was strongly linked with both higher autism severity and poorer adaptive functioning. The positive association between screen time and autism severity is consistent with previous literature linking early and heavy screen exposure with higher autism-related behaviour and broader developmental delay (Heffler et al., 2020; Madigan et al., 2019; Yuan et al., 2024). Several non-exclusive mechanisms may account for this pattern. The displacement hypothesis (Vandewater et al., 2006) posits that screen time crowds out the joint-attention, pretend-play, and reciprocal interactions that drive social-communicative development which is particularly heavy among children with ASD, whose spontaneous social initiation is already reduced (Adamson et al., 2019; Lord et al., 2020). The joint-attention disruption hypothesis (Mundy & Neal, 2001) and visual hyper stimulation hypothesis (Heffler & Oestreicher, 2024) further predict that prolonged exposure to fast-paced, low-reciprocity visual content can entrench atypical attention and sensory-seeking patterns that resemble core ASD features. It can be understood bidirectionally that children with autism symptoms may gravitate toward predictable digital content, while caregivers under high demand may use screens as a behaviour-management tool, creating a self-reinforcing loop (Ophir et al., 2023; Radesky et al., 2020). Parental mediation emerged as a powerful, independent promotive factor consistent with the claim that active, restrictive, and co-viewing strategies transform media exposure from a passive into a guided, scaffolded experience (Livingstone & Helsper, 2008; Nathanson, 2015). For children with ASD, parental commentary during media use may serve as an in-vivo joint-attention prompt, providing language models, perspective-taking opportunities, and explicit social cues which they rarely access spontaneously (Hirsh-Pasek et al., 2021). Parenting stress failed to predict either outcome after mediation was modeled. Consistent with the findings of Domoff et al. (2020), this suggests that observable parenting practice is more significant for the outcome behavior of children rather than the internal stress. The parental mediation did not moderate the relationship between screen time and autism severity or adaptive functioning. The widespread assumption that engaged parenting can offset the developmental cost of heavy screen use was not supported. Instead, the data are consistent with a dual-pathway model in which screen time and parental mediation each contribute independently. Mechanistically, parental mediation primarily shapes the qualitative texture of media engagement, whereas the developmental harms of screen time appear driven by its quantity and the activities it displaces; improving the quality of media experience cannot recover hours not spent in face-to-face interaction, play, or sleep (Carter et al., 2016; Hale & Guan, 2015).

This study emphasizes that interventions optimizing parental mediation strategies must therefore be paired with concrete reductions in total screen exposure. In urban India, where smart phone penetration is rapid, specialised ASD services are scarce, and digital media is often used as a behaviour-soothing tool (Divan et al., 2021; Gupta & Arora, 2022), screen-reduction guidance should be a routine component of ASD care, delivered alongside multilingual mediation-skills training.

Strengths of the study include standardised, psychometrically strong instruments, a clinically diagnosed ASD sample, explicit moderation modelling, and a focus on an under-represented Indian population. Limitations include the cross-sectional design (which precludes causal inference), heavy reliance on caregiver report (potential recall and social-desirability biases), a geographically restricted sample, and

non-differentiation of screen type and content (e.g., educational vs entertainment; Barr & Linebarger, 2017). Future research should adopt longitudinal and intervention designs, incorporate device-logged screen exposure, sample more diverse Indian regions, and use qualitative inquiry into parental decision-making.

CONCLUSION

In a clinical sample of 95 Indian children with ASD, daily screen time was strongly associated with greater autism symptom severity and poorer adaptive functioning, while parental mediation emerged as an independent promotive factor for both outcomes. Parental mediation did not buffer the developmental costs of heavy screen use, supporting a dual-pathway model rather than a moderation account. Clinicians, educators, and policymakers working with children with ASD should therefore prioritise concurrent strategies that reduce overall screen exposure and strengthen active, restrictive, and co-viewing parental practices.

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