



Original Research Article

ASSOCIATION BETWEEN EARLY SCREEN EXPOSURE AND LANGUAGE DEVELOPMENT IN CHILDREN AGED 6–36 MONTHS: A PROSPECTIVE OBSERVATIONAL STUDY

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ABSTRACT

Background: Early childhood represents a critical window for language acquisition and cognitive development. With the widespread availability of digital devices, screen exposure among infants and toddlers has increased substantially, raising concerns about its potential influence on early language outcomes. **Objectives:** To evaluate screen time patterns in children aged 6-36 months and examine their association with language development using the Language Evaluation Scale Trivandrum (LEST 0–3 years).

Materials and Methods: A total of 600 children aged 6-36 months were recruited for this cross-sectional study at MVJMC & RH. Screen use variables and demographic data were collected through structured questionnaire. Language milestones were evaluated using the LEST (0-3 years) screening tool. Data were analyzed with a significance threshold of p-value < 0.05

Results: Majority of children accessed mobile screens for cartoons, with initial exposure averaging at 12 months. Screen exposure fluctuated; 56.2% spent 1-2 hours daily. Speech delay was noted in 4%, yet data proved that longer viewing significantly lowered LEST scores. Furthermore, excessive screen use predicted shorter sleep duration, decreased play opportunities and emotional tantrums. Such patterns suggest a negative impact on growth.

Conclusion: Excessive and unsupervised screen exposure was associated with language delays. Mobile phones, prolonged duration (>2 hours/day) and passive viewing without parental interaction were the strongest predictors of poor language outcomes. Public health strategies should emphasize caregiver education, restricted exposure and promotion of interactive alternatives.

Keywords: Screen time; Language development; Speech delay ; Language Evaluation Scale Trivandrum (LEST).

INTRODUCTION

The early years of a child's life are a critical period of neurodevelopment, characterized by rapid brain growth and heightened synaptic plasticity. During this time, environmental stimuli play a crucial role in forming neural pathways that govern cognitive, linguistic, and socio-emotional abilities. Language development, in particular, is pivotal for overall growth and serves as the essential foundation for a child's holistic development. It enables them to regulate their emotions, confidently express their

unique identity and needs, navigate social interactions with competence, achieve academic readiness, and build deep cultural connections. However, adversity during critical periods of brain development disrupts the expected environment, leading to structural and functional changes that can permanently alter a child's trajectory. Excessive screen exposure acts as a form of developmental adversity by displacing essential real-world stimuli and disrupting neural architecture.

Screen time refers to the amount of time spent using various devices, such as mobile phones, tablets,

televisions, computers, and gaming consoles, to consume audiovisual media. This exposure is usually measured in hours per day or week.^[1] Considering its impact on language, physical development and to engage children in physical activity and obtain adequate sleep for their well-being, Indian academy of Pediatrics have issued guidelines that recommending no screen exposure in 0-23 months old and limit to 1 hour per day in 24-59 months old children.^[2] Despite these guidelines, compliance remains low. Most households exceed these recommendations due to increased affordability and accessibility of digital devices, greater reliance on technology for education, pandemic-driven digital transitions, entertainment, social media engagement, rising parental employment with busy lifestyles and the frequent use of screens by parents to occupy children.

Excessive screen exposure during early childhood can reduce essential parent-child engagement, limiting opportunities for face-to-face communication that are crucial for language acquisition. Key language domains, including lexicon, phonology, morpho-syntax, and pragmatics, develop through responsive interactions with caregivers. Therefore, it's important for parents to be mindful of background media exposure when children are around. Research indicates that it can affect children's vocabulary, executive skills, play quality, language acquisition, concentration, and comprehension. Moreover, excessive television time at a young age can also impact a child's arithmetic and reading skills. Hence, early, positive, and interactive experiences are vital for building strong language and cognitive foundations.^[1]

Analyzing the influence of screen time on speech and language development necessitates consideration of several factors, including the duration of screen time, whether the individual is actively engaged, the nature of the content being consumed, parental practices, and their impact on other aspects of childhood. Given the scarcity of region-specific data, this study seeks to explore the associations between screen media exposure and language development in young children. By doing so, it aims to contribute to evidence-based policy and intervention strategies that can optimize early developmental outcomes.

Aims and Objectives

1. To describe the pattern and characteristics of screen time use among children aged 6–36 months.
2. To assess the association between screen exposure and language development using the Language Evaluation Scale Trivandrum (LEST 0-3 years)

MATERIALS AND METHODS

A Hospital based prospective observational study was conducted at MVJ Medical College & Research Hospital in Bangalore over a two-year period.

Children aged 6-36 months attending the paediatric outpatient and inpatient services were included in the study. However, children with deafness, global developmental delay, history of hypoxic ischemic encephalopathy, prematurity, high-risk neonatal history, or a family history of deafness or language delay were excluded.

The sample size was calculated based on a reported mean daily screen time of 2.14 ± 0.4 hours,^[3] using a 5% level of significance, 80% power, and an absolute precision of 0.03. The minimum required sample size was 500, which was increased to 600 children after accounting for a 20% dropout rate. Institutional Ethics Committee approval was obtained, and written informed consent was taken from parents. No additional investigations were performed.

Data were collected using a structured parent-administered questionnaire that included demographic details, family characteristics, age of screen introduction, duration and context of screen use, device type, content viewed, and child involvement in other activities. Parental practices regarding screen exposure, such as supervision, restriction, and co-viewing, were recorded. Co-viewing was defined as shared screen use with active parental interaction. Based on responses, supervision was categorised as consistent or inconsistent, and screen exposure was classified as active or passive. Active exposure involves consistent parental supervision and co-viewing of screens, while passive exposure involves screen use without supervision or minimal parental interaction. Language development was assessed using the Language Evaluation Scale Trivandrum (LEST) for children aged 0–3 years. The findings were then correlated with screen time behaviour. The LEST (0-3 years) is a simple, reliable, and valid screening tool that can be used in communities to identify language development delays. This enables early intervention for children in the first three years of life.^[4]

Data were analysed using SPSS version 27.0. Normality was assessed using the Shapiro–Wilk test. Results were expressed as frequencies and percentages, and as mean \pm standard deviation or median with interquartile range. Associations were analysed using the Chi-square or Fisher's exact test for categorical variables and the independent t-test for continuous variables. A p-value < 0.05 was considered statistically significant.

RESULTS

The study involved 600 children aged 6 months to 36 months, with an average age of 20.2 ± 8.41 months. Most participants were toddlers (13-24 months, 44.2%), followed by children aged 24-36 months (34%) and those aged 6-12 months (21.8%). The majority of participants were female (51.2%), with an equitable gender distribution. Many parents had completed their primary to high school education. Fathers had achieved education level above higher

secondary schooling were 28% and mothers 24.1%. The majority of children had one (39.5%) or two (36.5%) siblings, while a smaller proportion had no siblings or more than two siblings. 67% of children belonged to joint families, 24.6% to nuclear families, and 7.6% to three-generational families.

Data suggests that parents were primarily responsible for child care (80.7%), feeding (83.7%), and interaction (84%). Grandparents played a secondary role, while extended family members, siblings, and maids had minimal involvement. The majority of children (47.2%) had 4-6 hours of interaction with their parents, while a smaller group (30.2%) spent less than 4 hours, and another group (22.6%) spent more than 6 hours.

The majority of children, accounting for 56.2%, spent 1-2 hours daily on-screen time. Mobile phones dominated as the preferred device, with 78.7% of children using them. Our study revealed a strong preference for visually engaging content like cartoons on YouTube, while other categories like religious videos, shlokas, and music are less frequently accessed. The average age of screen introduction was within 12 months for 59.3% of children, 12-24 months for 39.3%, and a minority of 1.4% for children aged 24-36 months. Notably, only one child in this study had their own device, while the rest used their parents or relatives devices.

Our study reveals that tantrums (54.2%) are the primary reason for introducing screens to children, followed by mealtime interactions, bedtime routines, on-demand access, and rewards. A significant portion of children, 42.2%, spend two or more hours on screens before bedtime. Furthermore, 74.2% use screens during meals consistently. A smaller percentage occasionally uses screens and avoids

them before bedtime and during meals. Although 79.8% of children received some supervision, only 18.5% were constantly supervised, and a very small 1.7% experienced no supervision at all. A significant majority of children (75.8%) co-view some of the time, while only one-fifth co-view all the time. In this study only minimal, children have their screen time controlled and limited by parents (34.9%), a significant proportion do not.

In our study, no speech delay was observed in the vast majority of cases, accounting for 96% of the sample. However, speech delay was reported in 4% of cases, affecting 24 individuals. A significant association was observed between screen time and LEST scores ($p < 0.001$), with children exposed to >3 hours of screen time demonstrating a higher proportion of decreased LEST scores compared with those with lower exposure. Screen time was also significantly associated with play duration ($p < 0.001$); children with lower screen exposure had longer daily play time, whereas those with higher exposure showed reduced play duration. Sleep duration was significantly lower among children with increased screen time ($p < 0.001$). Additionally, a significant association was found between screen time and tantrum behavior ($p = 0.03$), with higher screen exposure linked to more frequent tantrum episodes. The study found a strong correlation between increased screen time and lower LEST scores, reduced playtime, shorter sleep and more tantrums. These findings suggest that excessive early screen exposure could negatively impact language development and daily behavioral patterns in young children.

Table 1: Screen time characteristics

VARIABLE	CATEGORY	n (%)
DAILY DURATION	< 1 hour	108 (18.0)
	1-2 hours	337 (62)
	2-3 hours	129 (21.5)
	>3 hours	26 (4.3)
DEVICES USED	Mobile phone	472 (78.7)
	Television	110 (18.3)
	Tablets	18(3)
CONTENT VIEWED	Cartoons	465 (77.5)
	Rhymes	68 (11.3)
	Reels on social media platforms	27(4.5)
	Religious videos	31 (5.2)
	Movies/Music	9 (1.5)
TYPE OF SCREEN EXPOSURE	Active exposure	276 (46)
	Passive exposure	324 (54)

Table 2: Association between screen time and lest scores

SCREEN TIME	LEST SCORES		P VALUE
	NORMAL	DECREASED	
< 1 hour	108 (100.0)	0(0.0)	< 0.001*
1 -2 hours	328 (97.3)	9 (2.7)	
2-3 hours	127 (98.4)	2 (1.6)	
> 3 hours	13 (50.0)	13 (50.0)	
Total	576 (96.0)	24 (4.0)	

Table 3: Association between screen time and play time

SCREEN TIME	PLAY TIME				P VALUE
	1-3 HOURS	3-6 HOURS	6-9 HOURS	9-12 HOURS	
< 1 HOUR	0	7 (6.5)	55 (50.9)	46 (42.6)	< 0.001*
1-2 HOURS	17 (5.0)	43 (12.8)	151 (44.8)	126 (37.4)	
2-3 HOURS	0	6 (4.7)	84 (65.1)	39 (30.2)	
>3 HOURS	8 (30.8)	4 (15.4)	14 (53.8)	0	
TOTAL	25 (4.2)	60 (10.0)	304 (50.7)	211 (35.2)	

Table 4: Association between screen time and sleep hours

SCREEN TIME BEFORE GOING TO BED	SLEEP HOURS		P VALUE
	< 12 HOURS	≥ 12 HOURS	
< 1 HOUR	35 (32.4)	73 (67.6)	< 0.001*
1-2 HOURS	144 (42.7)	193 (57.3)	
2-3 HOURS	55 (42.6)	74 (57.4)	
>3 HOURS	23 (88.5)	3 (11.5)	
TOTAL	257 (42.8)	343 (57.2)	

DISCUSSION

The present study demonstrates a significant association between early and prolonged screen exposure and poorer language outcomes in children aged 6 months to 36 months. The prevalence of language delay in our study was comparable to earlier community-based estimates reported by MKC Nair et al. (7.5%),^[4] Sidhu M et al. (6.2%),^[5] and TM King et al. (10%),^[6] but lower than that reported by Alsaadi F A et al. (25.5%),^[7] Nikhil Bhandari et al. (39.6%),^[8] and Jessy Thomas et al. (13.5%).^[9] These variations may reflect differences in study populations, screening tools, and patterns of media exposure. Our study reveals a shift in digital consumption patterns, with mobile phones becoming the preferred medium over traditional television. This trend is driven by the increased portability and personalised content offered by mobile devices.

In the present study, most children were exposed to passive screen content such as cartoons and video-based programs. Similar findings were reported by Alsaadi et al,^[7] where 43.2% of parents indicated that children primarily used screens to watch cartoons and videos. Early introduction of screens was another important observation. Alsaadi et al,^[7] reported speech delay in 34.4% of children introduced to screens before one year of age compared with 11.1% among those introduced between three and four years. Early exposure during infancy may interfere with interactive verbal stimulation during a critical period of language acquisition.

Duration of screen exposure appears to be a key determinant of developmental outcomes. Alsaadi et al,^[7] reported speech delay in nearly 40% of children with more than four hours of daily screen time. Similar associations have been demonstrated by other investigators, including studies by AI-Hosani et al.^[10] Consistent with these findings, Nikhil Bhandari et al^[8] reported language delay in 66% of children with screen exposure exceeding two hours per day, while Jessy Thomas et al,^[9] observed speech and language delay in 66.7% of children with similar levels of exposure. The present study also observed poorer language outcomes with increasing screen duration,

supporting the hypothesis that excessive screen use may displace interactive play, caregiver communication, and social engagement essential for language development.

An important observation in the present study was the predominance of passive screen exposure with limited parental supervision and co-viewing. Reduced caregiver interaction during screen use may limit opportunities for shared attention and verbal exchange, which are essential for early language development, as emphasized in developmental studies by Campbell T F et al,^[11] and TM King et al.^[12] In addition to language delay, excessive screen exposure in the present study was associated with reduced playtime, shorter sleep duration, and behavioural difficulties such as tantrums, findings also reported by N Mondal et al,^[13] suggesting that screen use may affect multiple developmental domains.

Beyond language outcomes, the present study also identified secondary associations of excessive screen exposure, including reduced playtime, shorter sleep duration, and behavioural difficulties such as tantrums on screen withdrawal. Similar observations have been reported by N Mondal et al,^[13] suggesting that excessive screen exposure may influence multiple developmental domains rather than language alone. The clustering of language delay with behavioural and lifestyle disturbances indicates that early media exposure may contribute to broader developmental dysregulation.

The study's use of the Language Evaluation Scale Trivandrum (LEST 0-3 years) is backed by validation research by MKC Nair et al.^[4] This research showed good agreement with standardised language assessment tools, achieving a sensitivity of 66.7% and specificity of 94.8%. Furthermore, the consistent findings across multiple Indian studies support the LEST's practical utility as a screening tool for early language delay detection in both clinical and community settings.

Overall, the findings reinforce concerns about early and excessive screen exposure and underscore the importance of parental awareness and early developmental screening to support optimal language

development in young children. To address these risks, adhering to established guidelines is crucial. Limiting screen time and engaging in active co-viewing of high-quality educational content can enhance language development. Furthermore, promoting alternative activities like storytelling, shared reading, outdoor play, and interactive games supports cognitive growth. Modelling balanced digital behaviours also helps reduce passive consumption. Public health strategies should integrate screen time counselling into routine paediatric care, support community-based education initiatives, and enforce regulatory policies on child-targeted digital content. Paediatric counselling should focus on reducing unsupervised screen use, promoting co-viewing practices, and encouraging developmentally enriching activities to mitigate the negative effects of excessive screen exposure on early language development.

Strengths and Limitations

A key strength of this study is the large sample size and inclusion of children across a broad age range within the first three years of life. The use of a validated, culturally appropriate screening tool (LEST) enhances the reliability of language assessment. Additionally, the study provides a detailed evaluation of screen time characteristics, including supervision, exposure type, and contextual use, allowing for a nuanced understanding of screen-related behaviours.

However, certain limitations must be acknowledged. The hospital-based design may limit generalizability to the wider community. Screen time exposure and parental practices were self-reported, introducing the possibility of recall and reporting bias. The cross-sectional nature of the study precludes causal inference, and longitudinal follow-up would be necessary to establish long-term developmental outcomes. Despite these limitations, the consistency of findings with existing literature strengthens the overall validity of the results.

CONCLUSION

The findings of this study highlight the growing influence of early and excessive screen exposure on language development and overall behavioural patterns in young children. Paediatricians and primary care providers should proactively counsel parents on limiting screen time, promoting supervised and interactive media use, and encouraging responsive caregiver-child communication during the first three years of life. Public health initiatives should reinforce existing recommendations advocating minimal or no screen

exposure in children below two years and emphasize parental awareness regarding the risks of passive screen viewing. Incorporating routine screening for language delay and screen time behaviours into early child health programs may enable timely identification, parental guidance, and early intervention, thereby supporting optimal developmental outcomes in early childhood.

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