

Effects of Mobile Usage in Children's Behavioural and Developmental Outcomes

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Abstract: Early exposure to screen-based media is increasingly common during the toddler years, a period of rapid behavioural and motor development. This quantitative cross-sectional study examined associations between average daily screen exposure and behavioural, gross-motor and fine-motor indicators among 120 toddlers aged 12–36 months. Parent/ caregivers reports provided information on weekday and weekend screen use, sleep, outdoor play, behaviour and developmental activities. Average daily screen exposure was calculated as a weighted weekly average. Pearson correlation, Welch's independent-samples t-test, one-way ANOVA and multiple linear regression were used. Mean age was 24.06 months ($SD = 7.26$), and mean daily screen exposure was 1.87 hours ($SD = 0.76$). Screen exposure was moderately associated with behavioural difficulty ($r = .481, p < .001$). Positive raw associations were observed with gross-motor ($r = .322, p < .001$) and fine-motor indicators ($r = .219, p = .016$). After adjustment for age, sleep and outdoor play, screen exposure remained associated with behavioural difficulty ($B = 3.557, p < .001$) and gross-motor score ($B = 0.434, p = .025$), but not fine-motor score ($B = 0.102, p = .607$). Overall, higher screen exposure was associated with behavioural difficulty, while developmental findings require cautious interpretation because of age-related effects. The cross-sectional design does not permit causal conclusions.

Keywords: mobile usage; screen time; toddlers; behaviour; motor development

1. Introduction

Digital media has become part of the everyday environment of young children. Smartphones, tablets and television are widely available in homes and may be used during meals, travel, transitions, or periods when caregivers need children to remain occupied. The toddler period is developmentally important because attention, emotional regulation, social interaction, physical activity and motor coordination undergo rapid change. Direct interaction, active play and opportunities to explore the physical environment remain central to early development. The World Health Organization recommends limiting sedentary screen exposure in early childhood and emphasizes adequate sleep and active play within the 24-hour day. For children aged 2 years and above, sedentary screen time is recommended to be no more than one hour per day, with less being better [1]. The Indian Academy of Pediatrics similarly recommends avoiding screen exposure below two years and limiting supervised exposure among children aged 24–59 months [2].

Indian studies indicate that screen exposure begins early. Meena et al. reported widespread exposure among 15–18-month-old children in Delhi [3]. Varadarajan et al. reported high prevalence of excessive screen time among Indian children below five years and an association with developmental delay, particularly in language and communication [4]. International evidence has also linked greater early screen exposure with poorer developmental screening outcomes [5] and, more recently, with poorer language development in large samples of young children [6].

The present study examines behavioural difficulty together with gross- and fine-motor indicators among toddlers aged

12–36 months. Importantly, the dataset records overall screen exposure across smartphones, tablets and television. Therefore, the term mobile usage in the approved title is interpreted within the broader screen-use context and should not be read as a smartphone-only exposure.

1.1 Aim and Objectives

The study aimed to examine the association between average daily screen exposure and behavioural and developmental indicators among toddlers aged 12–36 months.

- To describe screen-use patterns among toddlers aged 12–36 months.
- To examine the association between average daily screen exposure and behavioural difficulty.
- To examine the association between average daily screen exposure and gross- and fine-motor indicators.
- To examine whether screen exposure remains associated with behavioural and developmental indicators after considering age, sleep duration and outdoor play.

2. Literature Survey

Existing research suggests that early screen exposure is influenced not only by duration but also by content, context, caregiver involvement and the activities that screen use replaces. Madigan et al. reported longitudinal associations between greater screen time and poorer developmental screening performance [5]. Meena et al. documented very early and widespread screen exposure among toddlers in an Indian setting [3], while Varadarajan et al. reported associations between excessive screen time and developmental delay in a larger Indian sample [4]. John et al. also reported high screen use among young children in

Kerala and highlighted the relevance of supervision and family context [7].

Recent evidence continues to show associations between mobile-device exposure and developmental outcomes. Rayce et al., using a large sample of two- and three-year-olds, reported that higher mobile-device screen time was associated with poorer language development [6]. A recent systematic review and meta-analysis also found an overall association between screen exposure and developmental outcomes, while emphasizing heterogeneity across studies [8]. These findings support the need for age-sensitive and context-sensitive analysis rather than interpreting screen duration as an isolated causal factor.

2.1 Research Gap

Much of the available evidence focuses on language, global developmental screening or preschool-age children. Fewer studies examine behavioural difficulty together with separate gross- and fine-motor indicators among toddlers in the 12–36-month age range. The present study addresses this gap using a caregiver-reported study schedule and examines screen exposure alongside age, sleep and outdoor play.

3. Problem Definition

The increasing use of smartphones, tablets and television during the toddler years raises concerns about possible associations with behavioural difficulty and developmental indicators. Although existing studies have examined screen exposure and language or general developmental outcomes, fewer studies have considered behavioural difficulty together with separate gross- and fine-motor indicators in toddlers aged 12–36 months. The present study therefore examines overall screen exposure in relation to these outcomes while considering age, sleep duration and outdoor play as relevant contextual variables.

4. Methodology

4.1 Research Design and Participants

A quantitative, non-experimental, cross-sectional correlational design was used. The sample consisted of 120 toddlers aged 12–36 months. Information was obtained from parents or caregivers, and participant records were coded using participant numbers rather than names. The recruitment contexts represented home care, Montessori/preschool settings and play-home/day-care contexts.

4.2 Measures

A structured study-specific parent/caregiver questionnaire collected demographic information, smartphone/ tablet/ television use, weekday and weekend screen time, screen-use context, sleep, active play, outdoor play, behavioural indicators and developmental activities. Average daily screen exposure was calculated as a weighted weekly average of weekday and weekend screen time divided by seven and converted into hours.

Behavioural difficulty was calculated from coded items Q23–Q36. The gross-motor indicator combined eight activities: independent walking, independent running, climbing low furniture, walking steps with support, kicking a ball, throwing a ball, jumping and maintaining balance. The fine-motor indicator combined picking small objects, stacking blocks, turning pages, using a spoon, attempting scribbling, manipulating toys, placing objects in containers and using both hands during play. These composite indicators were developed for the present study and are not clinical diagnostic scales.

Standardization of the questionnaire: the study-specific questionnaire was developed in accordance with the study objectives and relevant literature, and items were reviewed for clarity and relevance before administration. Uniform instructions and response procedures were used for participants. Formal psychometric reliability and validity coefficients were not estimated for this researcher-developed questionnaire and are therefore not reported.

4.3 Procedure and Ethical Considerations

The purpose of the study was explained to caregivers and consent was obtained before data collection. Participation was voluntary, information was treated confidentially, and participant codes were used in the dataset. The study involved no invasive procedures or experimental manipulation.

4.4 Statistical Analysis

Descriptive statistics summarized participant characteristics and screen-use patterns. Shapiro–Wilk testing was used to examine normality of the main continuous variables. Pearson product-moment correlations examined associations between average screen hours and major outcomes. Welch's independent-samples t-test compared children with ≤ 2 hours and > 2 hours of daily screen exposure, while one-way ANOVA compared the three screen-time groups (< 1 , $1–2$ and > 2 hours/day). Multiple linear regression examined the contribution of screen exposure while considering age, sleep duration and outdoor play. Statistical significance was set at $p < .05$.

5. Results & Discussion

5.1 Sample and Screen-Use Characteristics

Table 1: Participant and screen-use characteristics (N = 120)

Variable	Value	Range/Unit
Age	24.06 $\pm$ 7.26	12–36 months
Male	61 (50.8%)	
Female	55 (45.8%)	
Prefer not to say	4 (3.3%)	
Smartphone use	108 (90.0%)	
Tablet use	50 (41.7%)	
Television use	110 (91.7%)	
Weekday screen time	98.75 $\pm$ 40.44	min/day
Weekend screen time	146.36 $\pm$ 60.55	min/day
Average daily screen exposure	1.87 $\pm$ 0.76	hours/day
Sleep duration	10.72 $\pm$ 1.00	hours/day
Outdoor play	73.92	min/day

5.2 Normality Testing

Table 2: Shapiro–Wilk normality testing of main continuous variables

Variable	Shapiro–Wilk W	p
Average screen hours/day	0.990	.569
Behavioural difficulty	0.982	.120
Gross-motor indicator	0.857	<.001
Fine-motor indicator	0.872	<.001

Screen exposure and behavioural difficulty did not significantly depart from normality. The gross- and fine-motor indicators showed significant departures from normality; these findings were considered when interpreting the inferential results, particularly because motor indicators were also strongly age-dependent.

5.3 Correlations

Table 3: Pearson correlations between average daily screen exposure and major outcomes.

Outcome	r	p
Behavioural difficulty	.481	<.001
Gross-motor indicator	.322	<.001
Fine-motor indicator	.219	.016
Sleep duration	-.171	.062

Average daily screen exposure showed a moderate positive association with behavioural difficulty. Positive raw associations were also observed for gross- and fine-motor indicators. The motor findings should not be interpreted as evidence that screen exposure improves motor development because age was strongly associated with both motor indicators and was also positively associated with screen exposure.

5.4 Screen-Time Group Comparisons

Table 4: Mean outcome scores by screen-time group

Screen group	Behaviour	Gross motor	Fine motor
<1 h/day (n=17)	18.00 ± 5.49	13.18 ± 2.51	13.29 ± 2.28
1–2 h/day (n=50)	21.22 ± 4.18	13.84 ± 1.92	13.80 ± 2.10
>2 h/day (n=53)	24.72 ± 5.54	14.77 ± 1.35	14.45 ± 1.62

Behavioural difficulty increased across the three exposure groups, with the >2-hour group showing the highest mean score. Welch's t-test comparing ≤2 hours with >2 hours was significant for behavioural difficulty ($t = -4.520$, $p < .001$), gross-motor score ($t = -3.495$, $p < .001$) and fine-motor score ($t = -2.272$, $p = .025$). One-way ANOVA was significant for behavioural difficulty ($F = 13.606$, $p < .001$) and gross-motor score ($F = 6.451$, $p = .002$), but not fine-motor score ($F = 2.854$, $p = .062$).

5.5 Multiple Regression

Table 5: Multiple regression models including screen hours, age, sleep duration and outdoor play

Outcome	B for screen hours	p	Model R ²
Behavioural difficulty	3.557	<.001	.263
Gross-motor indicator	0.434	.025	.382
Fine-motor indicator	0.102	.607	.394

After considering age, sleep duration and outdoor play, screen exposure remained significantly associated with behavioural difficulty ($B = 3.557$, $p < .001$) and gross-motor score ($B = 0.434$, $p = .025$). Its unique contribution to fine-motor score was not significant ($B = 0.102$, $p = .607$). Age was particularly important for the motor indicators, supporting the need to account for developmental stage.

5.6 Discussion

The strongest finding was the positive association between greater screen exposure and behavioural difficulty. The result is broadly consistent with previous literature reporting associations between higher early screen exposure and developmental or behavioural difficulties [4–8]. However, the present cross-sectional data cannot determine directionality. Children with greater behavioural difficulty may receive screens more often, screen exposure may contribute to behavioural difficulty, or both may reflect family routines and other contextual factors.

The motor findings require particular caution. The higher-screen groups had higher mean gross- and fine-motor scores, and the raw correlations were positive. This does not indicate that screen exposure improves motor development. Motor indicators naturally increase with age, and age was strongly associated with both gross- and fine-motor scores. After adjustment, the screen-exposure association remained significant for gross-motor score but not fine-motor score. This pattern highlights the importance of developmental age and contextual variables when interpreting screen-related developmental data.

The study also found substantially higher weekend than weekday screen exposure, suggesting that screen use may be embedded in family routines rather than occurring uniformly across the week. Smartphone and television use were widespread in the sample. These findings support caregiver guidance focused not only on duration but also on timing, supervision, content, co-use and replacement activities such as outdoor play, movement, shared reading and direct interaction.

5.7 Limitations

- The cross-sectional design prevents causal inference.
- Screen exposure, behaviour and developmental activities were substantially based on caregiver reporting and may be affected by recall or social-desirability bias.
- The behavioural and motor composites were researcher-developed study indicators rather than standardized diagnostic or developmental assessment scales.
- The independent variable represented overall screen exposure across smartphones, tablets and television and therefore should not be interpreted as a smartphone-only effect.
- The selected sample may not represent all toddlers in the wider population.

6. Conclusion

Among 120 toddlers aged 12–36 months, greater average daily screen exposure was significantly associated with

higher behavioural-difficulty scores. Raw associations with gross- and fine-motor indicators were positive, but these findings were strongly influenced by developmental age. After adjustment for age, sleep and outdoor play, screen exposure remained associated with behavioural difficulty and gross-motor score but not fine-motor score. The findings support attention to high screen exposure while emphasizing that toddler development cannot be understood from screen duration alone. Age, sleep, active play, supervision, family interaction and the broader context of digital-media use should be considered together.

review and meta-analysis. *Cureus*. 2025;17(6):e85458. doi:10.7759/cureus.85458.

7. Future Scope

Future research should use larger and more diverse samples, longitudinal designs and standardized developmental assessment tools. Objective measures of screen exposure, separate recording of smartphone, tablet and television use, and detailed assessment of content, caregiver co-use and family routines would strengthen the evidence. Intervention studies examining structured screen reduction together with increased outdoor, active and interactive play may further clarify whether modifying screen routines improves behavioural and developmental outcomes.

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References

- [1] World Health Organization. Guidelines on physical activity, sedentary behaviour and sleep for children under 5 years of age. Geneva: World Health Organization; 2019.
- [2] Gupta P, Shah D, Kumar P, et al. Indian Academy of Pediatrics guidelines on screen time and digital media use in children and adolescents. *Indian Pediatrics*. 2022;59(3):235–244. doi:10.1007/s13312-022-2477-6
- [3] Meena P, Gupta P, Shah D. Screen time in children and adolescents. *Indian Pediatrics*. 2020;57(11):1033–1036. doi:10.1007/s13312-020-2031-3.
- [4] Varadarajan S, et al. Prevalence of excessive screen time and its association with developmental delay among children in India. *PLOS One*. 2021; 16(7): e0254102. doi:10.1371/journal.pone.0254102.
- [5] Madigan S, Browne D, Racine N, Mori C, Tough S. Association between screen time and children's performance on a developmental screening test. *JAMA Pediatrics*. 2019;173(3):244–250. doi:10.1001/jamapediatrics.2018.5056.
- [6] Rayce SB, Okholm GT, Flensburg-Madsen T. Mobile device screen time is associated with poorer language development among toddlers. *BMC Public Health*. 2024; 24: 1050. doi:10.1186/s12889-024-18447-4.
- [7] John JJ, et al. Screen use and developmental concerns among young children in Kerala, India. *BMC Pediatrics*. 2021; 21: 73. doi:10.1186/s12887-021-02545-y.
- [8] Khobragade A, Shenoy R. Screen time and developmental outcomes in children: a systematic