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**Original Article**

# Effect of Screen Time on Cognitive Development and Intelligence Quotient among School-Aged Children in India: A Cross-Sectional Study

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## Abstract

### Background

Smartphones have quietly become part of daily routines for many Indian families, so schoolchildren often spend several hours on screens each day, frequently for videos, games, or social media rather than schoolwork. This raises practical questions about how such habits might affect thinking skills while the brain is still developing.

### Objectives

We examined whether daily screen time is associated with children's performance in areas such as attention, word reasoning, information-processing speed, and overall cognitive ability.

### Methods

From November 2023 to April 2025, we invited 300 children from pediatric clinics and local schools in a semi-urban part of Haryana to join. Parents told us about their child's usual screen use over the past week. We measured cognitive skills using adapted parts of standard intelligence scales suitable for Indian children. We also noted family income level, parents' education, how long children slept at night, and how much time they spent playing outside. We examined links with correlations, group comparisons and regression models that took other influences into account.

### Results

Children spent an average of  $3.4 \pm 1.2$  hours on screens daily, and 42% went over three hours; most of this time was recreational. Overall cognitive scores sat at  $89.6 \pm 13.4$  on standard scales. Longer screen time was associated with lower scores, especially when daily use exceeded three hours. The pattern stayed visible even after we considered family background, parents' schooling and sleep length. Attention, verbal reasoning and speed of processing showed the clearest connections.

### Conclusion

In this group of Indian school children, more daily screen time—mainly for fun rather than learning—was tied to weaker performance across several thinking areas. Simple steps toward better balance at home and school could help, and longer studies would show whether changes in habits make a real difference over time.

### Keywords

Screen time, Cognitive development, Intelligence, School children, India, Attention, Digital habits.

## INTRODUCTION

India's children now grow up with ready access to phones, tablets and laptops. Affordable data and the move to online classes have made screens ordinary, but many families notice the hours adding up, often on short videos or games. The years from age 6 to 12 matter a great deal for brain growth, when skills such as keeping attention steady, putting ideas into words and working quickly with information help children learn and do well at school.

Recent Indian studies show that young children frequently exceed safe screen limits. A systematic review and meta-analysis reported that children under five in India average 2.22 hours of screen time per day (95% CI 1.80–2.63), already more than double the World Health Organization advice, with patterns that tend to carry on or increase once children reach school age [1]. Among early adolescents, one study found a mean daily screen time of 3 hours 35 minutes, with higher figures in nuclear families where both parents work [2]. Excess screen time in preschoolers has also been linked to parent-reported delays in cognitive skills [3].

Screen time appears to influence child development in multiple domains. One study highlighted its impact on cognitive, language, physical, and social-emotional development [4]. Another investigation showed that greater digital media exposure can affect children's intelligence even after controlling for genetic differences in cognition and socioeconomic background [5]. Screen time has further been associated with changes in auditory processing and working memory in tweens [6].

Advanced statistical methods have helped clarify these relationships. A Mendelian randomisation study suggested that leisure screen time has a negative causal effect on childhood intelligence, partly mediated by reduced intracranial volume, while physical activity showed protective effects [7]. Population-based data from India have also linked excessive screen time to developmental delay in children under five years [8]. Broader research on screen time's influence on children's development has examined effects across cognitive, language, physical, and socio-emotional domains [9]. Updated policy guidance emphasises the importance of content quality, context of use, and balancing screen time with sleep and physical activity [10].

Additional studies have explored the association between screen time and early childhood development outcomes [11], while local Indian research has documented screen time patterns in children as young as 15–18 months [12]. Finally, systematic reviews and meta-analyses have consistently reported an inverse relationship between screen media use

and academic performance among children and adolescents [13], with one specific Indian study confirming a correlation between screen time and cognitive development [14].

In India's competitive school environment, even modest changes in attention or reasoning can affect academic outcomes. Yet detailed data from typical semi-urban settings, where device access is rising rapidly, but parental supervision varies, remain limited. This cross-sectional study, therefore, examined the relationship between daily screen time and cognitive performance in children aged 6–12 years in Karad, Maharashtra, while accounting for family and lifestyle factors.

## METHODOLOGY

### Study Design and Participants

We carried out this snapshot study between November 2023 and April 2025 at a university-linked paediatric service and nearby schools in Ambala, Haryana. Children aged 6–12 years coming for routine check-ups or attending regular classes were invited. We left out those with known major developmental conditions, serious hearing or vision problems, or ongoing illnesses likely to affect thinking. In the end, 300 children took part.

### Measures

Parents answered straightforward questions about average daily screen hours over the past week, separating school-related use from entertainment. Cognitive skills were assessed with adapted sections of recognised intelligence scales covering overall ability plus attention, verbal reasoning and processing speed; scores followed standard scales with a mean of 100. We also recorded family income group, parents' education level, nightly sleep duration, daily outdoor play and school performance as reported by parents and teachers.

### Statistical Analysis

We summarised the group with means, standard deviations and percentages. Pearson correlations checked simple links between screen time and cognitive scores. We divided children into screen-time bands ( $\leq 2$  h, 2–3 h,  $> 3$  h) and compared scores with t-tests. Multiple regression tested whether screen time still mattered after allowing for parental education, family income and sleep. We used SPSS version 26 and took  $p < 0.05$  as meaningful.

## RESULTS

Nearly all children used screens regularly, mostly smartphones. Average daily time reached 3.4 hours and rose further in homes where both parents worked outside. Recreational content made up the larger part. Cognitive scores showed a clear downward trend with more screen hours (Figure 1).

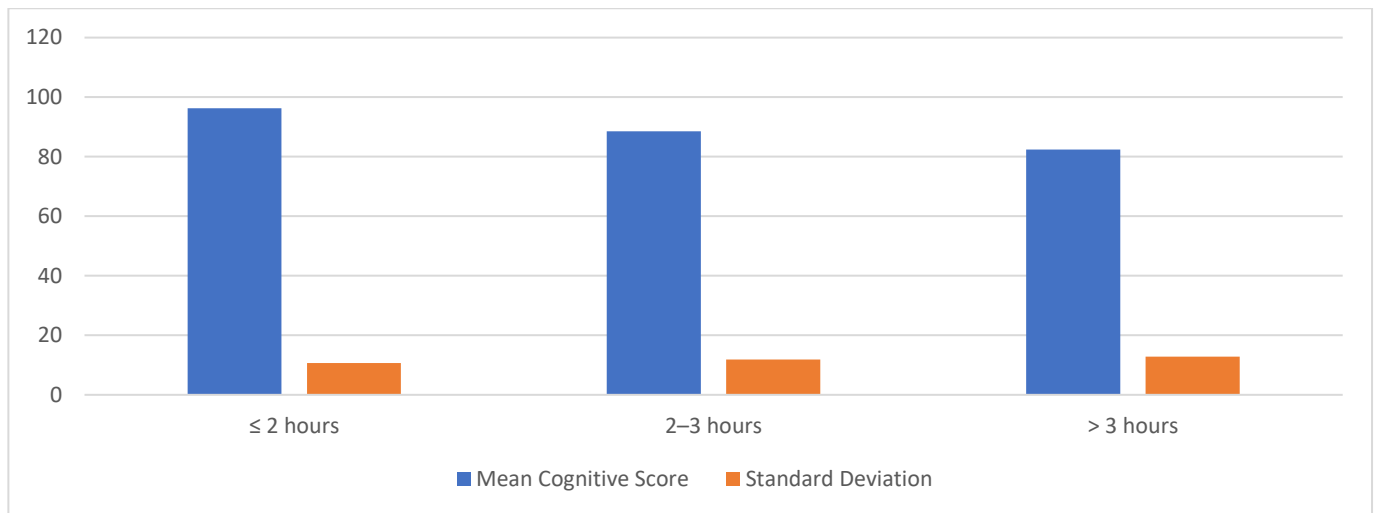
Correlations confirmed the pattern: longer screen time went with lower overall scores, and the same held for attention, reasoning with words and quick handling of information. School marks followed suit. In the full regression model that included family income, parents' education and sleep, screen time still stood out as its own factor pulling scores lower.

Better-educated parents and longer sleep offered some

protection. Age and gender did not alter the main picture.

**Table 1: Background Details of the 300 Participating Children**

Characteristic	Value (Mean ± SD or number (%))
Age in years	9.2 ± 2.1
Boys	162 (54%)
Family income group (upper/middle/lower)	28% / 52% / 20%
At least one parent graduated	41%
Daily screen time (hours)	3.4 ± 1.2
More than 3 hours per day	126 (42%)
Time spent on recreational content	68% of total screen time
Nightly sleep (hours)	8.1 ± 1.0
Overall cognitive score	89.6 ± 13.4



**Figure 1: Average Cognitive Scores by Daily Screen Time Categories (Bar chart: ≤2 hours ≈ 96.3; 2-3 hours ≈ 88.5; >3 hours ≈ 82.4. Scores drop steadily as screen time rises.)**

**Table 2: Links Between Screen Time and Thinking Areas**

Thinking Area	Correlation (r)	p-value
Overall cognitive score	-0.42	<0.001
Attention	-0.36	0.002
Verbal reasoning	-0.40	0.001
Processing speed	-0.29	0.014
School performance	-0.31	<0.01
Thinking Area	Correlation (r)	p-value
Overall cognitive score	-0.42	<0.001

## DISCUSSION

In this group of Indian school children, more daily screen time—chiefly for entertainment—lined up with lower scores across key thinking skills, especially attention, verbal reasoning and processing speed. These observations fit with other recent Indian findings. A study of early adolescents recorded average screen time of 3 hours 35 minutes and noted that heavier use was tied to poorer academic results and certain behavioural or sleep complaints [2]. Another piece of work reported a mean screen time of around 3 hours per day among school children and linked excess exposure to lower cognitive scores even after basic adjustments [11]. Preschool data from Kerala similarly connected higher screen hours and less parental oversight with increased chances of cognitive delays [3].

Every day, mechanisms probably play a part. Fast-changing videos and notifications can train the brain to switch attention often rather than stay with one task. Evening screen light can delay sleep, leaving less time for the mind to organise what was learned during the day. Screen hours also tend to push aside outdoor play and real conversations that help build coordination, language and steady focus [9]. A Mendelian randomisation analysis strengthened the picture by suggesting that leisure screen time has a negative causal influence on childhood intelligence, partly through smaller brain volume measures, while physical activity points in the opposite direction [7]. Broader reviews have noted similar patterns between more screen media use and academic performance [14].

Higher parental education and longer sleep appeared helpful in our data, echoing advice that family rules, shared screen time, and protected offline periods matter. Updated policy statements now encourage thinking about content quality, joint use and keeping sleep and movement safe rather than relying only on strict hourly limits [10]. In Indian families facing exam pressure and easy device access, small changes—such as keeping phones out of bedrooms at night or swapping one evening session for outdoor time—could prove useful.

We recognise limitations. Because we took a snapshot at one time, we cannot prove that screen time directly causes lower scores; other shared family habits might contribute. We depended on what parents remembered about screen use, which can vary in accuracy. The children came from one semi-urban area, so the exact numbers might shift in big cities or villages. On the stronger side, we used recognised assessment tools and adjusted for several important background factors.

## CONCLUSION

These results add everyday Indian evidence that greater recreational screen time often goes together with weaker performance in attention, reasoning and quick thinking among school children. While screens can support learning when chosen well, current patterns suggest families and schools should aim for a clearer balance.

Practical ideas include setting agreed device-free times (meals, an hour before bed, bedrooms), picking content together when screens are on, and making sure children get

at least an hour of active play most days. Schools could weave short talks on healthy digital habits into class time. Paediatric visits give a good moment for quick questions about screen routines.

Longer studies that follow the same children over years, ideally with actual device records, would help us understand whether cutting back on certain screen use lifts cognitive skills. For the moment, the message is simple: screens are part of modern childhood, but they help development most when they leave plenty of room for the hands-on, face-to-face experiences that let young minds grow strong.

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## CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

## ETHICAL APPROVAL

Approved by the Institutional Ethics Committee of Krishna Vishwa Vidyapeeth (Ref: KVV/IEC/2023/45). Parents gave written consent and older children added assent where appropriate

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