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DOES SCREEN CONTENT TYPE MATTER MORE THAN DURATION? ASSOCIATIONS WITH COGNITIVE AND SOCIAL DEVELOPMENT IN INDIAN CHILDREN AGED 8-14

Examining differential associations of educational and recreational screen time with academic performance and behavioural difficulties

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Abstract: *Screen time among Indian children has risen sharply in the post-pandemic period, yet most research treats all screen use as equivalent. This study examined whether the type of screen time — educational versus recreational — predicts children's cognitive and social development outcomes differently from total screen time alone. A correlational, cross-sectional design was employed with a sample of 54 parents of children aged 8–14 years recruited via WhatsApp groups. Parents completed the Screen Time Questionnaire (STQ), a five-point Academic Performance Rating for Mathematics and Language (English), and the Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997). Total screen time showed no significant association with academic performance but correlated significantly with SDQ total difficulties ($r = 0.398$, $p = 0.003$). Recreational screen time significantly predicted Language performance ($r = 0.352$, $p = 0.009$) and SDQ total difficulties ($r = 0.457$, $p < 0.001$). Multiple regression confirmed recreational screen time as the only significant predictor of Language rating ($B = 0.266$, $p = 0.012$) and SDQ total difficulties ($B = 1.985$, $p < 0.001$) after controlling for educational screen time and age. Educational screen time showed no significant associations. Findings support a content-differentiated model of screen time effects and have implications for parents, school counsellors, and digital wellness practitioners.*

Keywords **-** Screen time, cognitive development, social development, children, recreational screen time, SDQ, academic performance, India, digital media, counselling psychology

I. INTRODUCTION

The digital transformation of Indian households over the past decade has placed screens at the centre of children's daily lives. India crossed 800 million internet users in 2023, and smartphone penetration among families with school-age children has accelerated sharply since the COVID-19 pandemic shifted schooling online (Sharma & Gupta, 2022). Children aged 8–14 now navigate a landscape of educational apps, streaming platforms, social media, and gaming — often within the same device and the same hour.

Research on screen time and child development has expanded considerably, but a persistent methodological limitation runs through much of it: total screen time is treated as a single, undifferentiated variable. A child spending two hours on structured educational content and a child spending two hours on short-form entertainment video are both classified as having two hours of screen time, despite the developmental implications being potentially very different (Radesky et al., 2015; Rideout & Robb, 2019).

This study was designed to address this limitation directly. Rather than asking whether screen time is harmful or beneficial in aggregate, it examined whether educational and recreational screen time have different associations with academic performance in Mathematics and Language, and with behavioural and emotional difficulties as measured by the SDQ, in children aged 8–14 in India.

1.1. Theoretical Framework

Two theoretical positions guided this study. The Displacement Hypothesis holds that screen time, regardless of content, crowds out other cognitively and socially enriching activities — reading, outdoor play, face-to-face conversation — thereby harming development (Sigman, 2012). The Content-Based Model holds that effects depend primarily on what children watch and do on screens, not how long (Linebarger & Walker, 2005; Cardoso-Leite & Bavelier, 2014). By separating educational from recreational screen time, this study provides a direct empirical test of both frameworks.

1.2. Significance for the Indian Context

Most published screen time research draws on Western samples. India's distinctive context — high academic pressure, rapid post-pandemic device proliferation, and the coexistence of BYJU's-style educational platforms alongside YouTube Shorts and gaming — warrants dedicated investigation. This study contributes to a small but growing body of Indian-context evidence (Khobragade et al., 2025; Ray et al., 2025; Shivakumar & Mohannathan, 2024).

II. REVIEW OF LITERATURE

Madigan et al. (2019) found in a Canadian cohort that greater screen exposure at age two predicted significantly lower developmental scores at ages three and five. Christakis (2019) linked early television overuse to subsequent attention difficulties and academic problems. Nikkelen et al. (2014) conducted a meta-analysis across 33 studies and found significant associations between media use and ADHD-related behaviours in children and adolescents.

Twenge and Campbell (2018) used population-level data from the United States to show that children and adolescents with greater screen use reported lower psychological well-being, though effects were moderate and primarily observed at high usage levels. Przybylski (2019) found that moderate screen time was not strongly associated with poor mental health in adolescents, supporting a threshold or Goldilocks effect.

Conversely, Linebarger and Walker (2005) found that co-viewed educational television supported vocabulary and school readiness in young children. Cardoso-Leite and Bavelier (2014) reported that certain video games improved selective attention and visual processing. These findings collectively suggest that the content and context of screen use moderate its developmental effects considerably.

Within India, Shivakumar and Mohannathan (2024) studied 416 children aged 4–10 in Chennai and found screen time predicted internalising behavioural problems on the SDQ. A PeerJ (2025) study across multiple Indian cities found that higher screen time was associated with lower academic performance and higher anxiety. Ray et al. (2025) found average screen time of approximately 2 hours per day in a North Indian hospital outpatient sample. None of these Indian studies separated educational from recreational screen time, leaving that distinction empirically untested in this context.

A systematic review by Khobragade et al. (2025) on Indian children under five concluded that early screen use had adverse implications for cognitive and social development, with parental screen time identified as a key predictor of child screen habits, consistent with Kostyrka-Allchorne et al.'s (2017) emphasis on parental mediation.

III. RESEARCH METHODOLOGY

3.1. Research Design

A correlational, cross-sectional research design was employed. Data were collected at a single point in time. No manipulation of variables was performed. The study was conducted under a digital informed consent framework embedded in the survey.

3.2. Participants

The target population was parents of children aged 8–14 years residing in India. A convenience sample was recruited through the researcher's personal WhatsApp network, spanning college contacts, school contacts, residential community members, relatives, and office colleagues. A total of 69 responses were received in April 2026. Fifteen responses were excluded as the child fell outside the 8–14 age range, yielding a final analytical sample of N = 54 (25 male, 27 female, 2 preferred not to specify). The mean age of children was 11.46 years (SD = 1.86). Parental education: 35.2% graduate degree, 59.3% postgraduate degree, 5.6% doctoral degree. 85.2% of households reported four or more digital devices.

3.3. Instruments

All instruments were administered to parents through a single online Google Form survey. No direct child assessment was conducted.

Screen Time Questionnaire (STQ): A researcher-constructed log capturing average weekday and weekend hours of educational screen use (homework help, educational apps, online tuition) and recreational screen use (games, social media, entertainment) separately. Weighted daily averages were computed as: (weekday hours × 5 + weekend hours × 2) ÷ 7.

Academic Performance Rating: Parents rated their child's performance in Mathematics and Language (English) on a five-point scale (1 = Excellent, 2 = Above average, 3 = Average, 4 = Below average, 5 = Finds it challenging). An overall academic score was computed as the mean of the two ratings. Higher scores indicate lower performance.

Strengths and Difficulties Questionnaire (SDQ; Goodman, 1997): A 25-item validated parent-report behavioural screening tool yielding subscales for Emotional Symptoms, Conduct Problems, Hyperactivity/Inattention, and Peer Problems (each 0–10) and Prosocial Behaviour (0–10). Total Difficulties (0–40) is the sum of the first four subscales. Internal consistency $\alpha = 0.73$. The SDQ is validated in Indian populations and freely available.

3.4. Procedure

Data were collected in April 2026 via Google Forms (https://forms.gle/BXeCLsdqxVmMwA1w9). The form opened with a seven-item digital informed consent section; parents could not proceed until all statements were ticked. The STQ, Academic Performance Rating, and SDQ were embedded sequentially. The survey took approximately 15–20 minutes. Responses were stored in a password-protected Google Sheets spreadsheet. No identifying information was collected.

3.5. Data Analysis

Descriptive statistics were computed for all variables. Pearson's product-moment correlations tested Hypotheses 1 and 2 ($\alpha = 0.05$, two-tailed; $df = 52$). For Hypothesis 3, four separate multiple regression models were estimated (outcomes: Mathematics, Language, academic score, SDQ total difficulties) with educational ST and recreational ST as predictors and age as a control variable ($df = 3, 50$). All 54 participants had complete data; no imputation was required. Analyses were conducted using Python (scipy, statsmodels).

IV. HYPOTHESIS

H_{01}: There is no significant relationship between total screen time and children's cognitive (academic) development.

H_{02}: There is no significant relationship between total screen time and children's social development as measured by SDQ total difficulties.

H_{03}: There is no significant difference in the predictive relationship between educational and recreational screen time and developmental outcomes.

V. RESULTS

5.1. Descriptive Statistics

Mean total screen time was 2.80 hrs/day (SD = 1.18), comprising 0.94 hrs educational (SD = 0.66) and 1.86 hrs recreational (SD = 1.06). Weekend screen time (M = 3.44 hrs) exceeded weekday use (M = 2.54 hrs). Mathematics rating M = 2.30 (SD = 0.94), Language M = 2.06 (SD = 0.81), overall academic score M = 2.18 (SD = 0.72). SDQ Total Difficulties M = 12.02 (SD = 4.30); subscales: Emotional 2.46, Conduct 2.15, Hyperactivity 4.57, Peer 2.83. Prosocial Behaviour M = 6.69 (SD = 1.78).

5.2. Hypothesis 1 — Screen Time and Academic Development

Total screen time was not significantly correlated with Mathematics ($r = 0.030$, $p = 0.830$), Language ($r = 0.189$, $p = 0.170$), or overall academic score ($r = 0.126$, $p = 0.364$). H_{01} was retained. When screen time was disaggregated, recreational screen time correlated significantly with Language ($r = 0.352$, $p = 0.009$) and academic score ($r = 0.282$, $p = 0.039$). Educational screen time showed a non-significant negative trend with Language ($r = -0.228$, $p = 0.097$), directionally consistent with a beneficial effect. Note: higher academic scale scores indicate lower performance.

5.3. Hypothesis 2 — Screen Time and Social Development

Total screen time was significantly positively correlated with SDQ total difficulties ($r = 0.398$, $p = 0.003$). Subscale correlations: Emotional Symptoms $r = 0.384$ ($p = 0.004$), Conduct Problems $r = 0.411$ ($p = 0.002$), Hyperactivity $r = 0.260$ ($p = 0.058$, trend), Peer Problems $r = -0.073$ ($p = 0.603$, ns). Prosocial Behaviour was not significantly associated ($r = -0.021$, $p = 0.881$). H_{02} was partially rejected for SDQ total difficulties, Emotional Symptoms, and Conduct Problems.

5.4. Hypothesis 3 — Regression Analysis

Language regression: $F(3, 50) = 3.36$, $p = 0.026$, $R^2 = 0.168$. Recreational ST was the only significant predictor ($B = 0.266$, $SE = 0.101$, $t = 2.622$, $p = 0.012$). Educational ST ($B = -0.282$, $p = 0.112$) and age ($p = 0.433$) were not significant.

SDQ Total regression: $F(3, 50) = 4.98$, $p = 0.004$, $R^2 = 0.230$. Recreational ST was the only significant predictor ($B = 1.985$, $SE = 0.517$, $t = 3.843$, $p < 0.001$). Educational ST ($p = 0.832$) and age ($p = 0.258$) were not significant.

Mathematics regression: $F(3, 50) = 0.61$, $p = 0.614$ (ns). Overall academic score: $F(3, 50) = 2.25$, $p = 0.093$ (ns). H_{03} was partially rejected for Language and SDQ; retained for Mathematics.

VI. DISCUSSION

The central finding is that total screen time is an insufficient predictor of developmental outcomes. When disaggregated by content type, recreational screen time emerged as a consistent and statistically significant predictor of poorer Language performance and greater behavioural difficulties, while educational screen time showed no harmful associations and a directional trend toward benefit for Language. This pattern is consistent with the Content-Based Model and inconsistent with an undifferentiated Displacement Hypothesis.

The null effect of total screen time on academic performance conceals opposing directional effects that cancel each other when combined. Educational screen time trended toward better Language ratings while recreational screen time trended toward worse ratings. Studies reporting only total screen time may be systematically underestimating content-specific effects in both directions — a statistical masking problem with direct implications for how research findings are communicated to parents and policymakers.

Language, but not Mathematics, was significantly predicted by recreational screen time. This aligns with the observation that Language performance depends on sustained engagement with text — vocabulary, reading comprehension, and written expression — that recreational screens directly displace. Mathematics, built primarily through structured classroom instruction, is less susceptible to displacement by home screen habits.

The SDQ finding is consistent with Shivakumar and Mohannathan (2024) and the PeerJ (2025) Indian study. The emergence of Emotional Symptoms and Conduct Problems as the significantly correlated subscales suggests that the primary social cost of elevated screen use may be emotional regulation and rule-following behaviour rather than attentional difficulties. Cross-sectional data cannot establish causation: children with existing behavioural difficulties may gravitate to screens as a coping mechanism, or screen use may exacerbate existing difficulties, or both processes may operate simultaneously.

This study makes a methodological contribution to the Indian literature by explicitly separating educational from recreational screen time. A blanket recommendation to reduce screen time treats structured educational use and passive recreational consumption as equivalent, which the present data suggest they are not.

VII. LIMITATIONS

The cross-sectional design precludes causal inference. The convenience sample, recruited through WhatsApp networks, skews toward educated urban families and limits generalisability. As the survey had no geographic restriction, the regional composition of the sample is unknown. All data are parent-reported, introducing shared method bias across screen time estimates, academic ratings, and SDQ responses. The sample of 54 is adequate for detecting medium effects but may be insufficient for small effects. The academic rating scale cannot account for variation in grading standards across schools.

VIII. Conclusion

This study demonstrates that the distinction between educational and recreational screen time has measurable and statistically significant differential associations with Language performance and behavioural difficulties in Indian children aged 8–14. Total screen time, the metric most commonly used by parents and researchers, fails to capture this distinction. Counsellors, educators, and parents are better served by asking what a child does on screens than how long they spend on them. Future research should employ longitudinal designs, objective device-tracking data, and larger, more socioeconomically diverse Indian samples to establish temporal direction and test whether reducing recreational screen time improves Language outcomes and reduces behavioural difficulties.

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