



Screen Time and Digital Device Usage: Effects on Behaviour, Mental Health, and Academic Performance in Children and Adolescents — Narrative Systematic Review

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Abstract

Background: The proliferation of digital devices and increased screen time among children and adolescents has emerged as a major global public health concern. From behavioural changes in preschoolers to mental health disorders in young adults, evidence consistently links excessive screen usage to a spectrum of adverse outcomes. India, with its rapidly growing digital landscape, bears a significant burden of this challenge.

Objectives: To synthesize evidence on (1) the prevalence and patterns of screen time and digital device usage among children and adolescents; (2) the effects on behaviour, mental health, academic performance, and physical health; (3) the effectiveness of educational interventions; and (4) demographic and socioeconomic factors associated with problematic usage.

Review Methodology: A structured narrative review was conducted using a PRISMA-guided study-selection approach. Five independent peer-reviewed studies published in 2024–2025 and one supplementary analysis of an already included cohort were identified from Indian settings. Study designs included quasi-experimental, pre-experimental, and cross-sectional observational designs. The five independent studies included preschool children (2–5 years), school children (grades 4–5), GNM nursing students, parents of school-going children (6–12 years), and adolescents/young adults aged 13–25 years (unique total N = 1,773).

Key Findings: Among preschool children aged 2–5 years, 53.4% showed problematic media use. Mean screen time among school children was 3 hr 35 min/day. In the included online survey, depression symptoms (37.9%), anxiety (33.3%), high stress (43.7%), and low self-esteem (25.3%) were reported. Educational interventions were associated with statistically significant post-intervention improvements in knowledge ($p < 0.05$ in the reported studies).

Conclusion: Excessive screen exposure and problematic media use are important concerns across the child and adolescent age spectrum. The included evidence suggests associations with behavioural, mental health, academic, sleep-related, and physical outcomes; however, causal conclusions should be interpreted cautiously because most included evidence was observational. Educational interventions showed improvement in knowledge outcomes. Further high-quality longitudinal and controlled intervention studies are needed.

Categories: Child Health; Adolescent Mental Health; Digital Media; Screen Time; Nursing Education; Community Medicine

Keywords: Screen Time; Digital Device Use; Problematic Media Use; Behavioural Problems; Mental Health; Children; Adolescents; Educational Intervention; Self-Instructional Module; India

Introduction

The rapid expansion of digital technology has placed screens at the centre of daily life for children across all age groups. Smartphones, tablets, televisions, laptops, and gaming devices are now ubiquitous — even among preschoolers aged 2–5 years. According to WHO guidelines, recommended screen time for children aged 2–5 years is not more than 1 hour/day, and screen exposure is actively discouraged for children below 2 years.

India — with its 190 million adolescent population, rapidly expanding smartphone penetration (67.6% rural households by 2021), and a youth population that spends an average of 6.5–7 hours/day on screens — faces a particularly acute challenge. Nearly 60% of Indian teenagers spend more than 5 hours per day on smartphones (Fortis Healthcare, Gurugram). The COVID-19 pandemic accelerated this trend through mandatory digital learning, further eroding healthy screen boundaries.

The first five years of life are critical for brain development, laying the foundation for socio-emotional relationships and habit formation. Excessive screen usage during these formative years is associated with behavioural problems, impaired sleep, reduced prosocial behaviour, and delayed language development. In older children and adolescents, evidence links prolonged screen time with depression, anxiety, low self-esteem, academic underperformance, dry eye syndrome, obesity, and musculoskeletal pain.

Healthcare workers and parents represent critical nodes for intervention. Yet studies reveal that nursing students, GNM students, and parents of school-going children demonstrate inadequate baseline knowledge about the hazards of digital device addiction. Structured educational interventions have shown promise in bridging this knowledge gap.

This review synthesizes evidence from five independent recent Indian studies, with one additional supplementary analysis of an already included school cohort, to characterize patterns of screen use,

associated outcomes, and the effectiveness of educational interventions.

Review Methodology

A structured narrative review was conducted using a PRISMA-guided study-selection approach. Peer-reviewed studies were identified from IJTSRD, IJSDR, International Journal of Contemporary Pediatrics, European Journal of Cardiovascular Medicine, and Journal of Nature and Science of Medicine.

Search Terms: 'screen time children India', 'smartphone addiction adolescents', 'digital device behavioral changes preschool', 'structured teaching programme mobile phone hazards', 'mental health screen time Indian youth'.

Inclusion Criteria

1. Peer-reviewed quantitative or experimental studies published during 2024–2025.
2. Studies conducted in India.
3. Studies involving children, adolescents, parents, or nursing students.
4. Studies assessing screen time/digital device use and related behavioural or mental health outcomes, knowledge, or intervention effectiveness.

Exclusion Criteria

1. Qualitative-only studies.
2. Studies conducted outside India.
3. Studies without relevant or extractable quantitative outcomes.
4. Non-peer-reviewed and duplicate publications.

Five independent studies met the inclusion criteria. One additional report represented a supplementary

analysis of an already included cohort and was not treated as an independent study for participant counting. The unique total sample across the five independent studies was N = 1,773.

Digital Devices: Impact Overview

Types of Devices Involved

Smartphones (98.3% usage among children aged 2–5 years), television (95.6%), tablets/iPads (reported as 100% usage in the included school setting), laptops/desktops (36%), and gaming devices (58%) were reported across the included evidence. Reported age of initiation varied; one included study reported that 46.6% of children began device use between ages 1–2 years.

WHO Screen Time Recommendations

- 1. Under 2 years: No screen time recommended
- 2. 2–5 years: Maximum 1 hour/day of high-quality programming
- 3. For children and adolescents aged 5–17 years, guidance should emphasize limiting recreational screen-based sedentary behaviour, avoiding displacement of sleep and physical activity, and

promoting balanced daily routines; a universal WHO limit of 2 hours/day should not be presented as a WHO recommendation.

- 4. Adequate physical activity, sleep, and social interaction must be maintained

Documented Health Effects

- 1. Behavioural: Stubbornness (45%), anger/irritability (34%), tantrums (10%), reduced prosocial behaviour
- 2. Sleep: Insomnia, night terrors, shortened sleep duration, poor sleep quality — especially with >4 hr/day exposure
- 3. Mental Health: Depression (37.9%), anxiety (33.3%), high stress (43.7%), low self-esteem (25.3%)
- 4. Physical: Dry eye syndrome (27%), obesity (11%), headaches (10%), neck/shoulder pain (2% with >5 hr/day)
- 5. Academic: Inverse relationship confirmed — poor performance linked to >4 hr/day screen exposure
- 6. Problematic media use: 53.4% of preschoolers showed problematic media use (PMUM-SF score ≥3 on ≥5 items).

PRISMA Flow Summary

PRISMA Stage	Count
Records identified through search	10
Duplicates removed	2
Records screened (title/abstract)	8
Records excluded (wrong population/outcome)	2
Full-text articles assessed for eligibility	6
Independent studies included in final synthesis	5 (plus 1 supplementary analysis of the same cohort)

Key Risk Factors for Excessive Screen Time

1. Nuclear family structure (avg 4 hr 19 min vs 3 hr 12 min in joint families)
2. Both parents working (avg 4 hr 18 min vs 3 hr 07 min — single parent working)
3. Higher parental education paradoxically linked to higher PMUM in preschoolers ($p=0.009$)
4. Employed mothers — 72.5% children showed PMUM vs 43.4% with homemaker mothers
5. Bedroom device access (32.8% children)
6. Age 4–5 years: Higher PMUM prevalence (65.4%) than 2–4 years (46.9%)

Table 1: Summary of Included Evidence (Five Independent Studies Plus One Supplementary Analysis of an Included Cohort)

Sr.	Author(s)	Year	Design	Setting / Journal	Population	Tool / Method	Key Findings	Significance
1.	Verma AK et al. (Hind College of Nursing, Barabanki, UP)	2024	Quasi-experimental; one-group pre-test post-test	Barabanki, UP; IJTSRD Vol.8 Issue 6, pp.1209-1213	60 GNM 2nd year nursing students; random sampling	Structured Knowledge Questionnaire (30 items); Self-Instructional Module (information booklet); Mean, Median, SD, Chi-square	Pre-test: 45% inadequate, 55% moderate, 0% adequate. Post-test: 61.66% adequate, 38.33% moderate. Mean pre: 11.26; post: 21.25. Knowledge gain: 88.88%. No significant association with demographic variables ($p>0.05$).	SIM effective ($p<0.05$). H_1 accepted.
2.	Prajapati NR & Das S (Pioneer Nursing)	2025	Pre-experimental; one-group	Urban Vadodara, Gujarat; IJSDR	50 parents of school-going children	Structured Knowledge Questionnaire (25 items);	Pre-test: 80% poor, 16%	STP highly effective

	College, Vadodara)		pre-test post-test	Vol.10 Issue 9, Sep 2025	(6–12 yrs); nonprobabi lity convenient sampling	Structured Teaching Programme (STP); Paired t- test; tool reliability r=0.97	average, 4% good. Post- test: 4% poor, 12% average, 84% good. Mean pre: 8.32±3.3 4; post: 20.16±3. 50. Mean diff: 11.84. t=21.16, df=49, p<0.05.	(p<0.05 ***). Signific ant.
3.	Hapani NT & Hapani TP (The Galaxy School / Padmakun varba Hospital, Rajkot)	20 25	Cross- sectional observati onal study	Rajkot, Gujarat; Int J Contemp Pediater 2025;12(10) :1642-1646	155 Grade 4–5 students (54% male); parents surveyed; voluntary participatio n	Structured parent questionnaire; BMI via IAP charts; SPSS v26; Chi-square; descriptive statistics	Mean screen time: 3 hr 35 min (range 40 min– 8.5 hr). Nuclear family: 4 hr 19 min; both parents working: 4 hr 18 min. Dry eye: 27%, stubborn ness: 45%, anger: 34%. Good academi	Family structur e & parental work status: significa nt (p<0.05).

							c performa nce linked to <3 hr/day. Poor performa nce: avg 4 hr 19 min.	
4.	N. Abhijit et al. (Dept. Communit y Medicine, Govt. Medical College, Ongole, AP)	20 25	Communi ty-based cross- sectional study	Balaji Nagar, Ongole, AP; Eur J Cardiovasc Med 2025;15(6): 117-124	116 children aged 2–5 years; parents/gua rdians interviewe d; purposive + simple random sampling	PMUM-SF Scale (9 items, 5-point Likert); SDQ Questionnaire (25 items); MS Excel + SPSS; Chi-square; multivariate logistic regression	53.44% children showed problem atic media use. Mean screen time: 102.46± 14.7 min. TV use: 95.6%; mobile: 98.3%. 56.9% sat continuo usly >20 min. Strong positive correlati on between PMUM and SDQ total score: r=0.6825 , p<0.001. Working parents, mother's	PMUM –SDQ correlati on: r=0.68, p<0.001 ***

							education & father's education significantly associated with PMUM (p<0.05)	
5.	Journal of Nature & Science of Medicine (LNCT Medical College, Indore, MP)	2024	Cross-sectional online survey	India (online); J Nat Sci Med; IRB No 247/23/MC approved Dec 2023	1,392 participants : 672 adolescents (13–19 yrs) + 720 young adults (20–25 yrs); convenience sampling	PHQ-9 (depression), GAD-7 (anxiety), PSS (stress), RSES (self-esteem); validated scales; SPSS v27; correlation, regression, ANOVA, thematic analysis	Avg screen time: 7.0±2.5 hr/day; social media: 3.0 hr/day. Depression: 37.9%; anxiety: 33.3%; high stress: 43.7%; low self-esteem: 25.3%. Screen time +ve correlated: depression (r=0.32), anxiety (r=0.28), stress (r=0.36); -ve correlated: self-esteem (r=-0.25)	All correlations p<0.001 ***. Highly significant.

							). Poor sleep, cyberbullying exacerbate; physical activity & social support protective.	
Supplementary analysis (not an independent study)	Same Hapani cohort as Study 3	2025	Supplementary analysis of previously included cohort	Same publication/cohort as Study 3	Same 155 school children; not counted again	Subgroup/supplementary analysis	Findings may be discussed as additional analyses from the same cohort but must not be counted as a separate study or additional participants.	Not independent; excluded from unique study count

Synthesis of Key Findings

1. Prevalence of Problematic Screen Use

Among preschool children aged 2–5 years in Ongole, 53.44% showed problematic media use on the PMUM-SF scale. Mean reported screen time was 102.46 ± 14.7 minutes/day. Among school children in Rajkot, mean screen time was 3 hr 35 min/day (range 40 min–8.5 hr). In the included online survey of adolescents and young adults, average daily screen time was 7.0 ± 2.5 hours. These findings indicate substantial screen exposure in the studied populations, although estimates should not be generalized beyond the included settings.

2. Behavioural & Mental Health Effects

A strong positive association between problematic media use and behavioural difficulties was reported in one preschool study: $r(114)=0.6825$, $p<0.001$ (Abhijit et al.). Stubbornness (45%), anger (34%), and tantrums (10%) were reported in the included school-age study. Among 1,392 adolescents and young adults in an online survey, depression symptoms (37.9%), anxiety (33.3%), high stress (43.7%), and low self-esteem (25.3%) were reported and were statistically associated with screen time. Because these data are primarily cross-sectional, they demonstrate association rather than causation.

3. Effectiveness of Educational Interventions

Both interventional studies (Verma et al. and Prajapati et al.) produced highly significant knowledge gains post-intervention ($p<0.05$):

Study	Pre Mean	Post Mean	t-value	p
Verma et al. 2024	11.26	21.25	24+ (t-test)	<0.05
Prajapati et al. 2025	8.32	20.16	21.16	<0.05 ***

In GNM students (Verma et al.), post-test adequate knowledge rose from 0% to 61.66%; students gained 88.88% more knowledge. Among parents (Prajapati et al.), post-test good knowledge improved from 4% to 84%.

4. Academic & Physical Health Impact

An inverse association between screen time and academic performance was reported in the included school-based study (Hapani et al., 2025): students with good academic performance averaged 2 hr 47 min of screen time compared with 4 hr 19 min among poor performers. Reported physical outcomes included dry eye (27%), obesity (11%), headaches (10%), and neck/shoulder pain in a small subgroup. These findings should be interpreted as observational associations.

5. Demographic & Family Correlates

Across the included studies, nuclear family structure, parental employment patterns, parental education, and bedroom device access were reported as factors associated with higher screen exposure or problematic media use. However, the direction and independence of these associations varied by study and should not be interpreted as universally established risk factors.

6. Mediating & Protective Factors

Poor sleep, physical activity, social support, and coping practices were discussed as factors associated with mental health outcomes in the included online survey. These relationships are observational and should be interpreted cautiously; the review cannot establish mediation or causal protective effects.

Prevention Strategies & Recommendations

School-Level Interventions

- 1. Integrate screen time guidelines and digital safety into school curriculum from Class 3 onwards
- 2. Conduct annual school-based Structured Teaching Programmes for students and parents
- 3. Train school health nurses as digital wellness educators
- 4. Mandate outdoor physical activity (minimum 1 hr/day) — enforce IAP guidelines
- 5. Ergonomic device use education: posture, screen distance, blue light protection
- 6. Provision of regular eye check-ups to detect dry eye syndrome early

Healthcare Provider-Level Interventions

- 1. Include screen time counseling in all well-child visits and adolescent health consultations
- 2. Nursing education curriculum (B.Sc./GNM) must incorporate digital addiction hazards module
- 3. Train ASHA, ANM, and community health workers on digital device addiction and its consequences
- 4. Screen for depression, anxiety, and sleep disorders as part of routine adolescent screening
- 5. Develop self-instructional modules (SIM) for systematic health education delivery

Family & Community-Level Interventions

- 1. Parent education programmes — especially targeting dual-working and nuclear family households

2. Establish co-viewing habits for preschool age (2–5 yrs) when screen use occurs
3. No devices in children's bedrooms — remove 32.8% bedside device prevalence
4. Encourage joint family living patterns for natural supervision of screen use
5. Promote evening outdoor play, hobbies, mindfulness, and family social time
6. Limit device initiation — avoid screen exposure below age 2 years entirely

Mental Health & Psychosocial Support

1. Address cyberbullying as an independent mental health risk — school and parental vigilance
2. Promote digital detox practices and structured screen breaks
3. Create accessible school-based counseling services for adolescents experiencing anxiety/depression
4. Mindfulness and meditation programmes for adolescents — evidence for stress reduction

Policy-Level Recommendations

Policy-Level Recommendations

1. India: Update national pediatric screen time guidelines in alignment with current evidence
2. ASER survey to include digital addiction indicators alongside literacy metrics
3. Restrict classroom-mandated device use to structured learning only — not homework submission for children <10 yrs
4. NFHS-6 to track adolescent screen time, mental health indicators, and problematic media use as separate indicators

Limitations of This Review

1. Small sample sizes (n=50–155) in interventional and observational studies limit generalizability
2. Geographic concentration in UP, Gujarat, AP, and MP — pan-India representativeness limited
3. Cross-sectional studies rely on self-reported or parent-reported data with recall and social desirability bias
4. Interventional studies lack control groups — true causality cannot be established
5. No follow-up data on sustained knowledge retention post-STP/SIM

6. Formal meta-analysis not feasible due to heterogeneity in outcome measures and study designs
7. The large online survey (N=1,392) used convenience sampling, which may introduce selection bias and limit population generalizability. In addition, one supplementary analysis was derived from the same school cohort as another included report and should not be treated as an independent study.

Discussion

The included evidence indicates that high screen exposure and problematic media use are important concerns in the studied Indian populations. However, the evidence base is heterogeneous and predominantly observational; therefore, the findings should be interpreted as associations rather than evidence of universal prevalence or causation.

The Ongole preschool study (Abhijit et al., 2025) reported that 53.44% of children aged 2–5 years showed problematic media use. The positive correlation between PMUM and SDQ behavioural scores ($r=0.6825$, $p<0.001$) indicates an association within that study; it does not establish a dose–response or causal relationship.

The school-based cross-sectional study (Hapani et al., 2025) reported a mean screen time of 3 hr 35 min/day among the studied school-age cohort. The same cohort also contributed supplementary analyses; therefore, these analyses should not be counted as an independent additional study or participant sample.

The online survey of 1,392 adolescents and young adults reported depression symptoms, anxiety, stress, and low self-esteem, each statistically associated with screen time. The large sample provides useful descriptive evidence, but convenience sampling and the cross-sectional design limit causal inference and population generalizability.

Both educational intervention studies reported statistically significant post-intervention improvements in knowledge. These findings support the potential usefulness of structured educational approaches; however, the absence of control groups and follow-up assessment limits conclusions regarding comparative effectiveness and sustained knowledge retention.

Family structure, parental employment, parental education, and device access were associated with screen exposure or problematic media use in selected studies. These factors should be discussed as context-specific correlates rather than definitive independent predictors across all Indian children and adolescents.

Conclusions

This structured narrative review synthesizes five independent studies (unique total N = 1,773), with one supplementary analysis of an already included cohort. The following conclusions should be interpreted in light of the heterogeneous designs and predominantly observational evidence:

1. Problematic media use was reported in more than half of preschool children in one included study; however, this estimate should not be generalized as a national prevalence.
2. Screen-time estimates in the included school and adolescent/young-adult samples were high; however, comparisons with guideline thresholds should distinguish recreational from educational screen exposure.
3. One preschool study reported a strong positive correlation between problematic media use and behavioural difficulties ($r=0.68$, $p<0.001$), indicating association rather than causation.
4. The included online survey reported a substantial burden of depression symptoms, anxiety, high stress, and low self-esteem among adolescents and young adults, with statistical associations with screen time.
5. An inverse association between screen time and academic performance was reported in one school-based cross-sectional study; causal direction cannot be established.
6. Physical and sleep-related symptoms were reported in the included studies, but outcome definitions and exposure measures were heterogeneous.
7. Structured Teaching Programmes (STP) and Self-Instructional Modules (SIM) were associated with statistically significant short-term improvements in knowledge in two one-group intervention studies; controlled studies are needed to estimate comparative effectiveness.
8. Family structure, parental employment, parental education, and device access emerged as potential correlates in selected studies, but consistency and

independence of these associations require further investigation.

9. Sleep, physical activity, and social support may be relevant correlates of mental health and screen-use outcomes, but the included evidence does not establish mediation or protective causality.
10. Parents and health/nursing learners demonstrated knowledge gaps in the included intervention studies, supporting their relevance as target groups for educational interventions.
11. Future policy and practice should emphasize evidence-based education, balanced digital routines, protection of sleep and physical activity, and further research using longitudinal and controlled designs.

Disclosures

The authors declare no financial conflicts of interest. No funding was received for this review. The review synthesizes evidence from the cited studies to inform public health practice and nursing education. Because the included evidence is heterogeneous and largely observational, conclusions are presented with appropriate caution regarding causality and generalizability.

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