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Research Article

Parental Perspectives on Mobile Screen Time: A Mixed Methods Study of its Impact on Children's Sleep and Behaviour

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ABSTRACT

Background: Escalating mobile screen use among children is a global public health concern. Evidence links excessive screen time to sleep disturbances and behavioural difficulties; however, the mechanisms and parental contextual factors remain poorly characterised, especially in South Asian urban settings.
Objectives: To quantify associations between children's mobile screen time and sleep/behavioural outcomes, and to explore parental perspectives, strategies, and barriers in managing screen use.
Methods: An Explanatory Sequential Mixed Methods design was employed. Phase 1 consisted of a cross-sectional survey of 400 parents/caregivers at a paediatric outpatient clinic in Gandhinagar, India, using the Short-Form Children's Sleep Habits Questionnaire (SF-CSHQ) and the Strengths and Difficulties Questionnaire (SDQ). Phase 2 comprised semi-structured interviews with 30 purposively selected parents, analysed using Braun & Clarke reflexive thematic analysis (NVivo 14). Multivariable logistic regression identified independent predictors of poor sleep risk (SF-CSHQ ≥30).
Results: Mean child age was 9.8±2.3 years; 53.5% were male. High screen time (≥2h/day) was reported in 53% of children; 40.5% had bedtime use exceeding 30 minutes. On multivariable analysis, bedtime screen time >30 minutes (aOR 2.81, 95%CI 1.74–4.54, p<0.001), total daily screen time >2h (aOR 2.14, 95%CI 1.38–3.32, p=0.001), and absence of parental screen rules (aOR 1.89, 95%CI 1.22–2.93, p=0.004) were independent predictors of poor sleep risk. SDQ total difficulty scores were significantly higher in the high screen time group (14.2 vs 8.6, p<0.001). Qualitatively, five core themes emerged: screen as emotional soother, bedtime negotiation and conflict, perceived educational value, barriers to enforcement (parental fatigue, cultural norms), and limited digital literacy.
Conclusions:
Bedtime screen exposure and absence of parental rules are the strongest modifiable predictors of childhood sleep problems. Culturally tailored counselling interventions and school-based programmes are urgently needed.

Keywords*: mobile screen time; children; sleep; behaviour; parental perspectives; mixed methods; India.*

INTRODUCTION

The proliferation of smart mobile devices has fundamentally altered the ecology of childhood. Global estimates indicate that children between the ages of 6 and 14 years are exposed to mobile screens for an average of 3–5 hours daily, with substantially higher rates observed in lower- and middle-income countries where regulatory frameworks remain nascent [1,2]. India, with over 750 million smartphone users and a rapidly expanding 5G footprint, exemplifies this trajectory; recent national surveys suggest nearly 70% of school-aged children access mobile devices on a daily basis [3].

The neurobiological consequences of excessive screen exposure during childhood are increasingly recognised. Blue-light emission from mobile devices suppresses melatonin secretion, delays sleep-onset latency, and disrupts circadian rhythmicity [4,5]. Cross-sectional and longitudinal studies have consistently reported shorter sleep duration, more

frequent night awakenings, and daytime somnolence among children with higher screen time [6,7]. Concurrently, behavioural sequelae—including inattention, hyperactivity, irritability, and emotional dysregulation—have been associated with excessive digital media use, potentially mediated through sleep disruption itself [8,9].

Notwithstanding this evidence base, the mechanistic pathways remain incompletely characterised, and the role of the proximal family environment is underexplored. Parents are the primary architects of children's media environments, yet they operate under significant structural constraints: dual-income households, limited digital literacy, cultural norms of communal screen sharing, and the inherent tension between screen use as a perceived educational tool versus a recreational indulgence [10,11]. Quantitative studies capture prevalence and associations but cannot illuminate the lived experiences, decision-making frameworks, and socio-cultural determinants that shape parental management of screen time.

To address these gaps, the present study employs an Explanatory Sequential Mixed Methods design, combining a large-scale cross-sectional survey with in-depth qualitative interviews, conducted in a tertiary paediatric outpatient setting in Gandhinagar, Gujarat, India. The study has three inter-related objectives: (i) to quantify the association between children's mobile screen time and validated measures of sleep quality and behavioural difficulties; (ii) to identify independent predictors of sleep problems using multivariable logistic regression; and (iii) to explore, through parents' own narratives, the mechanisms, cultural contexts, and strategies that underpin these associations.

METHODS

Study Design and Setting

An Explanatory Sequential Mixed Methods design was adopted, comprising a Phase 1 quantitative survey followed by Phase 2 qualitative interviews, with formal integration at the interpretation stage [12]. The study was conducted in the Paediatric Outpatient Department (OPD) of GMERS Medical College and Hospital, Gandhinagar, Gujarat, India, a government-funded tertiary care institution serving a predominantly urban and peri-urban population. Ethical approval was obtained from the Institutional Ethics Committee (IEC), GMERS Medical College, Gandhinagar. Written informed consent was obtained from all participants.

Phase 1: Cross-Sectional Survey

Parents or primary caregivers of children aged 6–14 years attending the Paediatric OPD were recruited by consecutive sampling from January to August 2025. Children with major neurodevelopmental disorders affecting sleep or behaviour (e.g., autism spectrum disorder, intellectual disability, attention-deficit/hyperactivity disorder requiring pharmacotherapy) were excluded to avoid confounding. A sample size of 400 was calculated to detect an odds ratio of approximately 1.6 with 80% power at α=0.05 with up to 10 predictor variables in multivariable analysis.

The survey instrument comprised five sections: (A) child demographics; (B) screen use metrics (weekday/weekend duration, bedtime use, activity type, device location at night); (C) sleep quality via the Short-Form Children's Sleep Habits Questionnaire (SF-CSHQ, 23 items; score ≥30 indicates sleep problem risk); (D) behaviour via the Strengths and Difficulties Questionnaire (SDQ, parent-report, ages 4–17, 25 items across five subscales); and (E) family rules and parental attitudes. Questionnaires were administered interviewer-assisted in English, Gujarati, or Hindi over 12–15 minutes.

Phase 2: Qualitative Interviews

Thirty parents were purposively sampled from survey respondents to achieve maximum variation across four matrix cells: high screen/poor sleep; high screen/good sleep (resilient); low screen/poor sleep; and SDQ-flagged behavioural concern. Semi-structured individual interviews lasting 40–60 minutes were conducted in a private room adjacent to the OPD. An interview guide (pilot-tested with five parents) covered: (1) child's typical daily screen routine; (2) perceived links between screen use and sleep; (3) perceived links with behaviour; (4) parental strategies and rule enforcement; (5) challenges and facilitators; (6) perceived benefits; and (7) advice to other parents.

Interviews were audio-recorded with written permission and transcribed verbatim in the original language, then translated into English by bilingual researchers. Braun & Clarke's six-phase reflexive thematic analysis was applied using NVivo 14 [13]. Reflexivity logs were maintained. Inter-rater reliability was established by dual-coding 20% of transcripts, targeting a Cohen's kappa (κ) ≥0.70. Thematic saturation was monitored from the eighteenth interview onward.

Integration

Quantitative findings directed purposive sampling for qualitative interviews (connecting strategy). Joint displays were constructed to merge statistical associations with qualitative explanatory themes (merging strategy). Convergence, complementarity, and divergence across strands were explicitly examined in the interpretation [12].

Statistical Analysis

Descriptive statistics included means ± standard deviations (SD) for continuous variables and frequencies with percentages for categorical variables. Independent-samples t-tests and Mann-Whitney U tests compared continuous outcomes between screen time groups; chi-squared tests compared proportions. Pearson's correlation examined the

association between bedtime screen time and SF-CSHQ total score. Multivariable binary logistic regression (dependent variable: SF-CSHQ ≥30) was performed using backward conditional elimination; goodness-of-fit was assessed with the Hosmer-Lemeshow test, and explained variance by Nagelkerke R^2. Interaction terms for screen use × parental rules were explored. All analyses used R v4.3.1; two-tailed significance was set at $p<0.05$.

RESULTS

Participant Characteristics

Figure 1 presents the CONSORT-adapted participant flow. Of 450 parents approached, 400 (88.9%) completed the survey (Phase 1). Thirty of 40 invited parents participated in interviews (Phase 2 response rate: 75%). Sociodemographic characteristics are summarised in Table 1. Mean child age was 9.8±2.3 years (range 6–14); 53.5% were male. Approximately half (51%) were in the 10–14-year age group. Mothers constituted 66% of respondents. Nearly half (47%) of families were of upper or middle SES, and 56% reported having household screen time rules.

Figure 1. Participant Flow Diagram (CONSORT-Adapted)

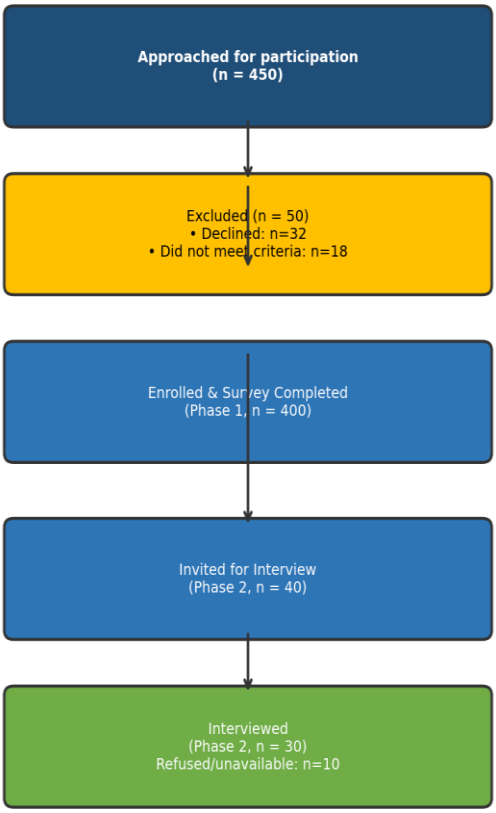

Figure 1. CONSORT-Adapted Participant Flow Diagram.

Table 1. Sociodemographic Characteristics of Study Participants (n=400)

Characteristic	n (%)	Mean ± SD	Range
Total participants	400 (100%)	—	—
Child age (years)	—	9.8 ± 2.3	6–14
6–9 years	196 (49%)	—	—
10–14 years	204 (51%)	—	—
Child sex	—	—	—
Male	214 (53.5%)	—	—
Female	186 (46.5%)	—	—
School grade	—	4.2 ± 2.1	1–9

Parent/caregiver	—	—	—
Mother	264 (66%)	—	—
Father	112 (28%)	—	—
Other	24 (6%)	—	—
Socioeconomic status (SES)	—	—	—
Upper/Middle	188 (47%)	—	—
Lower-Middle	144 (36%)	—	—
Lower	68 (17%)	—	—
Parental screen rules (Yes)	224 (56%)	—	—
Parental confidence (Likert 1–5)	—	3.1 ± 0.9	1–5

SES = Socioeconomic Status. Values are n (%) or mean ± SD.

Screen Time Patterns

Figure 2 illustrates the distribution of screen time by weekday versus weekend. On weekdays, 40% of children used screens for more than one hour daily; this rose to 67% on weekends and holidays. High total daily screen time (≥2 hours) was present in 212 children (53%). Bedtime screen use exceeding 30 minutes was reported for 40.5% of the cohort. The most common activity was video streaming (YouTube, OTT platforms) reported by 72%, followed by gaming (44%), social/messaging (28%), and schoolwork-related use (38%). The device was located in the child's bedroom overnight in 63.5% of households.

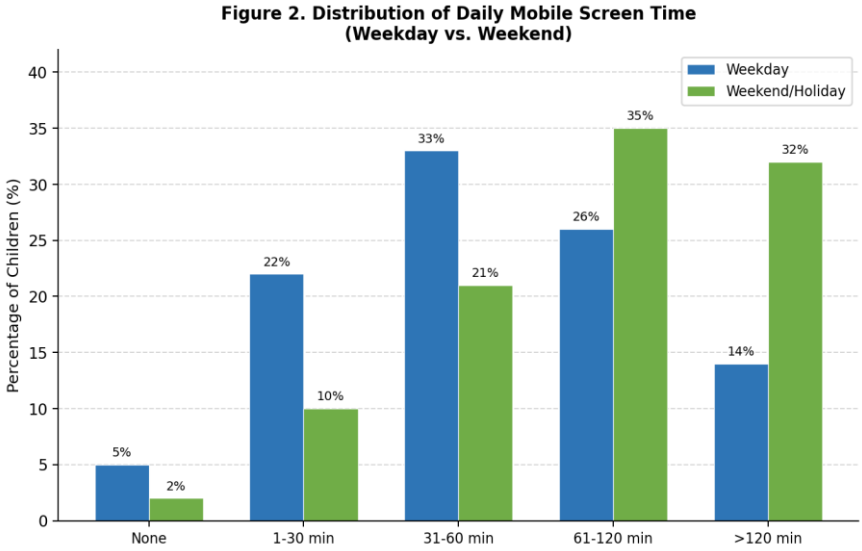

Figure 2. Distribution of Daily Mobile Screen Time (Weekday vs. Weekend/Holiday). Values are percentages.

Sleep Quality (SF-CSHQ)

The mean SF-CSHQ total score for the entire cohort was 30.9±5.6. Using the validated cutoff of ≥30, 48% of children (n=192) were classified as at risk for a behavioural sleep problem. Figure 3 demonstrates a stepwise increase in mean SF-CSHQ scores across screen time categories: 27.4±0.8 (low, <1h/day), 31.2±0.9 (moderate, 1–2h/day), and 35.8±1.1 (high, >2h/day; one-way ANOVA $F=148.2$, $p<0.001$). Post-hoc Tukey tests confirmed all pairwise differences were significant (all $p<0.001$).

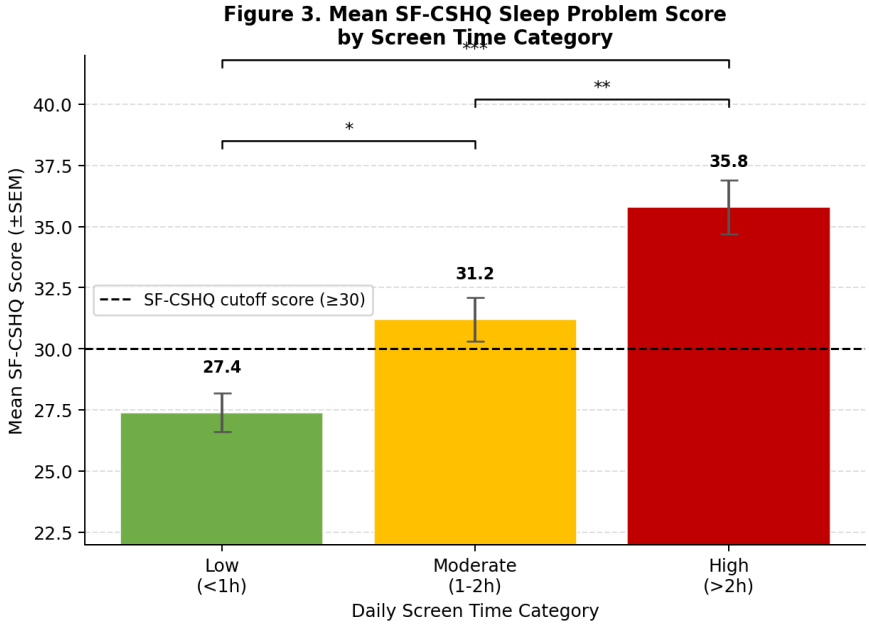

Figure 3. Mean SF-CSHQ Sleep Problem Score (±SEM) by Screen Time Category. Significance brackets: *p<0.05, **p<0.01, ***p<0.001. Dashed line indicates risk threshold (score≥30).

Pearson's correlation between bedtime screen time (minutes) and SF-CSHQ total score was r=0.54 (95%CI 0.46–0.61, p<0.001; Figure 5, presented later). The most affected SF-CSHQ domains were Sleep Onset Delay (47% scoring "usually"), Night Wakings (38%), and Morning Wake Difficulty (41%).

Behavioural Outcomes (SDQ)

Figure 4 displays mean SDQ subscale scores stratified by screen time group. High screen time (≥2h/day) was associated with significantly higher scores across all four difficulties subscales. Total Difficulties scores were 14.2±4.8 in the high screen group versus 8.6±3.2 in the low screen group (t=14.9, df=398, p<0.001). The Hyperactivity/Inattention subscale showed the largest absolute difference (5.4 vs 3.1; Cohen's d=0.58). Abnormal SDQ total scores (>17) were present in 46.2% vs 11.7% of high versus low screen time children, respectively (χ^2=64.3, p<0.001).

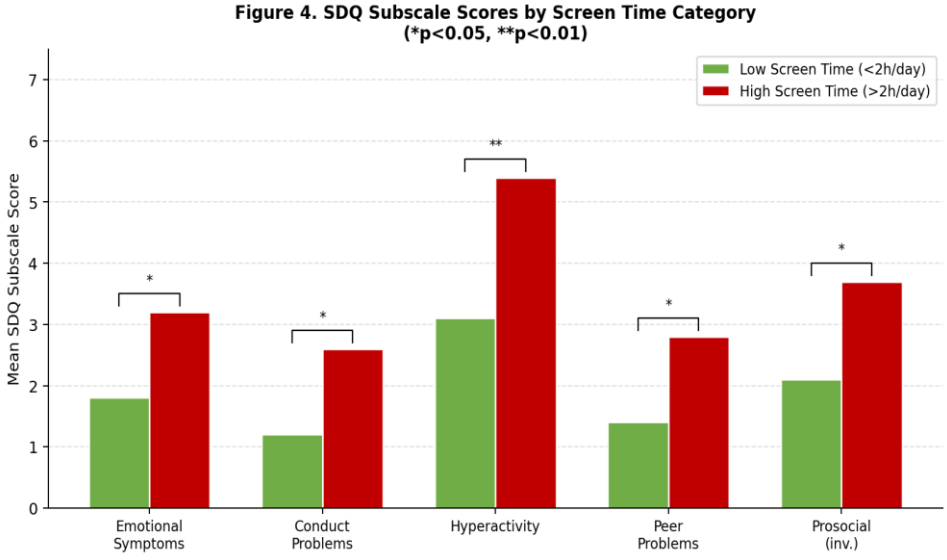

Figure 4. Mean SDQ Subscale Scores by Screen Time Category. Prosocial subscale is inverted for directionality. *p<0.05, **p<0.01.

Bivariate and Correlational Analysis

Table 2 summarises bivariate comparisons between the low and high screen time groups across all primary and secondary outcomes. All comparisons were statistically significant ($p<0.001$). Figure 5 depicts the scatter plot with regression line for bedtime screen time versus SF-CSHQ total score, confirming a moderately strong positive linear relationship ($r=0.54$, $p<0.001$).

Table 2. Bivariate Comparison of Outcomes by Screen Time Group

Variable	Low ST (<2h/d) n=188	High ST (≥2h/d) n=212	Statistic	p-value
SF-CSHQ Total (mean±SD)	27.4 ± 4.1	33.9 ± 5.2	t = 14.2	<0.001***
SF-CSHQ ≥30 (risk) n(%)	44 (23.4%)	148 (69.8%)	χ^2=86.4	<0.001***
SDQ Total Difficulties (mean)	8.6 ± 3.2	14.2 ± 4.8	t = 14.9	<0.001***
SDQ Abnormal (>17) n(%)	22 (11.7%)	98 (46.2%)	χ^2=64.3	<0.001***
Bedtime use >30 min n(%)	36 (19.1%)	164 (77.4%)	χ^2=141.2	<0.001***
Screen in bedroom n(%)	72 (38.3%)	182 (85.8%)	χ^2=94.7	<0.001***
No parental rules n(%)	62 (33%)	114 (53.8%)	χ^2=18.4	<0.001***

*ST = Screen Time; SF-CSHQ = Short-Form Children's Sleep Habits Questionnaire; SDQ = Strengths and Difficulties Questionnaire. ***p<0.001.*

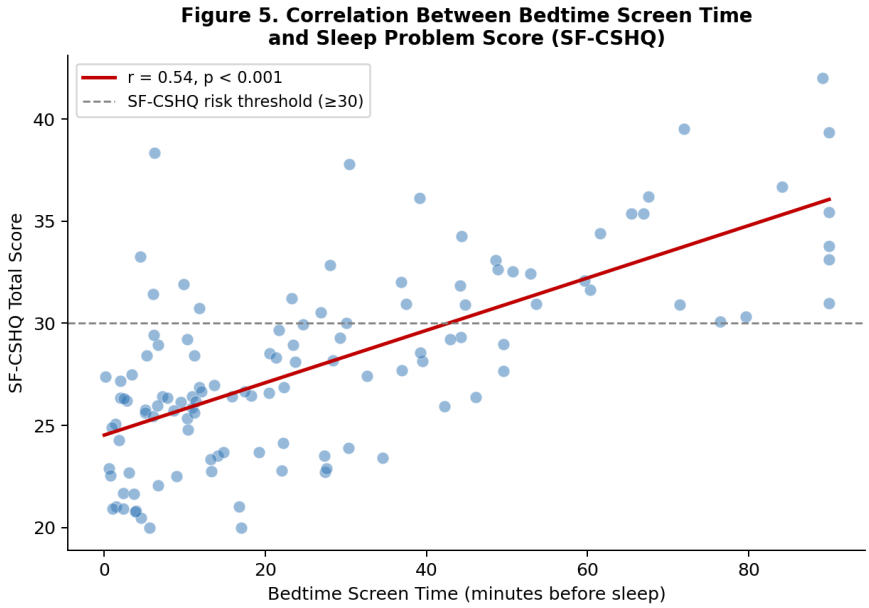

Figure 5. Scatter Plot: Bedtime Screen Time (minutes) vs. SF-CSHQ Total Score. Red line = linear regression fit; dashed grey line = risk cutoff (score≥30).

Multivariable Logistic Regression

Table 3 presents results from the multivariable logistic regression model for the outcome of SF-CSHQ ≥30 (poor sleep risk). After adjustment for all covariates, three variables emerged as independent, statistically significant predictors: bedtime screen time >30 minutes (aOR 2.81, 95%CI 1.74–4.54, $p<0.001$), total daily screen time >2h (aOR 2.14, 95%CI 1.38–3.32, $p=0.001$), and absence of parental screen rules (aOR 1.89, 95%CI 1.22–2.93, $p=0.004$). Child age 10–14 years showed a trend toward significance (aOR 1.56, $p=0.062$). Model fit was acceptable (Hosmer-Lemeshow $p=0.68$), and the model explained 41% of variance (Nagelkerke $R^2=0.41$). The forest plot (Figure 6) visualises all adjusted odds ratios with 95% confidence intervals.

A significant interaction was observed between total screen time and parental rules (OR 0.54 for the interaction term, p=0.03), indicating that the presence of parental rules attenuated the adverse effect of high screen time on sleep outcomes.

Table 3. Multivariable Logistic Regression: Predictors of Poor Sleep Risk (SF-CSHQ ≥30)

Predictor Variable	β	aOR (95% CI)	SE	p-value
Bedtime screen time >30 min	1.034	2.81 (1.74–4.54)	0.243	<0.001
Total daily screen time >2h	0.761	2.14 (1.38–3.32)	0.224	0.001
Absence of parental screen rules	0.636	1.89 (1.22–2.93)	0.225	0.004
Child age 10–14 years	0.444	1.56 (0.98–2.49)	0.238	0.062
Lower SES	0.358	1.43 (0.91–2.25)	0.231	0.117
High parental screen use	0.270	1.31 (0.84–2.04)	0.226	0.230
Low parental confidence	0.199	1.22 (0.78–1.91)	0.228	0.381
Nagelkerke R^2 = 0.41; Hosmer-Lemeshow p = 0.68; Model $\chi^2(7)$ = 128.4, p<0.001				

β = regression coefficient; aOR = adjusted odds ratio; SE = standard error; CI = confidence interval. Reference categories: bedtime use ≤30 min; screen time <2h/day; rules present; age 6–9 years; middle/upper SES.

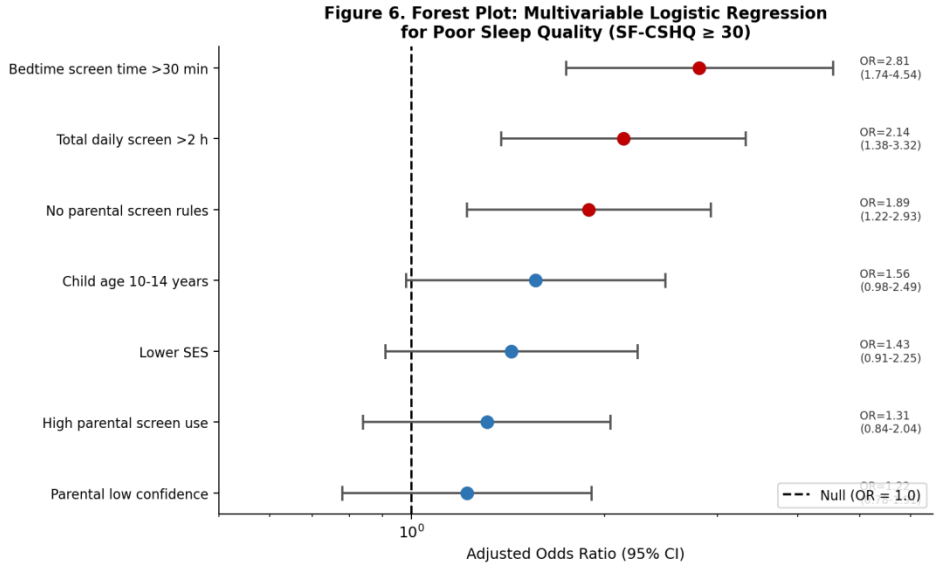

Figure 6. Forest Plot: Adjusted Odds Ratios (95% CI) for Predictors of Poor Sleep Risk (SF-CSHQ ≥30). Log scale. Filled diamonds = significant (p<0.05) predictors.

Qualitative Findings

Thematic saturation was reached at the 22nd interview. Inter-rater reliability was κ=0.78 (substantial agreement). Five overarching themes were identified and are mapped in Figure 7.

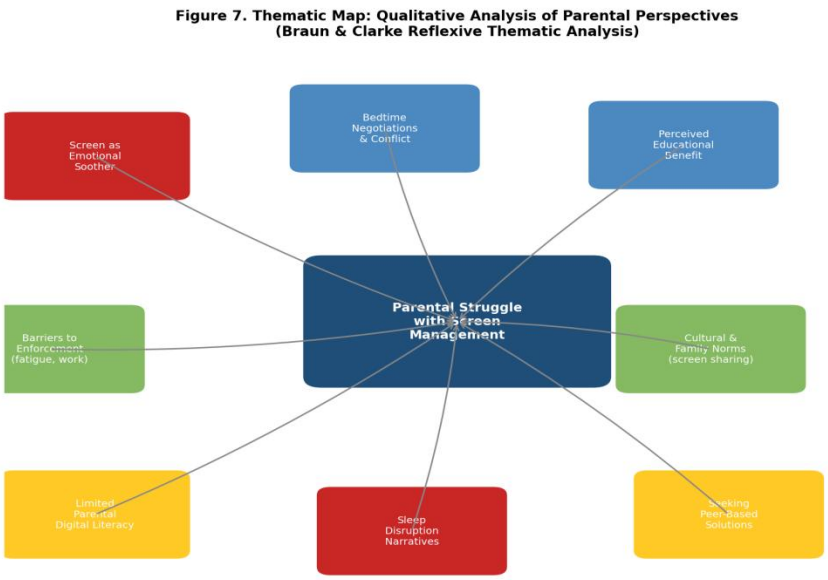

Figure 7. Thematic Map of Qualitative Analysis (Braun & Clarke Reflexive Thematic Analysis). Arrows indicate relationships between peripheral themes and the central overarching theme of Parental Struggle with Screen Management.

Theme 1 – Screen as Emotional Soother: The most frequently mentioned reason for permitting screen use was its immediate calming effect, particularly for younger children (ages 6–8). Parents described phones as a "pacifier" during mealtime, travel, or emotional distress. While parents acknowledged the resulting sleep disruption, many expressed that the immediate cessation of conflict outweighed longer-term concerns.

Theme 2 – Bedtime Negotiations and Conflict: Virtually all parents described daily conflict at bedtime. Negotiations involved time extensions, conditional screen access tied to academic performance, and frequent rule violations. Mothers, as the parent more often present at bedtime, bore disproportionate enforcement burden.

Theme 3 – Perceived Educational Value: A pervasive tension existed between parents' awareness of screen harm and their belief in screens as educational tools. YouTube, e-learning platforms, and Google search were cited as justifications for continued access. This theme was stronger among parents with higher educational attainment.

Theme 4 – Barriers to Enforcement: Parental fatigue (particularly among shift workers), inconsistent co-parental approaches, and peer pressure ("all his friends have Instagram") were identified as major barriers. Parents employed by the informal sector reported the least consistent enforcement.

Theme 5 – Cultural and Family Norms: Living in joint family households introduced additional complexity. Grandparents were frequently identified as inconsistent enforcers who would provide phone access when parents were unavailable. The communal nature of evening television viewing was described as normalising screen presence at bedtime.

Table 4. Qualitative Themes and Representative Quotes

Theme	Sub-themes	Illustrative Quote
1. Screen as Emotional Soother	Use to pacify/reward; guilt-justified use	"When he cries, the phone is the only thing that calms him down." (Mother, child age 7)
2. Bedtime Conflict & Negotiation	Daily battles; inconsistent enforcement	"Every night is a fight. She says just five more minutes and then it becomes an hour." (Father, child age 10)
3. Perceived Educational Value	Ambivalence; screen for learning justification	"I let her watch YouTube because she learns English from it. I cannot just ban it." (Mother, child age 9)
4. Barriers to Enforcement	Parental fatigue; peer pressure; work hours	"After a 12-hour shift, I do not have the energy to argue about the phone." (Father, child age 12)

5. Cultural & Family Norms	Joint family screen sharing; normalization	"In our house everyone is on mobile. How do I tell only my child not to use it?" (Mother, child age 8)

All quotes translated from Gujarati or Hindi and lightly edited for clarity, preserving participant voice.

Mixed Methods Integration

The quantitative finding that bedtime screen use was the strongest predictor of poor sleep was directly echoed in Theme 2 (bedtime negotiations), with parents describing the precise mechanism: children maintaining screen access under blankets or in the dark. The protective effect of parental rules identified in the regression model (interaction OR 0.54) was contextualised by Themes 4 and 5, which revealed that rule-setting capacity was itself mediated by familial structures, employment, and cultural norms. Resilient families (high screen/good sleep) were characterised by high parental confidence scores (mean 4.1 vs 2.8, $p<0.001$) and consistent co-parental agreement, an emergent finding with clear clinical translation.

DISCUSSION

This study presents one of the first mixed-methods investigations of mobile screen time and its sleep and behavioural consequences among school-aged children in an Indian urban setting, combining validated psychometric instruments with rich parental narratives. Our principal findings are fourfold: (i) bedtime screen exposure >30 minutes nearly triples the odds of clinically significant sleep problems; (ii) total daily screen time >2 hours independently predicts both sleep problems and behavioural difficulties; (iii) parental rule-setting significantly attenuates these risks; and (iv) qualitatively, parental enforcement capacity is itself shaped by cultural, structural, and familial factors that quantitative instruments cannot capture.

The prevalence of at-risk sleep (SF-CSHQ ≥30) of 48% in our cohort is substantially higher than rates reported in Western samples (25–35%) [6,14] but broadly consistent with emerging South Asian data [15]. This disparity may reflect later school start times promoting insufficient sleep pressure, higher household density limiting sleep hygiene, and the rapid uptake of mobile technology outpacing parental awareness. Our finding that bedtime screen use was the strongest predictor (aOR 2.81) accords with the melatonin suppression hypothesis [4] and reinforces the growing consensus that the timing of screen use—particularly proximity to sleep—is more consequential than aggregate daily duration.

The SDQ data extend earlier meta-analytic findings [8,9] to an Indian paediatric population, with particular prominence of the hyperactivity/inattention subscale. This domain may reflect both direct effects of interactive media on attentional systems and indirect mediation via sleep insufficiency. Future longitudinal designs should attempt to disentangle these pathways using structural equation modelling.

The significant interaction between screen time and parental rules ($p=0.03$) is a clinically actionable finding: the presence of household rules almost halved the odds of screen-related sleep problems, irrespective of absolute exposure. This resonates with the concept of "media mentoring" articulated by the American Academy of Pediatrics [1], which privileges parental co-engagement and consistent rule-setting over blanket restrictions. Our qualitative data add nuance: rule-setting capacity is not uniformly distributed and is constrained by fatigue, joint-family dynamics, and culturally embedded norms of screen sharing.

The five qualitative themes converge with and extend quantitative findings in important ways. The "screen as soother" theme captures a rational parental calculus that has been described in Western qualitative literature [11] but whose salience in the joint-family Indian context—where multiple caregivers may differentially enforce rules—is novel. The tension between perceived educational value and health harm is particularly salient given India's ambitious digital education agenda, and merits policy attention to the framing of screen use in national curricula.

Several limitations warrant acknowledgement. The cross-sectional design precludes causal inference. Convenience sampling from a single tertiary OPD limits generalisability to rural populations and private healthcare attendees. Screen time was measured by parental report, subject to social desirability bias; objective measures (screen logs, actigraphy) were not available. The SF-CSHQ, while validated internationally, has not been formally standardised for the Gujarati-speaking population. Qualitative sample size, while adequate for saturation, was drawn from a single institution.

Conclusions and Recommendations

This mixed methods study provides robust evidence that bedtime mobile screen exposure and the absence of household screen rules are the most potent modifiable determinants of sleep problems and behavioural difficulties in school-aged children in urban India. The integration of qualitative data reveals that structural, cultural, and familial barriers substantially constrain parental enforcement capacity—a finding that is invisible to survey instruments alone.

Based on these findings, we propose the following recommendations for practice and policy:

- Paediatric counselling at well-child visits should include structured screening for bedtime screen use and discussion of household media plans (family media plan tool, AAP model adapted for Indian families).

- School-based digital wellbeing programmes should address both children and parents/grandparents, acknowledging joint-family structures.
- The "Parent Guidance Bundle" generated from this study (including a Bedtime Screen Habits Checklist and a Paediatric Counselling Checklist) should be piloted in primary healthcare settings.
- Future research should employ longitudinal cohort designs with objective sleep measurement (actigraphy) and include rural populations and fathers as primary respondents.
- Policy dialogue is needed on the framing of educational screen use, to ensure digital education mandates do not inadvertently legitimise bedtime device access.

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Author Contributions
Conceptualisation and design: NP, JKP. Data collection and survey administration: JKP. Qualitative interviews and analysis: JKP, HVP. Statistical analysis: HVP. Manuscript drafting: JKP, HVP. Critical revision: NP. All authors approved the final version.

Declarations
Conflict of Interest: The authors declare no competing interests.

Ethics: Approved by IEC, GMERS Medical College, Gandhinagar. Written informed consent obtained from all participants.

Data Availability: De-identified survey data available on reasonable request from the corresponding author. Qualitative transcripts are confidential.

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