

*Original Article*

# Parental Nighttime Smartphone Soothing Practices and Delayed Emotional Self-Regulation Among Preschool Children Attending Urban Clinics

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## ABSTRACT

**Background:** Smartphones are increasingly used by caregivers to calm preschool children during bedtime routines, but repeated reliance on screen-based soothing may reduce opportunities for caregiver-led co-regulation and adaptive emotional coping. **Objective:** To examine the association between parental nighttime smartphone-based soothing practices and emotional dysregulation among preschool-aged children attending urban outpatient clinics. **Methods:** A cross-sectional observational study was conducted from August to November 2025 in pediatric and family medicine outpatient clinics in the Islamabad–Rawalpindi region. Seventy-eight parent–child pairs involving children aged 3–5 years were recruited through consecutive sampling. Nighttime smartphone soothing frequency and duration were assessed using a structured interviewer-administered questionnaire, and emotional dysregulation was measured using the Emotion Regulation Checklist dysregulation component. Data were analyzed using SPSS version 26.0. Descriptive statistics, Pearson correlation, independent-samples t-tests, and one-way ANOVA were applied, with  $p < 0.05$  considered statistically significant. **Results:** The mean child age was  $4.2 \pm 0.8$  years, and 44 children (56.4%) were male. Daily nighttime smartphone soothing was reported in 36 children (46.2%). Mean ERC dysregulation scores increased progressively from  $22.1 \pm 4.8$  among children exposed for less than 15 minutes to  $33.4 \pm 5.2$  among those exposed for more than 30 minutes. Smartphone exposure duration was positively correlated with dysregulation score ( $r = 0.61$ , 95% CI: 0.45–0.73;  $p < 0.001$ ). **Conclusion:** Longer and more frequent nighttime smartphone soothing was associated with higher emotional dysregulation scores among preschool children. These findings support parental counseling on structured bedtime routines and non-digital soothing strategies. **Keywords:** Child Development; Preschool Child; Emotional Regulation; Smartphone; Screen Time; Parenting; Bedtime Routine.

## INTRODUCTION

Early childhood is a critical period for the development of emotional self-regulation, during which children gradually acquire the capacity to recognize emotional states, tolerate frustration, delay impulsive responses, and recover from distress through repeated interaction with caregivers and their environment. In preschool-aged children, these capacities remain developmentally immature and are strongly shaped by co-regulation, caregiver responsiveness, predictable routines, and opportunities to practice adaptive coping in emotionally challenging situations. Difficulties in emotional regulation during this stage may contribute to behavioral problems, sleep disruption, impaired peer interaction, reduced school readiness, and later psychosocial vulnerability (1). As digital devices have become increasingly embedded in family life, the caregiving environment in which emotional regulation develops has also changed. Smartphones are now frequently used by parents as immediate tools to

manage crying, irritability, boredom, bedtime resistance, and other distress-related behaviors in young children (2).

Although smartphones may provide short-term behavioral quieting, their repeated use as a soothing strategy raises developmental concerns because digital distraction may replace interpersonal calming practices that normally support emotional learning. Caregiver-led soothing through verbal reassurance, physical comfort, storytelling, affect labeling, and gradual limit-setting helps children internalize coping strategies over time. In contrast, when emotional discomfort is consistently interrupted through screen-based stimulation, children may have fewer opportunities to experience tolerable distress, practice self-calming, and develop intrinsic regulation skills (3). Existing evidence suggests that screen exposure is associated with behavioral and emotional outcomes in early childhood, although the strength and direction of these associations may vary according to caregiving context, parental involvement, content type, timing, and the child's baseline temperament (4). Therefore, the developmental relevance of screen use may depend not only on total duration but also on the emotional situation in which the device is offered.

Nighttime smartphone soothing is a particularly important but underexplored caregiving practice. Bedtime routines traditionally provide a structured setting for emotional security, caregiver-child bonding, and physiological transition to sleep through calming interpersonal activities such as conversation, affection, prayer, storytelling, or quiet reassurance. When smartphones are introduced during bedtime resistance or distress, they may alter both the emotional and sleep-related functions of the nighttime routine. Screen exposure before sleep may increase cognitive and sensory stimulation, delay sleep onset, and reduce opportunities for parent-child co-regulation, all of which may contribute to emotional lability and difficulty calming after distress (5). However, most available research has focused on general screen time, educational media exposure, or broad behavioral outcomes rather than the specific use of smartphones as a parental soothing tool during bedtime routines (6).

The issue is especially relevant in urban family settings, where parental workload, limited time, caregiver stress, restricted recreational spaces, and easy device availability may encourage reliance on smartphones for rapid behavioral management. Pediatric and family medicine clinics increasingly encounter parental concerns related to irritability, poor sleep routines, excessive screen exposure, and behavioral dysregulation in preschool children, yet the specific relationship between nighttime smartphone-based soothing and emotional regulation remains insufficiently characterized in routine outpatient populations (7). This gap is important because bedtime practices are modifiable and can be addressed through anticipatory guidance, parent education, and practical non-digital soothing strategies in primary care and pediatric settings (8).

From a PICO perspective, the population of interest comprises preschool children aged 3–5 years attending urban outpatient clinics; the exposure is parental use of smartphones for nighttime soothing; the comparison is lower-frequency or shorter-duration smartphone soothing; and the outcome is emotional dysregulation assessed using a structured behavioral measure. Clarifying this association may help clinicians identify families who would benefit from counseling on healthier bedtime routines and responsive caregiving strategies. Therefore, the present study aimed to examine whether greater frequency and longer duration of parental nighttime smartphone-based soothing are associated with higher emotional dysregulation scores among preschool-aged children attending urban clinics. The study hypothesized that children exposed to more frequent and prolonged nighttime smartphone soothing would demonstrate significantly higher emotional dysregulation scores than children with less frequent or shorter exposure (9,10).

## **MATERIALS AND METHODS**

A cross-sectional observational study was conducted over four months, from August 2025 to November 2025, in selected pediatric and family medicine outpatient clinics located in the Islamabad–Rawalpindi

region of Pakistan. The study design was selected to examine the association between parental nighttime smartphone-based soothing practices and emotional dysregulation among preschool-aged children in a routine urban clinical setting. The clinics were considered appropriate recruitment sites because they serve families from diverse socioeconomic backgrounds and commonly receive children presenting for routine health concerns, minor illnesses, and developmental or behavioral parental queries.

The study population comprised preschool-aged children between 3 and 5 years of age who attended the selected outpatient clinics with a primary caregiver. Parent–child pairs were eligible when the accompanying caregiver was regularly involved in the child’s nighttime routine and was able to provide information regarding the child’s bedtime behavior and smartphone exposure. Only one child from each household was included to avoid correlated reporting from the same family environment. Children were excluded if they had previously diagnosed autism spectrum disorder, intellectual disability, neurodevelopmental delay, chronic neurological illness, visual or hearing impairment, or documented psychiatric illness, because these conditions could independently influence emotional regulation. Caregivers with major communication barriers or inability to complete the questionnaire were also excluded.

Participants were recruited through non-probability consecutive sampling from outpatient waiting areas during clinic hours. Eligible caregivers were approached by the data collection team, informed about the study purpose and procedures, and enrolled after written informed consent was obtained. A total of 84 eligible parent–child pairs were approached, and 78 completed participation, yielding a response rate of 92.8%. The final sample size was considered adequate for detecting a moderate association between smartphone exposure duration and emotional dysregulation in an exploratory clinic-based cross-sectional analysis. To strengthen transparency, the target sample was aligned with the expected feasibility of recruitment during the defined study period and with prior behavioral research involving comparable preschool populations.

Data were collected using a structured interviewer-administered questionnaire developed after review of relevant pediatric behavioral and digital media literature. The questionnaire included sociodemographic characteristics, parental nighttime smartphone soothing practices, and child emotional regulation behavior. Sociodemographic variables included child age, sex, primary caregiver identity, and socioeconomic status. The main exposure variable was parental nighttime smartphone-based soothing, operationally defined as offering a smartphone to the child during the bedtime period to calm crying, irritability, restlessness, bedtime resistance, or distress before sleep. Exposure frequency was categorized as occasional, frequent, or daily based on caregiver-reported usual practice. Exposure duration was recorded as the average number of minutes of smartphone use during the bedtime period and was categorized as less than 15 minutes, 15–30 minutes, and more than 30 minutes per night. The reason for smartphone use, timing of exposure, and age at initiation of the practice were also recorded where applicable.

The primary outcome was emotional dysregulation assessed using the Emotion Regulation Checklist dysregulation component. Higher dysregulation scores were interpreted as greater difficulty in emotional control, greater emotional lability, increased irritability, and poorer calming after distress. The instrument was administered to caregivers in interview format to minimize missing responses and improve consistency of item interpretation. The main independent variables were frequency and duration of nighttime smartphone soothing, while potential confounding variables included child age, sex, caregiver type, parental education, and socioeconomic status. These variables were selected because of their plausible relationship with both digital caregiving practices and emotional-behavioral outcomes in preschool children.

Several procedures were used to reduce bias and improve data integrity. Consecutive recruitment was used to minimize selective enrollment of participants. The same structured questionnaire was used for all caregivers, and interviews were conducted in a consistent sequence. Caregivers were assured that

their responses would remain confidential and would not affect clinical care, reducing the risk of social desirability bias. Completed forms were reviewed for completeness before data entry, and all data were coded using anonymous participant identifiers. Data were entered into SPSS version 26.0 and checked for range errors, missing values, and inconsistent responses before analysis.

Descriptive statistics were used to summarize demographic characteristics, smartphone soothing practices, and emotional dysregulation scores. Quantitative variables were reported as mean and standard deviation when approximately normally distributed, while categorical variables were presented as frequencies and percentages. Normality of continuous variables was assessed using the Shapiro–Wilk test and visual inspection of distribution patterns. Pearson correlation analysis was used to examine the relationship between average nighttime smartphone exposure duration and emotional dysregulation score. Independent-samples t-tests and one-way analysis of variance were applied to compare mean dysregulation scores across exposure categories. Where group differences were identified, interpretation was based on both statistical significance and clinical direction of mean score differences. A p-value of less than 0.05 was considered statistically significant.

To address confounding, child age and parental education were considered in adjusted analysis where relevant to the exposure–outcome relationship. The primary interpretation emphasized association rather than causation because of the cross-sectional design. Missing data were minimized through interviewer-administered data collection and immediate form checking; complete questionnaires were available for all 78 enrolled participants and were included in the final analysis. Ethical principles of voluntary participation, informed consent, anonymity, confidentiality, and the right to withdraw were maintained throughout the study. The study was conducted after institutional permission from the participating clinical sites, and no identifiable personal data were reported.

## RESULTS

A total of 84 eligible parent–child pairs were approached during the study period, of whom 78 completed participation and were included in the final analysis, giving a response rate of 92.8%. The mean age of participating children was  $4.2 \pm 0.8$  years. Male children constituted 44 participants (56.4%), while female children constituted 34 participants (43.6%). Most responding caregivers were mothers ( $n=56$ , 71.8%), and more than half of the families belonged to the middle-income group ( $n=41$ , 52.6%). Daily nighttime smartphone soothing was reported in 36 children (46.2%), and the mean reported bedtime smartphone exposure duration was  $28.6 \pm 11.4$  minutes.

*Table 1. Baseline Demographic and Smartphone Exposure Characteristics of Participants (N=78)*

Variable	Category	n (%) / Mean $\pm$ SD
Child age	Years	$4.2 \pm 0.8$
Gender	Male	44 (56.4%)
	Female	34 (43.6%)
Primary caregiver	Mother	56 (71.8%)
	Father	22 (28.2%)
Socioeconomic status	Lower income	23 (29.5%)
	Middle income	41 (52.6%)
	Upper income	14 (17.9%)
Mean nighttime smartphone exposure duration	Minutes/night	$28.6 \pm 11.4$
Daily nighttime smartphone soothing	Yes	36 (46.2%)

The mean Emotion Regulation Checklist dysregulation score in the full sample was  $29.1 \pm 6.7$ . Emotional dysregulation scores increased progressively across categories of bedtime smartphone exposure duration. Children exposed for less than 15 minutes had the lowest mean dysregulation score ( $22.1 \pm 4.8$ ), those exposed for 15–30 minutes had an intermediate score ( $27.8 \pm 5.6$ ), and those exposed for more than 30 minutes had the highest score ( $33.4 \pm 5.2$ ). The overall between-group difference was statistically significant, with a large estimated effect size ( $F=26.32$ ,  $p<0.001$ ,  $\eta^2=0.41$ ). Compared with children

exposed for less than 15 minutes, children exposed for more than 30 minutes had an 11.3-point higher mean dysregulation score, indicating a large difference in emotional dysregulation burden.

**Table 2. Emotion Regulation Checklist Dysregulation Scores by Nighttime Smartphone Exposure Duration**

Exposure Duration	Participants, n	Mean ERC Dysregulation Score ± SD	Mean Difference (95% CI)	Cohen's d	Overall Test
<15 minutes	21	22.1 ± 4.8			F=26.32, p<0.001, η <sup>2</sup> =0.41
15–30 minutes	32	27.8 ± 5.6	5.7 (2.8 to 8.6)	1.08	
>30 minutes	25	33.4 ± 5.2	11.3 (8.3 to 14.3)	2.25	

Correlation analysis showed a statistically significant positive association between average nighttime smartphone exposure duration and ERC dysregulation score (r=0.61, 95% CI: 0.45 to 0.73; p<0.001). Frequency of smartphone soothing was also positively correlated with dysregulation score (r=0.48, 95% CI: 0.29 to 0.63; p=0.002). These findings indicate that both longer exposure duration and greater soothing frequency were associated with higher emotional dysregulation scores.

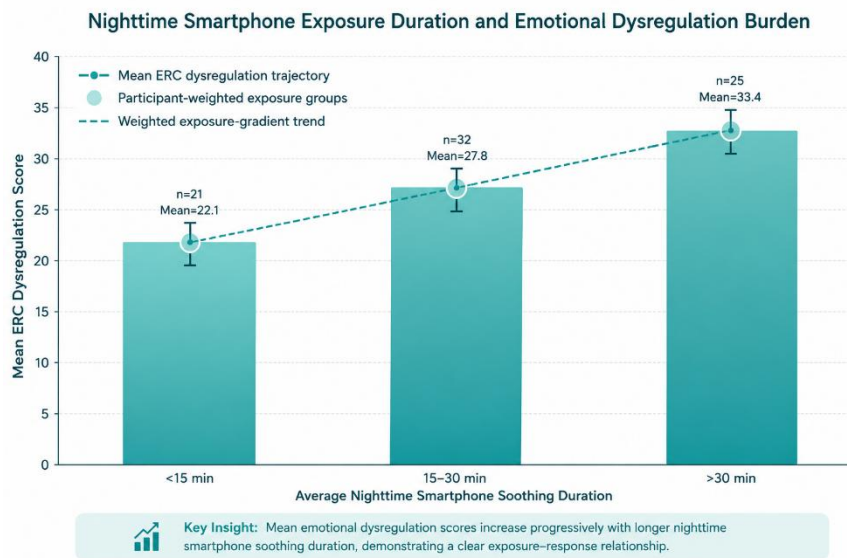
**Table 3. Correlation Between Nighttime Smartphone Soothing and Emotional Dysregulation**

Variables	Pearson r	95% CI	p-value
Nighttime smartphone duration vs ERC dysregulation score	0.61	0.45 to 0.73	<0.001
Smartphone soothing frequency vs ERC dysregulation score	0.48	0.29 to 0.63	0.002

Analysis by soothing frequency showed a graded increase in dysregulation scores across occasional, frequent, and daily smartphone soothing categories. Children with occasional nighttime smartphone soothing had a mean ERC dysregulation score of 23.9 ± 4.7, compared with 28.5 ± 5.3 among children with frequent soothing and 31.8 ± 5.9 among children with daily soothing. The overall group difference was statistically significant (F=12.66, p<0.001, η<sup>2</sup>=0.25). Compared with occasional smartphone soothing, daily soothing was associated with a 7.9-point higher mean ERC dysregulation score, representing a large standardized difference.

**Table 4. Comparative Analysis of Emotional Dysregulation by Smartphone Soothing Frequency**

Soothing Frequency	Participants, n	Mean ERC Dysregulation Score ± SD	Mean Difference vs Occasional (95% CI)	Cohen's d vs Occasional	Overall Test
Occasional	18	23.9 ± 4.7			F=12.66, p<0.001, η <sup>2</sup> =0.25
Frequent	24	28.5 ± 5.3	4.6 (1.5 to 7.7)	0.91	
Daily	36	31.8 ± 5.9	7.9 (4.9 to 10.9)	1.43	



**Figure 1 Nighttime Smartphone Exposure Duration and Emotional Dysregulation Burden**

Mean ERC dysregulation scores increased progressively across nighttime smartphone soothing duration categories, rising from 22.1 ± 4.8 among children exposed for less than 15 minutes to 27.8 ± 5.6 among those exposed for 15–30 minutes and 33.4 ± 5.2 among those exposed for more than 30 minutes. The

weighted exposure-gradient pattern demonstrates a clinically meaningful dose–response association, with the highest exposure group showing an 11.3-point greater mean dysregulation score than the lowest exposure group, supporting a moderate-to-strong relationship between prolonged bedtime smartphone soothing and poorer emotional regulation indicators.

Overall, the results demonstrated a consistent exposure–response pattern. Preschool children with longer and more frequent nighttime smartphone soothing had higher emotional dysregulation scores than children with shorter or less frequent exposure. The strongest contrast was observed between children exposed for less than 15 minutes and those exposed for more than 30 minutes nightly, with the latter group showing substantially higher dysregulation scores. These findings support an association between parental nighttime smartphone-based soothing and poorer emotional regulation indicators among preschool-aged children, while the cross-sectional design does not permit causal inference.

## DISCUSSION

The present study examined the association between parental nighttime smartphone-based soothing and emotional dysregulation among preschool-aged children attending urban outpatient clinics. The findings demonstrated a consistent exposure–response pattern in which children exposed to longer and more frequent nighttime smartphone soothing had higher ERC dysregulation scores. Children exposed for more than 30 minutes before sleep showed the highest mean dysregulation score, while those exposed for less than 15 minutes showed the lowest score. The positive correlation between smartphone exposure duration and ERC dysregulation further supports the interpretation that bedtime digital soothing is meaningfully associated with poorer emotional regulation indicators in this preschool clinical sample. However, because of the cross-sectional design, these findings should be interpreted as associations rather than evidence of causality.

These findings are developmentally plausible because preschool children remain highly dependent on caregiver-supported co-regulation during emotionally demanding situations. Bedtime is not merely a sleep-transition period; it is also a repeated relational context in which children learn calming behaviors through reassurance, routine, verbal labeling of emotions, physical comfort, and predictable caregiver responses. When smartphones are repeatedly used to suppress bedtime distress, the child may receive immediate distraction but may have fewer opportunities to practice tolerating frustration, expressing distress verbally, or gradually internalizing non-digital calming strategies. The observed increase in dysregulation scores across exposure-duration categories is therefore consistent with the view that the emotional context of screen use may be as important as total screen time. This interpretation aligns with emerging literature suggesting that screen exposure in early childhood may be associated with behavioral and emotional difficulties, particularly when it replaces caregiver interaction or is used as a primary strategy for managing distress (11).

The results also highlight the importance of distinguishing ordinary screen exposure from smartphone-based soothing. Many studies on child screen time focus on total daily duration, educational content, or broad developmental outcomes. In contrast, the present study specifically focused on smartphone use as a parental calming tool during nighttime routines. This distinction is clinically important because a child passively watching digital content for entertainment may not have the same developmental implications as a child repeatedly receiving a smartphone whenever distressed, irritable, or resistant to sleep. The latter pattern may reinforce reliance on external sensory stimulation for emotional relief. In the present study, daily smartphone soothing and exposure exceeding 30 minutes were associated with substantially higher emotional dysregulation scores, suggesting that both frequency and duration should be considered when clinicians counsel families about bedtime routines.

The bedtime setting may further amplify the observed association. Evening routines are expected to support physiological down-regulation, emotional security, and sleep readiness. Smartphone use during this period may introduce visual and cognitive stimulation at a time when children require reduced

arousal and stable caregiver interaction. Poorer sleep onset, shortened sleep duration, or fragmented sleep may contribute to irritability, emotional lability, and difficulty calming during the following day. Although sleep quality was not directly measured in this study, the pattern of findings suggests that future research should examine sleep as a potential mediator between nighttime smartphone exposure and emotional dysregulation. This would help clarify whether the association is primarily explained by reduced caregiver co-regulation, disturbed sleep physiology, parental stress, child temperament, or a combination of these factors.

The findings must also be interpreted within the realities of urban caregiving. Parents in metropolitan environments often experience occupational pressure, limited time availability, reduced extended-family support, and fewer safe play spaces. Under these conditions, smartphones may become convenient tools for quickly reducing bedtime resistance or preventing tantrums. The present findings should therefore not be interpreted as criticism of caregivers, but as evidence that habitual reliance on digital soothing may be a modifiable behavioral pattern worth addressing through supportive pediatric counseling. Clinicians can help parents replace smartphone-based soothing with feasible alternatives such as predictable bedtime sequencing, dim-light storytelling, calm conversation, breathing routines, comfort objects, gentle music without screen exposure, and consistent limit-setting.

A key strength of the study was its focused evaluation of nighttime smartphone soothing rather than general screen exposure. This allowed a more specific assessment of a caregiving behavior that is common in everyday family life but less frequently examined in clinical research. The use of a structured behavioral measure also strengthened outcome assessment by allowing emotional dysregulation to be quantified rather than described only through informal parental concern. The high response rate and recruitment from outpatient clinics further support the practical relevance of the findings for pediatric and family medicine settings.

Several limitations should be considered. First, the cross-sectional design prevents determination of temporal direction. It is possible that children with greater baseline emotional lability are more likely to receive smartphones as a soothing strategy, rather than smartphone soothing independently contributing to dysregulation. Second, exposure and behavioral outcomes were based on caregiver report, which may be affected by recall bias or social desirability bias. Third, the sample was recruited from selected urban clinics through non-probability consecutive sampling, limiting generalizability to rural populations, community-based samples, or families with different cultural and socioeconomic characteristics. Fourth, although the analysis demonstrated strong unadjusted associations, the available dataset did not fully account for all relevant confounders such as parenting style, parental stress, child temperament, baseline sleep quality, household media rules, caregiver mental health, and total daily screen exposure. These variables should be incorporated in future multivariable and longitudinal studies.

Future research should use larger multicenter designs, objective or diary-based screen exposure measurement, validated sleep assessments, and longitudinal follow-up to clarify whether nighttime smartphone soothing precedes later emotional dysregulation. Mediation models examining sleep quality and caregiver-child interaction would be especially useful. Interventional studies are also needed to determine whether parent education on non-digital bedtime soothing can reduce emotional dysregulation scores and improve sleep-related behaviors. Despite these limitations, the present study provides clinically relevant evidence that frequent and prolonged nighttime smartphone soothing is associated with higher emotional dysregulation scores among preschool-aged children, supporting the need for anticipatory guidance on balanced bedtime routines and responsive non-digital calming practices.

## CONCLUSION

Parental nighttime smartphone-based soothing was significantly associated with higher emotional dysregulation scores among preschool-aged children attending urban clinics. Children exposed to smartphones for longer bedtime durations and those receiving daily smartphone soothing demonstrated a clear gradient of higher ERC dysregulation scores compared with children exposed for shorter durations or less frequent soothing. These findings suggest that excessive reliance on smartphones as bedtime calming tools may be linked with poorer emotional regulation indicators during early childhood. Because the study was cross-sectional, causal conclusions cannot be drawn; however, the results support the clinical importance of counseling parents about structured bedtime routines, caregiver-led reassurance, and non-digital soothing strategies that promote emotional security and self-regulation development.

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## GRAPHICAL ABSTRACT

