Research Article

Association Between Sleep Quality, Sleep Duration With Screen Time Among School Going Children in The Age Group Of 6-14 Years – Cross Sectional Study

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ABSTRACT

Background: Sleep is essential for the physical, cognitive, emotional, and behavioral development of children. Increasing exposure to digital devices has raised concerns regarding its potential effects on sleep duration and sleep quality. This study aimed to assess the association between sleep quality, sleep duration, and screen time among school-going children aged 6–14 years.

Methods: A cross-sectional study was conducted among 500 school-going children aged 6–14 t the Department of Paediatrics, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India, between January 2024 and June 2025. Data were collected using a structured questionnaire covering demographic characteristics, screen-use patterns, and sleep-related outcomes. Data were analyzed using IBM SPSS Statistics. Descriptive statistics, chi-square tests, and Pearson's correlation coefficient were used, with statistical significance set at $p < 0.05$.

Results: Screen-use characteristics were significantly associated with several sleep-related outcomes. Longer pre-sleep screen exposure was associated with shorter sleep duration ($\chi^2 = 149.264$, $p < 0.001$) and poorer sleep quality ($\chi^2 = 125.713$, $p < 0.001$). Daily screen time was significantly associated with sleep quality ($\chi^2 = 128.136$, $p < 0.001$) and sleep-onset latency ($\chi^2 = 120.851$, $p < 0.001$). Device type was also significantly associated with sleep quality ($\chi^2 = 41.748$, $p < 0.001$) and sleep duration ($\chi^2 = 21.347$, $p = 0.002$). However, the reported daytime dysfunction results require verification before their direction can be interpreted.

Conclusion: Screen-use patterns were significantly associated with sleep duration, sleep quality, and sleep-onset latency among the children studied. These findings highlight the importance of examining children's screen-use habits, particularly before bedtime. As the study used a cross-sectional design, the findings indicate associations rather than causal relationships.

Keywords: Screen time; Sleep quality; Sleep duration; School-going children; PSQI.

1 INTRODUCTION

Sleep is a fundamental biological process that is essential for the physical, cognitive, emotional, and behavioral development of children [1]. Adequate sleep supports memory consolidation, attention, learning, emotional regulation, brain development and overall well-being [2]. In contrast, insufficient or disrupted sleep during childhood and early adolescence may be associated with difficulties in concentration, emotional regulation, learning and behavior [3] [4]. Sleep health depends not only on sleep duration but also on sleep quality, regularity, and timing. Therefore, maintaining healthy sleep patterns is important for the growth, development, and academic functioning of school-going children [5].

Digital technology has become an integral part of children's daily lives. Smartphones, tablets, televisions, computers, gaming consoles, and internet-based platforms are widely used for education, communication, and entertainment, [6]. Although digital media can provide educational and social benefits, excessive screen exposure may displace sleep, physical activity, face-to-face interaction, and outdoor play. Screen use, particularly during the evening and before bedtime, has been associated with delayed bedtimes and shorter sleep duration. Exposure light-emitting devices may influence circadian rhythms and melatonin production, while stimulating activities such as gaming and social media use may increase psychological arousal and delay sleep onset [7]. Greater screen exposure has also been associated with daytime sleepiness and difficulties in daily functioning [8]. These concerns are particularly relevant among children aged 6-14 years, who experience substantial physical, cognitive, emotional and social development alongside increasing academic demands [9]; [10].

Previous research has reported associations between screen exposure and several sleep-related outcomes among children and adolescents. Although greater screen time has been associated with shorter sleep duration, findings

concerning other dimensions of sleep, particularly sleep quality, remains less consistent [11]. A systematic review and meta-analysis of cohort studies found that greater daily screen time was associated with shorter sleep duration and an increased risk of sleep-related problems, including delayed bedtime and difficulty initiating sleep [12]. Similarly, studies involving schoolchildren has linked digital-media use, particularly exposure close to bedtime, with shorter sleep duration, poorer sleep habits, nighttime awakenings, and daytime sleepiness [13] [14]. Research involving urban Indian schoolchildren also reported an association between higher screen time and poorer sleep quality [15]. These findings highlight the importance of examining screen exposure in relation to both sleep duration and sleep quality among school-going children. As screen use is a potentially modifiable lifestyle behavior, understanding these associations may help inform appropriate digital-media practices, healthy bedtime routines, and sleep hygiene strategies [16]; [17]; [18].

Evidence from longitudinal studies and systematic reviews further indicates that the relationship between screen exposure and sleep may involve several interconnected behavioral and environmental factors. Research among Australian children identified a reciprocal association between screen time and sleep duration in older children, with physical activity potentially influencing these relationships [19]. Studies examining children's screen use during the COVID-19 pandemic also reported changes in screen exposure and sleep patterns, with parental support emerging as a relevant factor in children's digital-media use [20] [21].

Research involving younger children has identified additional associations between screen exposure, sleep, and development. Systematic reviews have linked excessive screen exposure with shorter sleep duration, poorer sleep quality, and behavioral or cognitive difficulties [22] [23]. Studies of preschool children have also associated higher screen time with shorter sleep duration, poorer sleep quality, and difficulties in attention, communication, and problem-solving [24]. Another study reported that sleep duration moderated the relationship between screen time and behavioural and emotional problems, suggesting that sleep may be an important factor when examining these associations [25]. However, evidence from preschool populations may not be directly applicable to school-going children aged 6–14 years. Research examining evening screen exposure has also highlighted the importance of considering age-related differences when interpreting associations with sleep quality [26]. Collectively, these findings indicate that relationships between screen exposure and sleep may vary according to children's age, the duration and timing of screen use, the devices used, and other behavioral and environmental factors.

Despite the growing evidence, further investigation is warranted into the relationship between screen exposure, sleep duration, and sleep quality among school-going children aged 6–14 years. Previous studies have examined different age groups, screen-use patterns, and sleep outcomes, and some have concentrated primarily on either sleep duration or sleep quality. Although research has identified associations between screen exposure and sleep-related outcomes, the evidence available from Indian school settings remains comparatively limited regarding the combined assessment of these dimensions within the same population. In addition, the timing of screen exposure and the type of device used may provide useful information for understanding variations in children's sleep patterns. A focused investigation of these relationships may therefore contribute to a better understanding of screen-use behaviors associated with sleep outcomes among school-going children.

Accordingly, the present study aimed to examine the association between screen time, sleep duration, and sleep quality among school-going children aged 6–14 years. It also explored how daily screen time, screen use before bedtime, and the types of devices used were related to sleep-related outcomes, including the time taken to fall asleep and daytime dysfunction. The Study provides a better understanding of the relationship between children’s screen-use habits and their sleep patterns.

2 METHODOLOGY

2.1 Research Design and Study Setting

This study employed a quantitative cross-sectional study design to examine the association between screen time, sleep duration, and sleep quality among school-going children. The study was conducted in the Department of Paediatrics, Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India, from January 2024 to June 2025. The study examined the daily screen exposure, screen use before bedtime, and device use in relation to sleep duration, sleep quality, sleep-onset latency, and daytime dysfunction. Data were collected using a structured questionnaire and analyzed using IBM SPSS Statistics.

2.2 Study Population and Sampling Procedure

The study population comprised children aged 6–14 years attending the Department of Paediatrics at Sree Balaji Medical College and Hospital who met the eligibility criteria. A hospital-based convenience sampling method was used to recruit participants. A total of 500 children were included in the study. Participants were recruited based on their availability and eligibility during the study period, and parental or guardian consent was obtained before data collection.

2.3 Data Collection

Primary data were collected from 500 children aged 6–14 years using a structured questionnaire administered through Google Forms to parents or guardians. The questionnaire collected information on demographic characteristics, screen-time exposure, and sleep-related outcomes. Data collection was conducted in the Department of Paediatrics at Sree Balaji Medical College and Hospital, Chennai, Tamil Nadu, India, from January 2024 to June 2025. The collected data were analyzed to examine associations between screen-time exposure and sleep-related outcomes. Categorical associations were examined using chi-square tests, while Pearson's correlation analysis was used to assess the relationship between screen-time and sleep-related scores.

2.4 Data Collection Instruments and Measurement Variables

Data were collected using a structured questionnaire covering demographic characteristics, screen-time exposure, and sleep-related outcomes. Demographic variables included age, gender, school class, family type, mother's educational level, and socioeconomic status. Socioeconomic status was classified according to the B. G. Prasad classification.

Screen-time assessment: Screen-time exposure was assessed using the questionnaire identified in this study as SCREEN-Q. The assessment covered daily screen time, screen use before bedtime, and device types, including computers, mobile phones, and television/gaming devices. Daily screen time was categorized as ≤2 hours or >2 hours, while screen use before bedtime was categorized as ≤30 minutes or >30 minutes. The screen-time questionnaire score was also included in the correlation analysis with the global PSQI score [27].

Sleep-quality assessment: Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI), developed by (Buysse et al., 1989). The PSQI assesses sleep quality and disturbances over the preceding month. It consists of 19 self-rated items contributing to seven component scores: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction. Each component is scored from 0 to 3, producing a global score ranging from 0 to 21, with higher scores indicating poorer sleep quality. In the original validation study, a global score greater than 5 was used to distinguish poor sleepers from good sleepers. This threshold should be described as the study's classification criterion if it was applied in the present analysis.

Sleep duration was categorized as <8 hours or ≥8 hours, in accordance with the prespecified study protocol. Sleep-onset latency was categorized as <30 minutes or ≥30 minutes. These classifications were used to examine associations between screen-use patterns and sleep-related outcomes. However, the uniform sleep-duration cutoff does not fully account for age-specific sleep requirements among children aged 6–14 years. Recommended sleep duration varies across childhood and adolescence; therefore, the cutoff was used as an analytical classification rather than a universal indicator of adequate sleep [28].

2.5 Inclusion and exclusion criteria

Inclusion criteria

- Children aged 6–14 years attending the Department of Paediatrics at Sree Balaji Medical College and Hospital.
- Children whose parents or legal guardians provided informed consent for participation.

Exclusion criteria

- Children younger than 6 years or older than 14 years.
- Children diagnosed with sleep disorders, such as insomnia, sleep apnoea, or narcolepsy.
- Children with neurological, psychiatric, or developmental disorders that could affect sleep or screen use.
- Children taking long-term medication known to influence sleep patterns.
- Children with chronic medical conditions that could affect sleep quality or duration.

2.6 Statistical analysis

Data were coded and analyzed using IBM SPSS Statistics. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize participants' demographic characteristics, screen-use patterns, and sleep-related outcomes. Chi-square tests were used to examine associations between categorical screen-use variables and sleep-related outcomes. Pearson's correlation coefficient was used to assess the relationship between screen-time scores and sleep-related scores. Statistical significance was set at $p < 0.05$.

2.7 Ethical Considerations

The study was conducted in accordance with established ethical principles for research involving human participants. Informed consent was obtained from the parents or legal guardians of participating children, and confidentiality and privacy were maintained throughout the study. Participation was voluntary, and the collected data were used solely for research purposes.

3 RESULTS

A total of 500 school-going children aged 6–14 years were included in the study. The findings are presented in terms of participants' demographic characteristics, screen-use patterns, sleep duration, sleep quality, and the associations between screen-time characteristics and sleep-related variables.

Socio-demographic Characteristics of the Study Population

Table 1 Age distribution

Age (years)	n	%
6	58	11.6
7	56	11.2
8	54	10.8
9	54	10.8
10	47	9.4
11	56	11.2
12	63	12.6
13	63	12.6
14	49	9.8
Total	500	100.0

Among the 500 participants, the largest proportion was observed among children aged 12 and 13 years (12.6% each), followed by children aged 6 years (11.6%) and those aged 7 and 11 years (11.2% each). The lowest proportion was observed among 10-year-old children (9.4%). Overall, the participants were fairly distributed across the 6–14-year age groups.

Table 2 Gender distribution

Gender	n	%
Male	263	52.6
Female	237	47.4
Total	500	100.0

Among the 500 participants, 263 (52.6%) were males and 237 (47.4%) were females. Thus, males constituted a slightly higher proportion of the study population, although the distribution between the two genders was relatively balanced.

Table 3 . Class distribution

Class	n	%
1	58	11.6
2	56	11.2
3	54	10.8
4	54	10.8
5	47	9.4
6	56	11.2
7	63	12.6
8	63	12.6
9	49	9.8
Total	500	100.0

The highest proportion of participants was observed in Classes 7 and 8 (12.6% each), followed by Class 1 (11.6%) and Classes 2 and 6 (11.2% each). The lowest proportion was observed in Class 5 (9.4%). Overall, the participants were fairly distributed across the different classes.

Table 4 Family type

Family type	n	%
Nuclear	289	57.8
Joint	211	42.2
Total	500	100.0

Among the study participants, 211 (42.2%) belonged to joint families, whereas 289 (57.8%) belonged to nuclear families. Thus, the majority of participants were from nuclear families.

Table 5 Mother's educational status

Mother's education	n	%
Illiterate	38	7.6
Primary	87	17.4
Middle school	95	19.0
High school	129	25.8
Diploma	84	16.8
Graduate	67	13.4
Total	500	100.0

The largest proportion of mothers had completed high school education (25.8%), followed by middle school (19.0%) and primary education (17.4%). Diploma holders constituted 16.8%, while 13.4% were graduates. The lowest proportion was observed among illiterate mothers (7.6%).

Table 6 Socioeconomic distribution

Socio-economic class	n	%
Class I	138	27.6
Class II	241	48.2
Class III	76	15.2
Class IV	45	9.0
Total	500	100.0

According to the B.G. Prasad socioeconomic classification, the largest proportion of participants belonged to Class II (48.2%), followed by Class I (27.6%). Class III accounted for 15.2%, while Class IV represented 9.0% of the participants.

Screen-Use Characteristics of the Study Population

Table 7 Purpose of screen use

Purpose	n	%
Entertainment	392	78.4
Education	108	21.6
Total	500	100.0

The majority of participants (78.4%) reported using screens primarily for entertainment, while 21.6% used screens for educational purposes. Thus, screen use in the study population was predominantly recreational.

Table 8 Use of screens during meals

Screen use during meals	n	%
Yes	341	68.2
No	159	31.8
Total	500	100.0

A total of 341 participants (68.2%) reported using screens during meals, whereas 159 (31.8%) did not. Thus, screen use during meals was common among the study participants.

Association Between Screen Devices Used and Screen Time Before Sleep

Table 9 Screen Device Use and Pre-Sleep Screen Time

Device	≤30 min (n)	>30 min (n)	χ^2	p
Computer	32	73	28.312	<0.001*
Mobile phone	98	206		

Television	56	35		

Screen-device use was significantly associated with the duration of screen exposure before sleep ($\chi^2 = 28.312$, $p < 0.001$). Higher numbers of participants using computers and mobile phones reported more than 31 minutes of screen exposure before going to sleep compared with less than 30 minutes.

Association Between Sleep Duration and Screen Time Before Sleep

Table 10 Pre-Sleep Screen Time and Sleep Duration

Sleep duration	≤30 min (n)	>30 min (n)	χ^2	p
<8 hours	63	273	149.264	<0.001*
≥8 hours	123	41		

A statistically significant association was observed between screen exposure before sleep and sleep duration ($\chi^2 = 149.264$, $p < 0.001$). Among participants with less than 8 hours of sleep, a larger proportion reported more than 31 minutes of screen exposure before sleep. In comparison, participants sleeping more than 8 hours were more frequently represented in the less-than-30-minute screen-exposure group.

Association Between Overall Screen Time and Sleep Quality

Table 11 Screen Time and Sleep Quality (PSQI)

Screen time/day	Good	Poor	χ^2	p
<2 hours	134	81	128.136	<0.001*
>2 hours	39	246		

Statistically significant at $p < 0.05$.

A statistically significant association was observed between overall screen-time duration and sleep quality ($\chi^2 = 128.136$, $p < 0.001$). Participants with longer screen exposure were more frequently represented among those with poor sleep quality compared with those with shorter screen exposure.

Association Between Screen Devices Used and Sleep Quality

Table 12 Screen Device and Sleep Quality (PSQI)

Device	Good	Poor	χ^2	p
Computer	30	75	41.748	<0.001*
Mobile phone	85	219		
Television/Gaming	58	33		

A statistically significant association was observed between the type of screen device used and sleep quality ($\chi^2 = 41.748$, $p < 0.001$). Poor sleep quality was more common among computer users (n = 75) and mobile-phone users (n = 219), whereas television/gaming users showed a higher number with good sleep quality (n = 58) than poor sleep quality (n = 33). These findings indicate that sleep quality differed significantly across the different screen-device categories.

Association Between Screen Time Before Sleep and Sleep Quality

Table 13 Pre-Sleep Screen Time and Sleep Quality (PSQI)

Pre-sleep screen time	Good	Poor	χ^2	p
≤30 min	122	64	125.713	<0.001*
>30 min	51	263		

Statistically significant at $p < 0.05$.

A statistically significant association was observed between screen exposure before sleep and sleep quality (χ^2 = 125.713, p < 0.001). Participants who spent more than 30 minutes using screens before sleep were more frequently classified as having poor sleep quality compared with those who spent less than 30 minutes.

Association Between Screen Time Before Sleep and Daytime Dysfunction

Table 14 Pre-Sleep Screen Time and Daytime Dysfunction

Pre-sleep screen time	Dysfunction: Yes	Dysfunction: No	χ^2	p
≤30 min	129	57	119.977	<0.001*
>30 min	63	251		

Statistically significant at p < 0.05.

A statistically significant association was observed between pre-sleep screen time and daytime dysfunction (χ^2 = 119.977, p < 0.001). Among participants with pre-sleep screen exposure of ≤30 minutes, 129 reported daytime dysfunction and 57 reported no dysfunction. In contrast, among those with >30 minutes of pre-sleep screen exposure, 63 reported daytime dysfunction, while 251 reported no dysfunction. These findings indicate that the distribution of daytime dysfunction differed significantly according to the duration of screen exposure before sleep.

Association Between Overall Screen Time and Daytime Dysfunction

Table 15 Screen Time and Daytime Dysfunction

Screen time/day	Dysfunction: Yes	Dysfunction: No	χ^2	p
≤2 hours	155	60	181.022	<0.001*
>2 hours	37	248		

Statistically significant at p < 0.05.

A statistically significant association was observed between daily screen-time duration and daytime dysfunction (χ^2 = 181.022, p < 0.001). Among participants with ≤2 hours of daily screen time, 155 reported daytime dysfunction and 60 reported no dysfunction, whereas among those with >2 hours of screen time, 37 reported dysfunctions and 248 reported no dysfunction. These findings indicate that the distribution of daytime dysfunction differed significantly according to daily screen-time duration.

Association Between Screen Time Duration and Time Taken to Fall Asleep

Table 16 Screen Time and Sleep-Onset Latency

Screen time/day	<30 min to fall asleep	≥30 min to fall asleep	χ^2	p
≤2 hours	164	51	120.851	<0.001*
>2 hours	76	209		

A statistically significant association was observed between daily screen-time duration and sleep-onset latency (χ^2 = 120.851, p < 0.001). Among participants with ≤2 hours of daily screen time, 164 took less than 30 minutes to fall asleep, while 51 took 30 minutes or longer. In contrast, among those with >2 hours of screen time, 76 fell asleep within 30 minutes, whereas 209 required 30 minutes or more. These findings indicate that longer daily screen exposure was significantly associated with delayed sleep onset.

Association Between Screen Devices Used and Sleep Duration

Table 17 Screen Device and Sleep Duration

Device	5 h	6 h	7 h	8 h	χ^2	p
Computer	11	26	33	35	21.347	.002

Mobile phone	20	86	115	83		
Television/Gaming	4	13	28	46		

A statistically significant association was observed between the type of screen device used and sleep duration (χ^2 = 21.347, p = 0.002). Among computer users, the largest proportion reported 8 hours of sleep (n = 35), while among mobile-phone users, 7 hours of sleep was most common (n = 115). Similarly, among television/gaming users, the highest number reported 8 hours of sleep (n = 46). These findings indicate that sleep-duration patterns differed significantly across the different screen-device categories.

Table 18 Correlation Between PSQI and Screen-Time Scores

Variable	Mean	SD
Global PSQI score	13.8943	4.60444
Screen-time questionnaire score	15.3163	5.17684

A statistically significant moderate positive correlation was observed between total screen-time score and global PSQI score (r = 0.841, p < 0.001). The mean screen-time score was 15.31 ± 5.17, while the mean global PSQI score was 13.89 ± 4.60. Since a higher screen-time score indicates poorer sleep quality, the findings suggest that greater screen exposure was associated with poorer sleep quality.

The coefficient of determination (R^2 = 0.707) indicates that approximately 70.7% of the variation in PSQI scores was explained by variation in screen-time scores in this analysis.

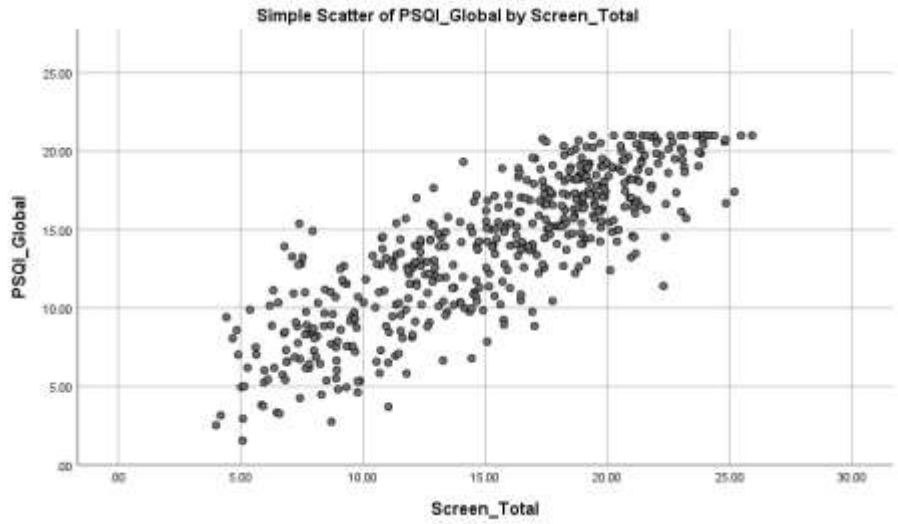


Figure 1 Scatter plot showing the relationship between PSQI score and screen-time score

3.1 DISCUSSION

The present study demonstrated significant associations between screen exposure and multiple sleep-related outcomes among school-going children aged 6–14 years. Longer pre-sleep screen exposure was significantly associated with shorter sleep duration (χ^2 = 149.264, p < 0.001), poorer sleep quality (χ^2 = 125.713, p < 0.001), and daytime dysfunction (χ^2 = 119.977, p < 0.001). Similarly, greater overall daily screen time was significantly associated with poor sleep quality (χ^2 = 128.136, p < 0.001), daytime dysfunction (χ^2 = 181.022, p < 0.001), and longer sleep-onset latency (χ^2 = 120.851, p < 0.001). These observations are broadly consistent with [4], whose systematic review and meta-analysis among children aged 5–10 years found that each additional hour of smartphone or tablet exposure was associated with an average reduction of approximately 11 minutes in sleep, while exposed children had greater odds of shorter sleep duration and poorer sleep quality. Similar findings were reported in an earlier

systematic review and meta-analysis by [18] involving more than 125,000 school-aged children, which showed that bedtime access to or use of portable media devices was significantly associated with inadequate sleep quantity, poor sleep quality, and excessive daytime sleepiness. More recent evidence also supports these relationships. A scoping review of 32 studies concluded that prolonged screen use before bedtime was associated with shorter sleep duration, greater sleep-onset latency, sleep fragmentation, and daytime sleepiness, particularly when screen use involved social media or gaming.

Furthermore, a large systematic review and meta-analysis of cohort studies reported that increasing daily screen time was associated with shorter total sleep duration, delayed bedtime, insomnia symptoms, and greater difficulty initiating sleep. The significant association observed in the present study between screen-device type and both sleep quality ($\chi^2 = 41.748$, $p < 0.001$) and sleep duration ($\chi^2 = 21.347$, $p = 0.002$) is also supported by an umbrella review reporting that smartphones and computers tended to show stronger adverse relationships with adolescent sleep than television viewing. Nevertheless, not all evidence demonstrates equally strong effects. [17] using objective night-by-night measures, found that screen use during the two hours before bed was not associated with most sleep outcomes; however, screen use while actually in bed, particularly interactive use and gaming, was associated with delayed sleep onset and shorter total sleep time. Thus, the present findings are largely consistent with the existing literature and further suggest that not only the total duration of screen exposure but also its timing and the type of device used may be relevant to sleep health among school-going children.

3.2 CONCLUSION

The present study concludes that screen exposure is significantly associated with sleep-related outcomes among school-going children aged 6–14 years. Longer pre-sleep screen exposure and greater overall daily screen time were associated with shorter sleep duration, poorer sleep quality, increased daytime dysfunction, and delayed sleep onset. Significant differences in sleep quality and sleep duration were also observed across different screen-device categories. In addition, the strong positive correlation between screen-time questionnaire scores and global PSQI scores indicates that greater screen exposure was associated with poorer sleep quality. These findings highlight the importance of reducing excessive screen use, particularly before bedtime, and promoting healthy screen-use habits and consistent sleep routines among children. Parents, teachers, and healthcare professionals should encourage appropriate limits on daily screen exposure to support better sleep quality, adequate sleep duration, improved daytime functioning, and overall child well-being.

4 LIMITATIONS OF THE STUDY

This study has several limitations that should be considered when interpreting the findings. First, the cross-sectional design identifies associations between screen time and sleep outcomes but cannot establish cause-and-effect relationships. Second, convenience sampling was used to recruit children from the Department of Paediatrics at Sree Balaji Medical College and Hospital, Chennai, which may limit the generalizability of the findings to children in other hospitals and settings. Third, the use of questionnaire-based data may have introduced recall and reporting bias, as reported screen time and sleep patterns may not fully reflect actual behaviors. Finally, a uniform cutoff of <8 hours and ≥8 hours were used to classify sleep duration among children aged 6–14 years, although recommended sleep duration varies by age. Future studies should consider larger, more representative samples, longitudinal designs, and age-specific sleep-duration classifications.

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