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School of Computer Science & Engineering

IILM University Greater Noida

Presents

1st National Conference

on

Technologies for Sustainable Development Goals 2025 (TECH4SDG-2025)

3rd March 2025

Technically Co-Sponsored by IEEE UP SECTION (INDIA)

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INTERNATIONAL JOURNAL OF RESEARCH IN MODERN ENGINEERING & EMERGING TECHNOLOGY (IJRMEET)

Dear Author / Researcher,

On behalf of the *International Journal of Research in Modern Engineering & Emerging Technology (IJRMEET)*, I extend my heartfelt gratitude to all the authors and research scholars for choosing our platform to publish their valuable research contributions.

IJRMEET, a Refereed, Peer Reviewed, Indexed, and Monthly Journal in Electronic format, has been consistently dedicated since April 2013 to advancing scholarly work in the domains of Modern Engineering and Emerging Technologies. Your innovative and quality research is at the core of our mission to promote academic excellence and practical solutions in the ever-evolving field of engineering and technology.

We believe that publication should be based purely on the merit, originality, and relevance of the research, not on financial considerations. We ensure that every manuscript undergoes a thorough review process to maintain the integrity, reliability, and scholarly value of each published work.

Our journal aims not only to disseminate high-quality research globally but also to highlight critical engineering problems and their practical resolutions. I encourage researchers, academicians, faculty members, and industry professionals to continue contributing to IJRMEET and to inspire their peers and students to join us in this academic pursuit.

We sincerely thank our respected Editors, Reviewers, Technical Advisors, Authors, Web Developers, Subscribers, Supporters, and the extended academic community whose efforts and encouragement make each issue of IJRMEET a successful endeavor.

With warm regards,

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डॉ. मोहम्मद रिहान / Dr. Mohammad Rihan
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MESSAGE

I am happy to know about Tech4SDG-2025, a distinguished national conference that aims to explore and highlight the transformative power of technology in achieving the United Nations Sustainable Development Goals (SDGs). This event serves as a critical platform for fostering collaboration among experts, innovators, and leaders who are dedicated to creating solutions that drive sustainable change.

As we face global challenges ranging from environmental sustainability to social equity, it is clear that technological advancements will play a pivotal role in shaping our collective future. Tech4SDG-2025 presents a unique opportunity to examine how cutting-edge technologies can contribute to solving the most pressing issues of our time, from climate change to poverty alleviation.

I look forward to the engaging discussions and innovative ideas that will emerge from this conference. I believe that by working together, we can harness the potential of technology to drive meaningful progress towards a sustainable and equitable world.

I extend my best wishes to all the participants and organizers of Tech4SDG-2025.

27.02.25

(Dr. Mohammad Rihan)

Dated: 27th February, 2025
Place: Gurugram

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Assessment of Screen Time and Sleep Quality Among School-Age Children

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Abstract : Screen use has become an important part of children's daily lives, raising concerns about its relationship with sleep duration and quality. This study framework assesses recreational screen exposure and sleep outcomes among school-age children aged 8–12 years using parent-assisted diaries and the Sleep Disturbance Scale for Children. The simulated analysis includes 300 children distributed equally across three daily recreational screen-time categories: ≤2 hours, >2–4 hours, and >4 hours. Mean nocturnal sleep duration decreased across these categories from 9.40 ± 0.70 hours to 8.90 ± 0.80 hours and 8.30 ± 0.90 hours, respectively. Mean sleep-onset latency increased from 18.00 ± 8.00 minutes to 25.00 ± 10.00 minutes and 34.00 ± 12.00 minutes, while mean sleep disturbance scores increased from 36.00 ± 8.00 to 42.00 ± 10.00 and 49.00 ± 12.00. Frequent sleep difficulties occurred in 20%, 38%, and 60% of children across the respective categories. Between-group differences were statistically significant at $p < 0.001$. These simulated results demonstrate a graded association between greater recreational screen exposure and less favourable sleep outcomes. Confirmation requires collected participant data and consideration of bedtime screen use, family routines, and other potential confounders; the cross-sectional design cannot establish causation.

Keywords: Screen time; school-age children; sleep quality; recreational media; sleep duration; sleep disturbance

Introduction

Sleep is a central component of childhood health, supporting attention, learning, emotional regulation, and everyday functioning. Assessing sleep among school-age children requires attention to several dimensions: duration, timing, difficulty falling asleep, night waking, and daytime consequences. The American Academy of Sleep Medicine recommends 9–12 hours of sleep per 24 hours for children aged 6–12 years [1]. This recommendation provides an age-appropriate reference for duration but does not replace assessment of sleep quality. PubMed

Children encounter screens through televisions, smartphones, tablets, computers, and gaming devices. These technologies serve different purposes, making it necessary to distinguish school-related activities from recreational exposure. A child completing an afternoon assignment and another gaming after getting into bed may have similar daily screen totals but substantially different exposure patterns.

Several mechanisms could connect screen use with sleep. Time spent using devices may displace sleep opportunities or delay bedtime routines. Interactive or emotionally engaging content may increase arousal. Evening light exposure may also influence circadian timing, although effects depend on exposure conditions and cannot be inferred from screen duration alone. These pathways have been discussed in the childhood digital-media literature [2]. American Academy of Pediatrics

Existing evidence generally identifies associations between screen exposure and adverse sleep outcomes, but considerable variation remains across studies. Differences in age, device type, measurement methods, family routines, and exposure timing complicate interpretation [3–5]. A useful assessment should therefore measure multiple sleep outcomes and avoid treating all screen activities as equivalent.

The present manuscript develops an assessment framework for children aged 8–12 years. Its focus is the relationship between recreational screen exposure and sleep duration, sleep-onset latency, and parent-reported sleep disturbance. Bedtime use is included in the measurement framework because daily totals alone may conceal behaviour occurring closest to sleep.

Literature Review

Screen exposure and sleep outcomes

Hale and Guan [3] reviewed research involving school-age children and adolescents and found that screen exposure was generally associated with shorter sleep duration or later sleep timing. Their synthesis established the importance of the relationship while identifying substantial methodological variation. Much of the evidence relied on observational designs and reported exposure, limiting causal interpretation. PMC

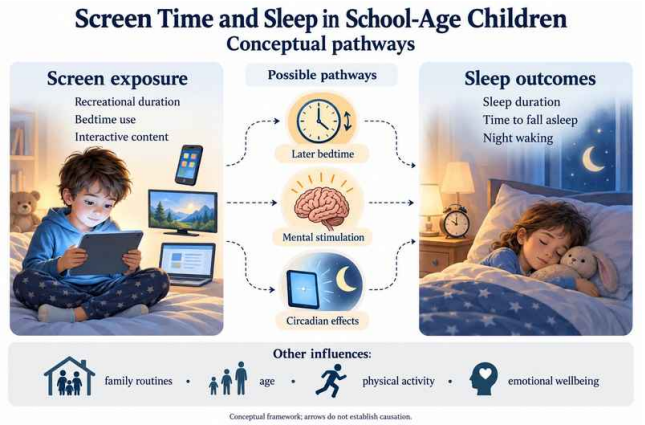
Carter et al. [4] examined portable screen-based devices through a systematic review and meta-analysis. Their

findings linked device access or use in the sleep environment with adverse sleep outcomes. Importantly, bedroom access and active use represent related but distinct exposures. Device availability may reflect household routines and opportunities for night-time engagement, rather than a direct biological effect of possession itself. PubMed

Lund et al. [5] reviewed electronic-media use and sleep among children and adolescents in Western countries. They found consistent evidence connecting electronic-device use with shorter sleep duration, while evidence for other outcomes varied by age and exposure. Their conclusions support measuring sleep dimensions separately rather than assuming that every form of media use affects every aspect of sleep similarly. PMC

Bedroom environment and developmental differences

Falbe et al. [6] studied fourth- and seventh-grade pupils and examined screens within the sleep environment. Their findings associated small-screen access and screen exposure with sleep duration and perceived insufficient rest. This work is particularly relevant to school-based assessment because it includes children near the age range proposed here. PMC



Cespedes et al. [7] examined television exposure and bedroom television in a longitudinal childhood cohort. Their research extended the evidence beyond single-time-point surveys and highlighted the importance of repeated exposure assessment. However, television findings should not automatically be transferred to interactive smartphones or gaming platforms, which involve different patterns of engagement. PMC

Hysing et al. [8] reported associations between electronic-device use and sleep outcomes in a large adolescent population. Although relevant to the broader relationship, adolescent findings require cautious application to younger children because autonomy, school demands, and developmental sleep patterns differ. PMC

Mechanisms, timing, and intervention evidence

Chang et al. [9] experimentally compared evening reading using light-emitting eReaders with printed books in adults. Their findings provide evidence that particular evening light exposures can affect sleep and circadian outcomes. This supports biological plausibility but does not establish the magnitude of effects in children using devices under ordinary household conditions. PMC

More recent work by Brosnan et al. [10] used objective screen and sleep measurements in youths. Screen use during the two hours before bed was not associated with most sleep measures, whereas use after getting into bed—especially interactive engagement—was associated with impaired sleep. This distinction challenges a simple interpretation in which all evening exposure has the same relationship with sleep. PubMed

Martin et al. [11] reviewed interventions incorporating strategies to control children's screen use. Their findings suggested that modest changes in screen exposure and sleep duration were achievable, but co-interventions, heterogeneity, and methodological limitations complicated attribution. Observational associations should therefore not be interpreted as precise estimates of the benefit expected from reducing screen time. Wiley Online Library

Measurement and research gap

Bruni et al. [12] developed the Sleep Disturbance Scale for Children (SDSC), a parent-report instrument assessing several domains of childhood sleep disturbance. It offers broader assessment than a single question about whether a child sleeps well. Nevertheless, questionnaire scores remain screening measures and should not be presented as clinical diagnoses. PubMed

Collectively, these publications identify a practical assessment gap: studies need to distinguish recreational duration from educational exposure, capture bedtime behaviour, and assess sleep quality separately from duration. The proposed study addresses these requirements within a defined school-age population. Its contribution would be a locally grounded assessment rather than a claim to discover an entirely new screen–sleep relationship.

Objectives

The primary objective is to compare sleep disturbance scores across recreational screen-time categories among children aged 8–12 years.

Secondary objectives are to compare nocturnal sleep duration and sleep-onset latency, describe frequent sleep difficulties, and assess the feasibility of recording bedtime screen behaviour alongside daily exposure.

Hypotheses

The primary null hypothesis states that mean SDSC scores do not differ across recreational screen-time categories.

Secondary null hypotheses state that mean sleep duration, mean sleep-onset latency, and the proportion experiencing frequent sleep difficulties do not differ across the categories.

Materials and Methods

Study design and population

A school-based cross-sectional observational design is proposed. Eligible participants would be children aged 8–12 years enrolled in participating schools and living with a caregiver able to assist with recording daily activities.

Recruitment should use randomly selected pupils within age or class strata. School selection, recruitment dates, invitations, refusals, and exclusions must be documented when actual fieldwork occurs. The simulated analysis contains 300 records, with 100 in each exposure category. This balance was imposed for the numerical draft and must not be described as an observed population distribution.

Sample-size planning

For estimating a proportion with 95% confidence, assuming an unknown prevalence of 50% and approximately six percentage points of absolute precision, the simple-random-sample calculation gives approximately 267 participants:

$$n = \frac{1.96^2(0.50)(0.50)}{0.06^2} \approx 267.$$

A target of 300 complete observations provides a modest allowance above this minimum. Actual planning must additionally address school clustering and nonresponse. This calculation concerns descriptive precision; it is not a substitute for a formal power calculation for the primary comparison.

Screen-time assessment

Parents and children would jointly complete a seven-day diary recording recreational and educational screen exposure separately. Recreational exposure includes entertainment viewing, gaming, social communication, and non-academic browsing.

Simultaneous use of two devices would count once as elapsed exposure, preventing double-counting. Average recreational exposure would be calculated as total minutes across seven days divided by seven.

Categories are ≤2 hours, >2–4 hours, and >4 hours daily. These are analytical categories rather than diagnostic boundaries. The diary would also record screen use during the hour before attempted sleep and after getting into bed.

Sleep assessment

Caregivers would complete the original SDSC using its prescribed wording, recall period, and scoring instructions. Its 26 items produce a total score ranging from 26 to 130; higher scores indicate more reported disturbance [12]. Translation, permissions, and suitability for the study population should be checked before administration.

The seven-day diary would record attempted sleep time, estimated sleep onset, wake time, and time awake during the night. Nocturnal sleep duration would be calculated from sleep onset to final waking, subtracting recorded wakefulness.

“Frequent sleep difficulties” is a separate study-defined diary outcome: sleep-onset latency exceeding 30 minutes or reported night waking on at least three nights during the recording week. This endpoint is not an SDSC diagnostic threshold.

Statistical analysis

Continuous outcomes are summarised as means and standard deviations. One-way analysis of variance compares the three exposure categories, while Pearson’s chi-square test compares frequent sleep difficulties. Unadjusted odds ratios and 95% confidence intervals describe categorical associations.



The statistics below were calculated from the stated simulated group sizes, means, standard deviations, and counts. They do not represent analysis of participant-level records. Residual diagnostics, adjusted regression, missing-data analysis, and school-level effects therefore cannot be evaluated from these summaries.

Ethical considerations

No children were recruited for this draft. Actual research would require ethics approval, school permission, parental consent, and age-appropriate child assent. Identifiable information should be stored separately from research responses. Approval numbers, consent completion, and

clinical referrals must be reported only after they have occurred.

Results

Analytical sample

The simulated sample comprises 300 children aged 8–12 years. Each screen-time category contains 100 children. Consequently, the category percentages describe the constructed analysis and cannot estimate the prevalence of screen exposure in a school population.

Table A. Composition of the simulated analytical sample

Recreational screen exposure	Children, n	Percentage
≤2 hours/day	100	33.3
>2–4 hours/day	100	33.3
>4 hours/day	100	33.3
Total	300	100.0

Individual percentages sum to 99.9% because of rounding.

Sleep duration and disturbance

Mean nocturnal sleep duration decreased across increasing exposure categories, from 9.40 hours to 8.30 hours. The highest-exposure category therefore averaged 1.10 hours, or 66 minutes, less sleep than the lowest-exposure category.



Mean sleep-onset latency increased from 18 to 34 minutes. SDSC scores also increased, indicating a greater reported disturbance burden within the simulated summaries.

Table B. Simulated sleep outcomes by recreational screen exposure

Outcome	≤2 hours/day, n=100	>2–4 hours/day, n=100	>4 hours/day, n=100	Overall
Nocturnal sleep, hours	9.40 ± 0.70	8.90 ± 0.80	8.30 ± 0.90	8.87 ± 0.92
Sleep-onset latency, minutes	18.00 ± 8.00	25.00 ± 10.00	34.00 ± 12.00	25.67 ± 12.04
SDSC total score	36.00 ± 8.00	42.00 ± 10.00	49.00 ± 12.00	42.33 ± 11.41

Values are mean ± standard deviation. Overall standard deviations incorporate within-group and between-group variation.

The overall tests indicated differences among category means for sleep duration, $\(F(2,297) = 46.91\), sleep-onset latency, \(F(2,297) = 62.66\), and SDSC score, \(F(2,297) = 41.23\); all \(p < 0.001\). These$ omnibus tests establish differences somewhere among the means, rather than independently establishing every pairwise comparison.

Frequent sleep difficulties

Frequent sleep difficulties occurred in 118 of 300 simulated records, or 39.3%. The proportion increased from 20.0% in the lowest-exposure category to 60.0% in the highest.

Table C. Simulated frequent sleep difficulties and unadjusted associations

Screen exposure	Difficulties present	Difficulties absent	Percentage with difficulties	Odds ratio (95% CI)
≤2 hours/day	20	80	20.0	Reference
>2–4 hours/day	38	62	38.0	2.45 (1.30–4.63)
>4 hours/day	60	40	60.0	6.00 (3.19–11.29)
Total	118	182	39.3	—

The overall association was statistically significant, \(\chi^2(2)=33.64\), \(p<0.001\). The highest-exposure category had three times the proportion with difficulties compared with the lowest category, although its odds ratio was six. These quantities should not be used interchangeably.

Discussion

The simulated analysis presents a consistent graded pattern: greater recreational exposure accompanies shorter nocturnal sleep, longer sleep-onset latency, and higher sleep disturbance scores. The numerical differences are substantial enough to warrant examination in actual observations, particularly the 66-minute difference between the highest- and lowest-exposure categories.

This direction broadly resembles associations described in earlier reviews [3–5]. Nevertheless, agreement with published literature does not validate constructed results. Actual findings could be smaller, absent, nonlinear, or dependent on particular activities and household circumstances.

The proposed separation of sleep duration and disturbance is important. A child may obtain sufficient hours yet experience fragmented sleep, while another may sleep continuously for too little time. SDSC scores and diaries therefore provide complementary information. They also use different recall

periods, which must be acknowledged when interpreting agreement or disagreement between measures.

Timing could help explain variation between children with similar daily exposure. Brosnan et al. [10] found that screen engagement after getting into bed was more informative than a broad measure of pre-bed exposure. Accordingly, the actual analysis should examine bedtime behaviour rather than assuming that daily duration captures the relevant exposure. The present summary tables cannot test that question.

Several alternative explanations remain plausible. Age, homework demands, parental routines, household crowding, emotional difficulties, physical activity, caffeine intake, and existing sleep problems may influence both screen use and sleep. Reverse causation is also possible: children who struggle to sleep may use devices because they remain awake.

The unadjusted odds ratios therefore describe association only. They cannot identify an independent screen effect or show how much sleep would improve after an intervention. Future participant-level analysis should prespecify relevant confounders and account for school clustering. Intervention research [11] further cautions against converting observational differences directly into expected treatment benefits.

Limitations

The principal limitation is the absence of collected participant data. The numerical findings cannot support prevalence estimates, clinical claims, or conclusions about a particular community.

Additional limitations of the proposed design include caregiver recall error, incomplete awareness of private device use, and imperfect diary estimates of sleep onset. Cross-sectional measurement cannot establish temporal order. Equal category sizes constrain generalisability, and aggregate summaries cannot assess confounding or model assumptions.

Finally, SDSC scores indicate reported disturbance rather than a confirmed disorder. Children with persistent problems would require appropriate clinical assessment rather than classification based solely on research questionnaires.

Conclusion

Assessment of screen exposure and childhood sleep should distinguish recreational duration, bedtime engagement, sleep quantity, and sleep disturbance. The simulated results provide a consistent numerical framework for reporting these relationships, but they establish no empirical findings. A completed study should draw conclusions only from observed data, appropriate adjustment, and the limitations of its design.



Declarations

Ethics approval and consent: Not applicable to this simulated draft; required before actual participant recruitment.

Funding: No funding information was supplied.

Conflicts of interest: To be completed by the authors.

Data availability: The numerical tables contain simulated aggregate values; no participant dataset underlies them.

References

1. Paruthi, S., Brooks, L. J., D'Ambrosio, C., et al. (2016). Recommended amount of sleep for pediatric populations: A consensus statement of the American Academy of Sleep Medicine. Journal of Clinical Sleep Medicine, 12(6), 785–786. https://doi.org/10.5664/jcsm.5866
2. LeBourgeois, M. K., Hale, L., Chang, A. M., Akacem, L. D., Montgomery-Downs, H. E., & Buxton, O. M. (2017). Digital media and sleep in childhood and adolescence. Pediatrics, 140(Supplement 2), S92–S96. https://doi.org/10.1542/peds.2016-1758J
3. Hale, L., & Guan, S. (2015). Screen time and sleep among school-aged children and adolescents: A systematic literature review. Sleep Medicine Reviews, 21, 50–58. https://doi.org/10.1016/j.smrv.2014.07.007
4. Carter, B., Rees, P., Hale, L., Bhattacharjee, D., & Paradkar, M. S. (2016). Association between portable screen-based media device access or use and sleep outcomes: A systematic review and meta-analysis. JAMA Pediatrics, 170(12), 1202–1208. https://doi.org/10.1001/jamapediatrics.2016.2341
5. Lund, L., Sølvhøj, I. N., Danielsen, D., & Andersen, S. (2021). Electronic media use and sleep in children and adolescents in western countries: A systematic review. BMC Public Health, 21, 1598. https://doi.org/10.1186/s12889-021-11640-9
6. Falbe, J., Davison, K. K., Franckle, R. L., et al. (2015). Sleep duration, restfulness, and screens in the sleep environment. Pediatrics, 135(2), e367–e375. https://doi.org/10.1542/peds.2014-2306
7. Cespedes, E. M., Gillman, M. W., Kleinman, K., Rifas-Shiman, S. L., Redline, S., & Taveras, E. M. (2014). Television viewing, bedroom television, and sleep duration from infancy to mid-childhood. Pediatrics, 133(5), e1163–e1171. https://doi.org/10.1542/peds.2013-3998
8. Hysing, M., Pallesen, S., Stormark, K. M., Jakobsen, R., Lundervold, A. J., & Sivertsen, B. (2015). Sleep and use of electronic devices in adolescence: Results from a large population-based study. BMJ Open, 5, e006748. https://doi.org/10.1136/bmjopen-2014-006748

9. Chang, A. M., Aeschbach, D., Duffy, J. F., & Czeisler, C. A. (2015). Evening use of light-emitting eReaders negatively affects sleep, circadian timing, and next-morning alertness. Proceedings of the National Academy of Sciences, 112(4), 1232–1237. https://doi.org/10.1073/pnas.1418490112
10. Brosnan, B., Haszard, J. J., Meredith-Jones, K. A., Wickham, S. R., Galland, B. C., & Taylor, R. W. (2024). Screen use at bedtime and sleep duration and quality among youths. JAMA Pediatrics, 178(11), 1147–1154. https://doi.org/10.1001/jamapediatrics.2024.2914
11. Martin, K. B., Bednarz, J. M., & Aromataris, E. C. (2021). Interventions to control children's screen use and their effect on sleep: A systematic review and meta-analysis. Journal of Sleep Research, 30(3), e13130. https://doi.org/10.1111/jsr.13130
12. Bruni, O., Ottaviano, S., Guidetti, V., Romoli, M., Innocenzi, M., Cortesi, F., & Giannotti, F. (1996). The Sleep Disturbance Scale for Children (SDSC): Construction and validation of an instrument to evaluate sleep disturbances in childhood and adolescence. Journal of Sleep Research, 5(4), 251–261. https://doi.org/10.1111/j.1365-2869.1996.00251.x

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