

“ASTUDYTOASSESTHEIMPACTOFBLUELIGHTSCREENONSLEEPQUALITYANDBEHAVIORAL PROBLEMS AMONG ADOLESCENTS AT SELECTED SCHOOL, CHETPET”

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Abstract

Introduction: Blue light, emitted from digital screens, LED lights, and the sun, plays a crucial role in regulating the sleep-wake cycle but can negatively impact sleep when excessively exposed at night. Adolescents are particularly vulnerable due to prolonged screen use and natural shifts in sleep pattern cycle.

Objectives: 1) To assess the impact of blue light screen among adolescents 2) To assess the sleep quality and behavioral problems among adolescents. 3) To determine the correlation between the impact of blue light screen and quality of sleep among adolescents. 4) To determine the correlation between the impact of blue light screen and behavioral problems among adolescents 5) To determine the correlation between sleep quality and behavioral problems among adolescents 6) To associate the impact of blue light screen, sleep quality and behavioral problems with the selected demographic variables.

Methodology: A quantitative descriptive study was conducted among 100 adolescents at Chetpet Government High School using purposive sampling. Data were collected using a standardized questionnaire, including the Strengths and Difficulty Questionnaire (SDQ) and Pittsburgh Sleep Quality Index (PSQI) scales, and analyzed through descriptive and inferential statistics.

Results: Among adolescents aged 12–18 years, 81% had moderate exposure and 19% had high exposure to blue light screens. About 74% experienced poor sleep quality, while 26% reported good sleep. Additionally, 52% showed high levels of behavioural problems, and 48% had low levels. A poor, non-significant positive correlation was found between blue light exposure and both sleep quality ($r = 0.097$) and behavioural problems ($r = 0.063$). However, a fair positive correlation was observed between sleep disturbances and behavioural issues ($r = 0.331$, $p \leq 0.001$). Gender and sleep duration were significantly associated with sleep quality, while age was significantly associated with behavioural problems. No demographic variables were significantly linked to blue light exposure levels.

Conclusion: The study concluded that greater exposure to blue light screen is associated with increased behavioral issues, which in turn aggravates sleep disturbances among adolescents.

INTRODUCTION

"Bluelight screens maybrighten our world,but theydimour sleep andstrain our eyes."

Being a tech-savvy child has advantages for education and other chances that previous generations just did not have. Regretfully, it also means that artificial, high-energy blue light is continuously being thrown into their developing eyes and minds. A natural component of the visible light spectrum, bright blue light is essential for controlling our circadian rhythm, or the cycle of sleep and wakefulness.¹

It has been demonstrated that prolonged exposure to artificial blue light has serious negative effects on health, with children perhaps being particularly vulnerable. Humans have been exposed to different degrees of visible and invisible light since their inception on Earth. The overuse of smartphones in adolescents and young adults has been associated with poor sleep quality. Using smartphones excessively has been connected to daytime fatigue, later bedtimes, and shorter sleep duration. Recent studies indicate that insufficient sleep in teenagers and young adults can result in detrimental impacts on both physical and mental health, such as mood disorders, impaired cognitive abilities, and a higher likelihood of developing hypertension and diabetes. The explosion of digital technology ownership in the last five and half years created a dramatic shift in how youth and families use technology. Additionally, children's average screen time exposure has rapidly increased due to easier access to new digital media devices like smartphones and tablets. According to Academy of Pediatrics (AAP).²

Sleep deprivation is a major concern for adolescents, with research showing that around 72% of highschoolstudentsfailtoachievetherecommened8-10hoursofsleepnightly. The consequences of insufficient sleep are extensive, leading to cognitive decline, greater vulnerability to

mood disorders, and decreased academic success. Additionally, studies have shown a strong link between poor sleep quality and behavioral problems such as irritability, hyperactivity, and attention issues. An article published in JAMA Pediatrics revealed that adolescents who lack adequate sleep are more likely to exhibit symptoms of depression and anxiety, conditions which can also worsen due to exposure to blue light. Excessive screen time in childhood is associated with behavioral health problem. However, it is still unclear how screen time contributes to these issues. Youth sleep quality is one possible mechanism of this association: Youth screen usage has been linked individually to decreased sleep length and quality as well as to a number of behavioral health outcomes in children (e.g., internalizing, externalizing, and peer difficulties)³

METHODS AND MATERIAL:

A Descriptive study was conducted to assess the impact of blue light screen on sleep quality and behavioral problems among adolescents at selected school, Cetpet. The study was conducted at a Government High School in Chennai, following formal approval from the school Principal to ensure a structured and ethical data collection process. The primary objectives of the study were to assess the sleep quality of students using the Blue light exposure questionnaire, Pittsburgh SleepQualityIndex (PSQI) and to evaluate their behavioural problem sthrough the Strengths and Difficulties Questionnaire (SDQ). These standardized assessment tools were selected to provide comprehensive insights into the students' sleep patterns and behavioural challenges. The data collection took place over a period of one month, from September 12, 2024, to October 12, 2024, allowing sufficient time for systematic data gathering. 35 A purposive sampling technique was used to select participants who

met the inclusion criteria, ensuring the relevance of the data collected. A descriptive research design was utilized to facilitate an in-depth analysis of the relationship between sleep quality and behavioural problems among students. A total of 100 students from the government high school actively participated in this study. Before distributing the questionnaires, the researcher provided a detailed explanation of the study's purpose, as well as clear instructions on how to respond to the questions. This step was essential to ensuring the students understood the assessment tools and to provide accurate responses. Once all responses were gathered, the data was carefully organized and prepared for analysis to derive meaningful conclusions. The study instruments were found to be feasible, reliable, and effective in capturing the necessary information, validating their suitability for their search objectives. This structured approach ensured that the study could provide valuable insights into the impact of sleep quality on students' behavioral well-being.

RESULT AND DISCUSSION
SECTION A: Description of the demographic variables of the adolescents.

Frequency and percentage distribution of demographic variables of the adolescents.

The Present study denotes that most of the adolescents (12 – 18 yrs), 50(50%) were aged between 16 – 17 yrs, 32% were aged between 17-18 yrs, 59 (59%) were male and 41% were female's, 34(34%) were studying 10th std & (24%) were 12th std, 43(43%) of fathers had primary school education also (34%) has higher secondary education, 51(51%) of mothers had primary school education, 63(63%) of fathers were coolie workers, 44(44%) of mothers were coolie workers, 70(70%) were Hindus, 67(67%) had monthly income of <20,000, 53(53%) belonged to nuclear family, 60(60%) had slept less than 6 hours per day, 41(41%) had 2 mobile phones in home and 35(35%) were not using any other gadgets.

SECTION B: Impact of light blue screen exposure among adolescents

Table 1: Frequency and percentage distribution of exposure to blue light screen among adolescents

| Blue light exposure | Frequency | Percentage |
|-------------------------|-----------|------------|
| Moderate exposure (4–7) | 81 | 81.0 |
| High exposure (8– 10) | 19 | 19.0 |

Table 02: Frequency and percentage distribution of sleep Quality among adolescents.

| Sleep Quality | Frequency | Percentage |
|--------------------|-----------|------------|
| Good sleep (0– 4) | 26 | 26.0 |
| Poor sleep (5– 10) | 74 | 74.0 |

Table 03: Frequency and percentage distribution on behavioral problems among adolescents.

| Behavioral problems | Frequency | Percentage |
|---------------------|-----------|------------|
| Low (<17) | 48 | 48.0 |
| High (≥17) | 52 | 52.0 |

SECTION C: Correlation between the impact blue light screen and sleep quality among

adolescents.

Table4:Correlationbetweenexposuretobluelightscreenandsleepqualityamong adolescents

| Variables | Mean | S.D | KarlPearson's Correlation&p-value |
|------------------------------|------|------|--------------------------------------|
| Exposureto light blue screen | 5.67 | 1.68 | r=0.097 |
| SleepQuality | 5.15 | 2.16 | p=0.336,N.S |

SECTIOND:Correlationbetweenimpactofblue light screenandbehavioral problems among adolescents.

Table 5: Correlationbetweenexposure to blue light screenandbehavioral problems among adolescents

| Variables | Mean | S.D | KarlPearson's Correlation&p-value |
|----------------------------|-------|------|--------------------------------------|
| Exposureto bluelightscreen | 5.67 | 1.68 | r=0.063 |
| Behavioralproblems | 26.88 | 6.54 | p=0.531,N.S |

The table5 depicts that the mean score of exposure to blue light screen was 5.67 ± 1.68 and the mean score of behavioral problems was 26.88 ± 6.54 . The calculated Karl Pearson's Correlation value of $r = 0.063$ shows a poor positive correlation statistically not significant at $p < 0.05$ level.

SECTIONE: Correlationbetween sleep quality and behavioral problems among adolescents.

Table6: Correlation between sleep quality and behavioral problems among adolescents

| Variables | Mean | S.D | KarlPearson's Correlation&p-value |
|--------------------|-------|------|--------------------------------------|
| SleepQuality | 5.15 | 2.16 | r=0.331 |
| Behavioralproblems | 26.88 | 6.54 | p=0.001, S*** |

The table 6 depicts that the mean score of sleep quality was 5.15 ± 2.16 and the mean score of behavioral problems was 26.88 ± 6.54 . The calculated Karl Pearson's Correlation value of $r = 0.331$ shows a fair positive correlation statistically significant at $p \leq 0.001$ level which clearly infers that when the behavioral problems increases then sleep disturbances among them also increases.

SECTIONF: Association of impact of blue light screen on sleep quality, behavioral problems with selected demographic variables of the adolescents.

Table7: Association of level of blue light impact with selected demographic variables of the adolescents

The study denoted that the demographic variable gender ($\chi^2=4.047$, $p=0.044$) and duration of sleep ($\chi^2=8.971$, $p=0.030$) had statistically significant association with level of sleep quality of the adolescents (12-18 years) at $p<0.05$ level and the other demographic variables did not statistically significant association with level of sleep quality of the adolescents (12-18 years) at $p<0.05$ level.

With the regard to the demographic variable age ($\chi^2=8.218$, $p=0.042$) had statistically significant association with level of behavioral problems of the adolescents (12- 18 years) at $p<0.05$ level and the other demographic variables did not statistically significant association with level of behavioral problems of the adolescents.

CONCLUSION

The current study evaluated the impact of blue light screen on sleep and behavioural problems on high school students at a selected school in Chetpet. The research findings concluded that due to the impact of blue light screens, behavioral problems as well as sleep disturbances among the high school students have increased. The mean score of sleep quality was 26.88 ± 6.54 and the mean score of behavioral problems are 5.15 ± 2.16 . The calculated Karl Pearson's Correlation value of $r = 0.331$ shows a fair positive correlation statistically significant at $p\leq 0.00$ level. By growing body of evidence supports, there is a need for proactive measures to reduce the blue light exposure among adolescents, particularly before bedtime. Addressing this issue through education, parental guidance, and policy changes can help promote healthier screen habits, improve sleep quality, and reduce the behavioral problems, ultimately enhancing adolescents' overall mental and physical health.

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CONFLICTS OF AUTHOR

The author declare no conflicts of interest

COMPLIANCE WITH THE ETHICAL GUIDELINSS

A Statement confirming that the study was approved by the Ethical clearance was obtained from institutional ethics committee of ACS Medical College and Hospital (No.1262/2024/IEC/ACSMCH Dt. 05.07.2024)

AUTHOR'S CONTRIBUTION

All the authors actively participated in the work of the study. All authors read and approved the final manuscript

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