



## **Impact of Screen Time on Health and Behaviour among Mid Adolescents: A Cross Sectional Study**

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### **Abstract**

**Introduction:** Media offers the viewers with wide variations of entertainment which has a negative impact on the adolescents in form of sleep disturbances, mental health problems and poor peer relationship. 3/4th (76.4%) of Indian adolescents viewed television during meal time. Smart phone addiction among adolescents ranged from 39% to 44%.

**Aims and objectives:** To assess the impact of screen time in mid adolescents on health, behavior and sleep disturbances.

**Material and methods:** A cross sectional study was conducted on 100 mid adolescents of 8th, 9th and 10th standard on pre- validated PSC-Y and CSHQ questionnaires. Data collected was entered into

Microsoft excel data sheet and analyzed using SPSS 22 version software.

**Results:** The PSC-Y screening showed significant score among those who viewed screen for more than 60 minutes ( $p < 0.01$ ) requiring the need for evaluation. Sleep awakening once during night was more in those who have screen time of  $>60$  minutes ( $p < 0.01$ ). It is seen that adolescents who view screen for more than 60 minutes are restless and move a lot while sleeping.

**Conclusion:** Increased screen time exposure ( $>1$  hour) among adolescents is associated with sleep disturbances, increased risk of mental health problems and decreased physical activity.

**Keywords:** PSC-Y (Pediatric symptom checklist-youth)

## Introduction

Screen time defined as total time spent in watching screens like television, computers, laptops, tablets, smartphones and handheld videogames in a day. Media forms an important part of the life of adolescents as they are engaged in watching television, playing video games. It is shown to have effects on behaviour, physical activity, obesity, sleep, language development, cognition and social development.

Electronic devices emit blue light which suppress melatonin production and alter circadian rhythms, leading to disrupted sleep[2]. Sleep deprivation enhance existing health problems, impair cognitive function, and increase the risk of accidents and injuries. It also lead to addiction, social isolation, and mental health issues such as anxiety and depression.

Excessive exposure to screens especially at adolescence has been associated with lower academic performance, increased sleep problems, obesity, behavioural problems, increased aggression, lower self-esteem and depression.[3]

Media offers the viewers with wide variations of entertainment which has a negative impact on the adolescents in form of sleep disturbances, mental health problems, poor peer relationship. 3/4th (76.4%) of Indian adolescents viewed television during meal time.[1] Smart phone addiction among adolescents ranged from 39% to 44%.

According to the 2021 update of the World Health Organization (WHO) [4], it is estimated that 14% of young people between 10 and 19 years old have mental health problems. Depression, anxiety, and behavioural disorders are among the leading causes of illness and disability in adolescents, and suicide is already the fourth leading cause of death[.]

The widespread use of portable electronic devices and the normalization of screen media devices in the bedroom is accompanied by a high prevalence of insufficient sleep, affecting a majority of adolescents, and 30% of toddlers, pre-schoolers, and school-age children.[5]

The National Sleep Foundation recommends that adolescents aged between 14 and 17 have 8-10 hours of sleep every 24 hour[6]. With the rise of new technologies, the use of screen such as smartphones, tablets, computers, and smart TVs have been studied as a potential risk factor for shorter sleep duration and lower sleep quality. Exposure of young children to screen based media is the global concern but the gravity of this situation has not been studied adequately in young children in the Indian setting.[7]

The advent of digital technology has transformed the landscape of adolescence, with screen time becoming an integral part of daily life for many young people. Mid-adolescents, typically defined as individuals aged 14 to 17, are particularly vulnerable to the effects of prolonged screen exposure due to their developmental stage, characterized by significant physical, emotional, and social changes. As digital devices become more accessible, concerns regarding the impact of screen time on health and behaviour have escalated, prompting a need for comprehensive research in this area.

Increase screen time is believed to activate the neurobiological system, particularly affecting the hypothalamic-pituitary-adrenal (HPA) axis and the dopaminergic, serotonergic, and adrenergic pathways. This activation can lead to various emotional and behavioural issues. Adolescence is a critical period characterized by significant changes in neurobiological

systems, making young people especially susceptible to such problems.

The developmental model of the adolescent brain indicates that while the affective-motivational system matures early in adolescence, the regulatory control system develops later in the early adulthood. This gap in maturation creates a phase of heightened vulnerability, increasing the likelihood of risk-taking behaviours and a tendency toward seeking rewards and novel experiences during mid-adolescence. These behaviours can be exacerbated by social factors, including pressure, feelings of isolation, and fears of abandonment.[8]

**Materials and Method**

A cross sectional study was conducted for 6 months from August 2023- January 2024 on 100 mid adolescents aged 13-16 years studying in high Schools of Karnataka. Students with known intellectual disability, neuro developmental and psychiatric disorders and on antipsychotic medications were excluded from the study. After obtaining the institutional ethical clearance, permission from B.E.O of the respective area and school principal, the study was conducted. Consent from the parents and assent from the students were taken. Demographic details, age & gender of child, class studying in were noted in a predesigned proforma. The pre- validated questionnaire Digital Screen exposure questionnaire(DSEQ), Paediatric Symptom Checklist-Youth report(Y-PSC), Children’s Sleep Habit Questionnaire(CSHQ) were administered to students. Scores of each questionnaire was calculated. Data was tabulated on Microsoft excel and analysed.

**Sample Size: 100**

Sample size was estimated by using the Proportion of sleep disturbance among adolescents was 33.9% from the study by **Maurya et al**[9] using the formula

$$\text{Sample Size} = \frac{Z_{1-\alpha/2}^2 P (1-P)}{d^2}$$

Using the above values at 95% Confidence level a sample size of 87 subjects will be included in the study. Considering 10% Nonresponse a sample size of 87 + 8.7 ≈ 96 subjects will be included in the study.

**Statistical analysis**

Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. **Chi-square test or Fischer’s exact test** (for 2x2 tables only) was used as test of significance for qualitative data.

**P value** (Probability that the result is true) of <0.05 was considered as statistically significant after assuming all the rules of statistical tests.

**Results**

Total of 100 students included in the study. 3 validated questionnaires were given to each student.

Out of 100 students, 37 viewed screen for less than 60 minutes, while 63 viewed for more than 60 minutes.

Table 1: Association of screen time with various factors:

Factors associated with screen time		BELOW 60	ABOVE 60	P value
		MIN N= 37(%)	MIN N=63(%)	
Sleep disturbances	NO	35(94.59)	8(13)	<0.001
	YES	2(5.4)	55(87)	
Type of electronic media	MOBILE	26(70)	50(79)	0.465
	TELEVISION	11(30)	12(19)	
	TABLET	0(0)	1(1.58)	
CONTENT	MOVIE	5(13.5)	10(15.8)	0.757
	GAMES	8(21.6)	10(15.8)	
	YOUTUBE	24(64.86)	43(68)	
PHYSICAL ACTIVITY	NO	2(5.4)	46(73)	<0.001
	YES	35(94.5)	17(26)	

87% of those who viewed screen more than 60 min had sleep disturbances which is statistically significant.

Adolescents who viewed screen for less than 60 min are more physically active (94.5%) which is statistically significant. (Table1)

Table 2: Association of screen time with PSC-Y scale and CSHQ:

		<60min	> 60min	P value
PSC-Y (significant)	No	29(90.6%)	11(16.2%)	<0.001
	Yes	3(9.4%)	57(83.8%)	
Sleep awakening once during night	No	22(64.7%)	11(16.7%)	<0.001
	Yes	12(35.3%)	55(83.3%)	
Restless and moves a lot while sleeping	No	21(61.7%)	11(16.7%)	<0.001
	Yes	13(38.3%)	55(83.3%)	

The PSC-Y screening showed significant score among those who viewed screen for more than 60 min ( $p < 0.01$ ) requiring the need for evaluation. Sleep awakening once during night was more in those who have screen time of  $>60$  min ( $p < 0.01$ ) when compared to those who view screen for less than 60 min. It is seen that adolescents who view screen for more than 60 min are restless and move a lot while sleeping when compared to those who view screen for less than 60 min (table 2).

### Discussion

In the study sleep awakening once during night was more in those who have screen time of  $>60$  min ( $p < 0.01$ ). It is also seen that adolescents who view screen for more than 60 min are restless and move a lot while sleeping. The above findings align closely with study done by **Alshoaibi Y, Bafil W, Rahim M**[10] revealed that adolescents in Riyadh had a high frequency rate and duration of screen use which may exceed 6 hours daily with nearly half of them with poor sleep quality, feeling fatigue, daytime sleepiness, and lack of concentration.

An another study done by **John R et al.**[11] showed excess screen time among secondary school children was

83.2%. There was a significant association between excess screen time and inadequate sleep.

In the study, mobile was most commonly used media. This aligns with the study done by **John R et al**[11] showed Mobile phone was the most used device (98.9%).

The study showed significant score among those who viewed screen for more than 60 min ( $p < 0.01$ ) requiring the need for evaluation which aligns with the study done by **Singh N** showed those with screen time of 6-8 hours had significant PSC-Y score.

In study by **Appelhans BM et al**[12], Sleep duration was the only health behaviour associated with child weight status (OR = 0.45, 95% CI: 0.27, 0.77), with normal weight children sleeping 33.3 minutes/day longer on average than overweight/obese children due to reduced physical activity. This explains 26% of variance in child weight status, inconsistent implementation of bedtime routines, and the presence of a television in children's bedrooms to childhood overweight/obesity through effects on screen time and sleep duration. In our study 94.5% of adolescents had screen time less than 60 minutes had more physical activity 73% of them had screen time more than 60 minutes had no physical activity which was found to be statistically significant.

In our study adolescents who view screen for more than 60 min were less physically active than those who has screen time of less than 60 minutes which is statistically significant ( $p < 0.01$ ). This aligns with the study done by **Han K et al**[13] which showed that adolescents who used computer /video time for more than two hours was significantly associated with high risks of physical inactivity (OR = 1.724, 95%CI: 1.531–1.941), insufficient sleep (OR = 1.354, 95%CI: 1.151–1.592).

The mechanisms by which higher levels of screen time cause sleep disturbances have been attributed to environmental, psychosocial, and biological causes[14]. Environmental cause is the use of screen-based activities, which often delays bedtime or truncates total sleep time.. Psychosocial source may be arousal due to the content of the media, interfering with the ability to fall and stay asleep. Potential biological mechanism is the effect of screen light on both circadian rhythm and alertness[13]. Excessive screen time has been associated with various physical health issues, most notably sedentary behaviour, which is a risk factor for obesity and related conditions. Studies indicate that prolonged periods of inactivity, often linked to screen use, can lead to reduced cardiovascular fitness and musculoskeletal problems. Increased screen time is often correlated with changes in social interaction patterns. While digital platforms can enhance communication and foster relationships, they may also lead to isolation and reduced face-to-face interactions.

Increased screen time often correlates with sedentary behaviour, which can lead to negative health outcomes. The nature of online interactions like social media engagement, gaming influence emotional well-being and behavioural patterns, potentially contributing to social isolation or heightened peer pressure.

Despite the growing body of evidence, gaps remain in understanding the specific impacts of screen time on mid-adolescents. This cross-sectional study aims to address these gaps by examining the relationships between screen time, physical health outcomes, and behavioural issues in this age group. The findings of this study will contribute to the existing literature and inform parents, educators, and policymakers about the potential risks associated with excessive screen time. The goal is

to promote healthier habits and foster a balanced approach to technology use among adolescents, ensuring their overall well-being in an increasingly digital world.

### **Conclusion**

Increased screen time exposure (>1 hour) among adolescents is associated with sleep disturbances in the form of awakening once during night, moving a lot while sleeping and being restless. It is also associated with increased risk of mental health problems, decreased physical activity and significant PSC- Y score requiring further evaluation and management.

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