e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(6); 1651-1656

Original Research Article

Association of Screen Time with Sleep Quality and Moderate-to-Vigorous Physical Activity Among School-Going Adolescents in Haryana: A Cross-Sectional Study

Meenakshi Kalhan[1], Annpurna[2], Vinod Chayal[3], Ramesh Verma[4], Priya Punyani[5], Anjali Jayanth[6]

[1]Professor, Department of Community Medicine, PGIMS, Rohtak, Haryana, India
[2]Assistant Professor, Department of Community Medicine, WCMSRH, Jhajjar, Haryana, India
[3]Professor, Department of Community Medicine, PGIMS, Rohtak, Haryana, India
[4]Professor, Department of Community Medicine, PGIMS, Rohtak, Haryana, India
[5]Senior Resident, Department of Community Medicine, PGIMS, Rohtak, Haryana, India
[6]Junior Resident, Department of Community Medicine, PGIMS, Rohtak, Haryana, India

Received: 01-04-2026 / Revised: 25-05-2026 / Accepted: 12-06-2026
Corresponding Author: Dr. Priya Punyani
Conflict of interest: Nil

Abstract

Background: Screen-based device use has increased rapidly among adolescents, leading to concerns about excessive screen time. Prolonged screen exposure may affect important health behaviours, particularly sleep and physical activity. However, local evidence from India remains limited. Therefore, this study aimed to determine the association of screen time with sleep quality and moderate-to-vigorous physical activity(MVPA) among school-going adolescents.

Material and Methods: A cross-sectional study was conducted among school-going adolescents of 8th to 12th class of government and private co-educational senior secondary schools in the urban area of the Rohtak district, Haryana. A total of 400 students were selected, 100 students from each school and 20 students from each class, using a multistage sampling technique.

Statistical Analysis: The data were compiled and entered into an MS Excel spreadsheet and analysis was carried out by SPSS v20.0.

Results: The prevalence of excessive screen time (>2 hours/day) was 70.3%. The median screen time was 3.14 hours/day. More than half of the study participants had normal BMI (52.0%). Excessive screen time was highest among obese (90.5%) and overweight (78.9%) study participants. Poor sleep quality was observed in 54.2%, and excessive screen time was more common among those with poor sleep quality (78.4%). Overall, 66.0% had MVPA <60 minutes/day. Excessive screen time was higher among study participants with MVPA >60 minutes/day (77.2%). The association of screen time with BMI, sleep quality, and MVPA was statistically significant.

Conclusion: A large proportion of adolescents reported screen time exceeding recommended limits. Encouraging balanced and appropriate use of screen-based media is important for promoting healthy behaviours.

Keywords: Adolescents, Body Mass Index, Moderate To Vigorous Physical Activity, Screen Time.

DOI: 10.25258/ijcpr.18.6.266

Introduction

The rapid integration of digital technologies into daily life has significantly transformed the dynamics of human interaction, education, and entertainment. Adolescents spend an average of 7-7 1/2 hrs a day of their time with these media in spite of outdoor activities.[1] Screen time (ST) is the time spent in sedentary behaviour involving screen-based media (SBM) like watching television, playing games, and using computer and smartphones, as recommended by the American Academy of Paediatrics, should not exceed more than 2 hr/day for all age group above 2 years.[2] Although screen use has some benefits, such as learning new things, expanding one's social network, getting support from others, and having access to health-related information, there are also numerous negative aspects that must be taken into consideration. The latter includes a higher chance of obesity, insomnia, headaches, eyestrain, and sleeplessness.[3] For healthy growth and development, adolescents should balance screen use with other activities. Research indicates that a large proportion (Four in five adolescents) of adolescents

report screen time of 2 hours or more per day, often exceeding recommended limits[4]. At the same time, many adolescents do not meet the World Health Organization (WHO) recommendation of at least 60 minutes per day of moderate-to-vigorous physical activity (MVPA).[5]

The situation in India is similar to global trends due to increasing access to digital devices, but there are limited local studies examining the impact of screen time on adolescent health. Therefore, there is a need to generate local evidence to better understand this issue.

Based on these concerns, the present study was planned to determine the association of screen time with sleep quality and physical activity among school-going adolescents in Rohtak district, Haryana.

Material and Methods

A cross-sectional study was conducted among school going adolescents aged 10-19 years of the selected co-educational government and private senior secondary schools of Rohtak district, Haryana. The study was carried out over a period of one year from the commencement of data collection. Adolescents studying in classes 8^{th} to 12^{th}, whose parents/guardians gave written informed consent and who gave assent were included in the study. Students who were absent on the day of data collection were excluded.

Sample size was calculated using the formula $n=(Z_{1-\alpha})^2PQ/L^2$.Taking the prevalence of screen time more than the recommended as 68%, based on a study by Dubey Met al.[6], with $Z_{1-\alpha}=1.96$ (at 95% confidence interval) and L as 5% absolute error, the sample size was calculated as335.After adjusting for 10% non-response, the final sample size was rounded to 370. However, 400 students were included to ensure adequate representation. The permission of the Institutional Ethics Committee of Pt. B.D. Sharma PGIMS, Rohtak was obtained vide letter No. BREC/22/TH/COMM.MED.-07 before the commencement of the study. A multistage sampling technique was used. In the first stage, two government and two private co-educational senior secondary schools were selected using simple random sampling by lottery method. Permission was sought from the District Education Officer and principals of the selected schools before data collection. In the second stage, eligible classes (VIII–XII) were included. In the final stage, students were selected using stratified random sampling with sex as the stratification variable. From each class, 10 boys and 10 girls were selected using simple random sampling from the class attendance register.

Written informed consent and assent were obtained, from their parents and study participants respectively. Data was collected in a separate room to maintain the privacy of the study subjects. The confidentiality of information shared was ensured.

Data were collected on a pre-designed and pre-tested semi-structured schedule. Information regarding socio-demographic characteristics was recorded, and socioeconomic status was assessed using the Modified Kuppuswamy Socioeconomic Scale.[7] Other variables included screen time, moderate to vigorous physical activity (MVPA), sleep quality and anthropometric measurements.

Weight was measured using a digital weighing scale (calibrated up to 0.1kg) and height was measured using a non-elastic measuring tape (last count of 0.1cm) as per standard techniques. BMI was calculated using the formula:- BMI = Weight(kg)/ Height(m^2) and classified using WHO BMI-for-age Z-score criteria.[8]

For assessing the quality of sleep, Pittsburg Sleep Quality Index (PSQI)[9] was used. It was a standardized tool and permission had sought to use it. The validated local language version[10] was used. Information regarding the pattern of sleep was recorded and a score for every item on a scale from 0 (not during the last month) to 3 (three or more times a week) was given and the final score was calculated. A total score of >5 indicative of poor sleep quality.

Statistical Analysis: Data was compiled and entered in the MS Excel sheet. Analysis were carried out by SPSS (Statistical Package for Social Sciences) software version 20 using appropriate statistical tests, wherever applicable.

Results

In the present study maximum study participants were from the age group 14-16 years (58.8%) and the mean age for males and females were 14.89 +1.86 years and 14.84 +1.78 years, respectively. As per parent's education, almost one-third of their fathers and mothers were educated up to graduate or post-graduate (33.3% and 33% respectively). According to the Modified Kuppuswamy Scale [7], most participants belonged to the upper-lower socioeconomic class (45.0%).

A total of 70.3% study participants reported screen time exceeding the recommended time (i.e.>2hours/day) and the median screen time was 3.14 hours/day.

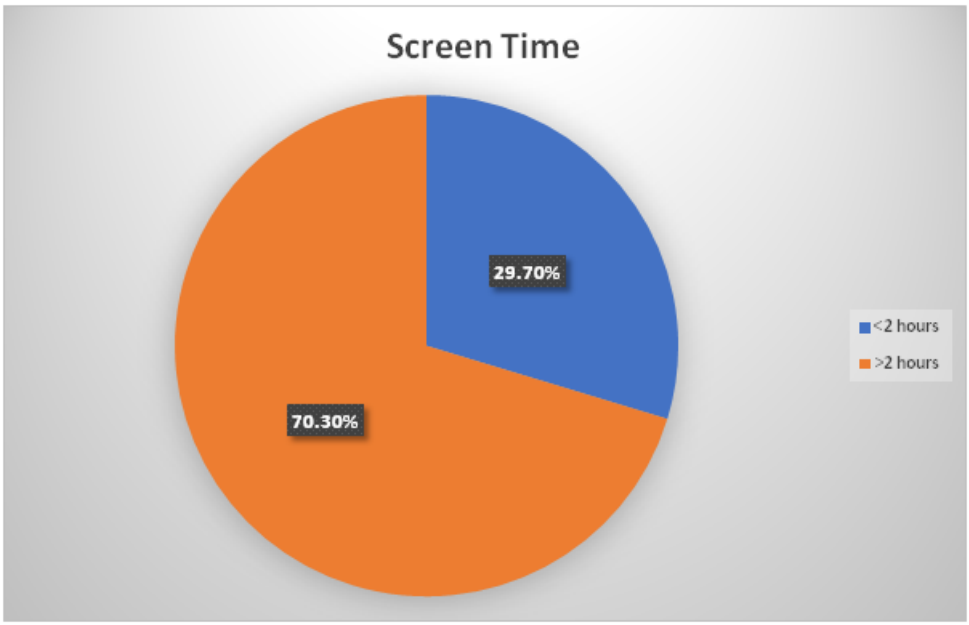

Figure 1: Distribution of study subjects according to Screen Time

Table 1: Association of BMI and Screen time

BMI category	Screen time		Total(%)	p value
	<2hr	>2hr		
Obese (>+2SD)	4(9.5%)	38(90.5%)	42(10.5)	χ^2= 16.03
Overweight (+2 to +1 SD)	15(21.1%)	56(78.9%)	71(17.8)	df= 4
Normal (+1 to -2 SD)	69(33.2%)	139(66.8%)	208(52.0)	p=0.003*
Thinness (-2SD to -3SD)	20(36.4%)	35(63.6%)	55(13.8)	
Severe Thinness (<-3SD)	11(45.8%)	13(54.2%)	24(6.0)	
Total	119(29.7%)	281(70.3%)	400	

Significant*

In table 1, according to the WHO BMI for age chart, around half of the study subjects had normal BMI, while 28.3% were overweight or obese and 19.8% were classified as thin or severely thin. The prevalence of excessive screen time was highest among obese participants, followed by overweight, normal, thinness and severe thinness categories. A statistically significant association was observed between BMI category and screen time (χ^2 = 16.03, df = 4, p = 0.003).

Table 2 highlights the association between excessive screen time and various components of the Pittsburgh Sleep Quality Index (PSQI). Excessive screen time was most prevalent among participants with poor subjective sleep quality, longer sleep latency (>60 minutes), shorter sleep duration (5–6 hours), and lower habitual sleep efficiency (<65%). Statistically significant associations were observed between screen time and subjective sleep quality (p=0.018), sleep latency (p=0.009), sleep duration (p=0.049), and daytime dysfunction (p=0.03).

However, no significant associations were found with habitual sleep efficiency (p=0.38) and sleep disturbances (p=0.28). None of the participants used sleep medication. Overall, the prevalence of excessive screen time was higher among individuals with poor sleep quality (PSQI score >5), and the association was found to be highly significant (χ^2= 14.8, df=1, p<0.001**).

Table 2: Association of Sleep Quality and Screen time

Sleep Quality Parameters	Screen time		Total	p value
Subjective Sleep Quality	**<2hr**	**>2hr**		
Very Good	75(35.4%)	137(64.6%)	212	χ^2= 10.06
Fairly Good	38(26.8%)	104(73.2%)	142	df=3
Fairly Bad	4(11.8%)	30(88.2%)	34	p=0.018*
Very Bad	2(16.7%)	10(83.3%)	12	
Sleep Latency	<2hr	>2hr	Total	p value
<15 minutes	32(42.1%)	44(57.9%)	76	χ^2= 11.46
16-30 minutes	56(31.6%)	121(68.4%)	177	df=3
31-60 minutes	24(22.4%)	83(77.6%)	107	p=0.009*

>60 minutes	7(17.5%)	33(82.5%)	40	
Sleep Duration	<2hr	>2hr	Total	p value
>7 hours	59(35.7%)	106(64.3%)	165	χ^2= 7.8
6-7 hours	46(29.1%)	112(70.9%)	158	df=3
5-6 hours	10(17.5%)	47(82.5%)	57	p=0.049*
<5 hours	4(20%)	16(80%)	20	
Habitual Sleep Efficiency	<2hr	>2hr	Total	p value
>85%	104(30.5%)	237(69.5%)	341	χ^2= 3.07
75-84%	13(28.9%)	32(71.1%)	45	df=3
65-74%	2(28.6%)	5(71.4%)	7	p=0.38
<65%	0(0%)	7(100%)	7	
Sleep Disturbances	<2hr	>2hr	Total	p value
0	13(38.2%)	21(61.8%)	34	χ^2= 3.75
1-9	85(30.9%)	190(69.1%)	275	df=3
10-18	20(24.1%)	63(75.9%)	83	p=0.28
19-27	1(12.5%)	7(87.5%)	8	
Use of Sleep Medication	<2hr	>2hr	Total	
Not using medication	119(29.7%)	281(70.3%)	400	
Using medication	0	0	0	
Daytime Dysfunction	<2hr	>2hr	Total	p value
0	53(33.7%)	104(66.3%)	157	χ^2= 8.9
1-2	50(31.6%)	108(68.4%)	158	df=3
3-4	16(22.2%)	56(77.8%)	72	p=0.03*
5-6	0(0%)	13(100%)	13	
Sleep Score	<2hr	>2hr	Total	p value
<5 Sleep Score	72(39.3%)	111(60.7%)	183	χ^2= 14.8
>5 Sleep Score	47(21.6%)	170(78.4%)	217	df=1
Total	119(29.7%)	281(70.3%)	400	p<0.001**

Highly significant**, Significant*

Table 3: Association of Moderate to Vigorous Physical Activity(min/day) and Screen time

MVPA (min/day)	Screen time		Total	p value
	<2hr	>2hr		
<60min/day	88(33.3%)	176(66.7%)	264	χ^2= 4.7
>60min/day	31(22.8%)	105(77.2%)	136	df= 1
Total	119(29.7%)	281(70.3%)	400	p=0.029*

Significant*

Table 3 illustrates the association of screen time and MVPA. Among all study subjects, about two-third (66%) had MVPA < 60min/day. Prevalence of excessive screen time was higher (77.2%) among study subjects whose MVPA was >60min/day compared to those with MVPA <60min/day (66.7%). Association of moderate to vigorous physical activity and screen time in our study was statistically significant ($\chi^2 = 4.7$, df = 1, p = 0.029).

Discussion

"In the present study, 70.3% of study participants had screen time exceeding the recommended limits and the median screen time was 3.14 hours/day. Comparable findings were reported in studies by Dubey M et al.[6], John R et al.[11], and Moitra P et al. [12], which also documented a high prevalence of excessive screen exposure. However, Pooja RS et al. [13] observed a comparatively lower prevalence. These variations indicate that excessive screen time is common across different populations, highlighting the need for strategies to encourage healthier screen use. In termsof nutritional status, the majority of participants were classified as normal BMI (52.0%), followed by overweight, thinness, obese andsevere thinness. Comparable distributions have been reported by Moitra P et al.[12], where 49% of participants had normal BMI, and by Babic MJ et al.[14], who also observed normal BMI as the predominant category. In contrast, Shin J et al. [15]documented a higher proportion of individuals with normal BMI (82.3%). This difference could be due to different dietary habits or could be due to unhealthy dietary habits, such as consuming junk food among adolescents in the present study. With respect to sleep patterns, slightly more than half of the participants reported good sleep quality, while a considerable proportion demonstrated poorer sleep scores. The distribution of sleep duration indicated that many participants slept less than the recommended duration. Similar observations have been reported by Moitra P et al. [12], who documented suboptimal sleep characteristics among

adolescents. These findings suggest that inadequate sleep remains a common concern in this age group.

Regarding physical activity, 66% of participants engaged in less than 60 minutes/day of MVPA, which is comparable with findings from Moitra P et al. [12] and Pooja RS et al. [13]. This reflects insufficient physical activity levels and highlights the persistence of sedentary behaviour among adolescents.

Association of BMI and Screen Time: In the present study, the prevalence of excessive screen time was highest among obese participants (90.5%), followed by overweight (78.9%) and normal BMI categories (66.8%), while thin and severely thin participants showed comparatively lower prevalence. The association between BMI and screen time was statistically significant ($p = 0.003$). Similar findings were observed by Khan A et al. [4], who reported higher screen time among overweight and obese children. However, John R et al. [11] did not find a significant association, indicating variation across studies. It was also observed that many participants reported eating while watching television, which may contribute to unhealthy weight outcomes.

Association of Sleep and Screen Time: In the present study, the prevalence of excessive screen time was higher among participants with poor sleep quality (78.4%), and the association was highly statistically significant ($p <0.001$). Comparable observations were reported by Moitra P et al. [12], suggesting a relationship between screen exposure and sleep quality. Hysing M et al. [16] also demonstrated that longer screen use was associated with adverse sleep characteristics. Similar findings were also reported by Jain S et al. [17], where night sleep time was significantly associated with screen time ($p = 0.017$). These findings indicate that prolonged screen engagement may negatively influence sleep patterns, possibly due to delayed sleep schedules and extended screen use.

Association of MVPA and Screen Time: In our study, the prevalence of excessive screen time was higher (77.2%) among participants with MVPA >60 minutes/day compared to those with MVPA <60 minutes/day (66.7%).The association between MVPA duration and screen time was found to be statistically significant.

In contrast, Pooja RS et al. [13] reported that excessive screen time was not significantly associated with physical activity levels, despite variations in MVPA duration. Similarly, Moitra P et al. [12] did not observe a statistically significant association between MVPA and screen time. These differences suggest variability in the relationship between physical activity and screen exposure across studies. Variations in lifestyle patterns and access to screen-based devices may partly explain these findings.

Conclusion

Highest prevalence of excessive screentime was observed in obese (90.5%), followed by overweight (78.9%), normal (66.8%), thinness (63.6%) and severe thinness (54.2%). Association of BMI and screentime was found to be statistically significant($p=0.003$).

Prevalence of excessive screen time was higher among those sleep score was >5 (78.4%) then those score <5 (60.7%). Association of Quality of sleep and screentime was highly statistically significant. ($p<0.001$).The association between MVPA duration and screen time was found to be statistically significant. ($p=0.029$)

Strengths and Limitations: Strength: The present study involves urban populations with a large sample size and multistage sampling technique was used which improves the external validity of the study.

Limitation: Owing to the cross-sectional study design, the study is unable to decipher the direction of association or long-term outcomes of excessive screen time as it needs more accurate and longer studies to determine the relationship among the variables under study more accurately.

Recommendations: Balance screen time with adequate time for sleep, physical activity, study, family, meals, and hobby time. Screens should be switched off 1 hour before bedtime, as blue light emitted from devices disturbs sleep.

The correct posture to be adopted while sitting in front of the computer and the mobile phone is shown in the figures below, respectively. To reduce eyestrain and dryness of eyes, it is important to follow 20-20-20 rule as outlined in the figure below. Every 20 minutes take a break for 20 seconds and look at an object 20 feet away. Encourage the use of media for educational purposes and promote physical activity and offline creative games for recreation.

Conflict of Interest: None

References

1. Rideout VJ, Foehr UG, Roberts DF. Generation M2. Media in the lives of 8 to 18 years old. Henry J. Kaiser Family Foundation. 2010;1:4. (cited on: 7 August 2022) Available from https://files.eric.ed.gov/fulltext/ED527859.pdf.
2. American Academy of Pediatrics. Committee on public education. American Academy of Pediatrics: Children, adolescents, and television. Pediatrics. 2001;107:423-6. (cited on : 9 August 2022) Available from https://pubmed.ncbi.nlm.nih.gov/11158483/.

3. Pandya A, Lodha P. Social connectedness, excessive screen time during COVID-19 and mental health: A review of current evidence. Front Hum Dyn. 2021 July;3:1-9.
4. Khan A, Burton N. Screen-based behaviours of adolescents in Bangladesh. J Phys Act Health [Internet]. 2016 [cited 2022 Aug 7];13:1156-63. Available from: https://pubmed.ncbi.nlm.nih.gov/27334303/.
5. Khan A, Burton N, Trost S. Patterns and correlates of physical activity in adolescents in Dhaka city, Bangladesh. Public Health [Internet]. 2017 [cited 2022 Aug 7];145:75-82. Available from: https://doi.org/10.1016/j.puhe.2016.12.011.
6. Dubey M, Nongkynrih B, Gupta SK, Kalaivani M, Goswami AK, Salve HR et al. Screen-based media use and screen time assessment among adolescents residing in an urban resettlement colony in New Delhi, India. J Family Med Prim Care [Internet]. 2018 [cited 2022 Aug 2];7:1236-42.Available from https://pubmed.ncbi.nlm.nih.gov/30613503/.
7. Radhakrishnan M, Nagaraja SB. Modified Kuppuswamy socioeconomic scale 2023: stratification and updates. Int J Community Med Public Health. 2023 Nov;10(11):4415-8.
8. World Health Organization. BMI-for-age (5–19 years). Geneva, Switzerland: World Health Organization; 2019. [cited 9 August 2022] Available from: https://www.who.int/tools/growth-reference-data-for-5to19-years/indicators/bmi-for-age.
9. Buysse DJ, Reynolds III CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Res[Internet]. 1989 [cited 2022 Aug 7];28:193-213.Available from: https://pubmed.ncbi.nlm.nih.gov/2748771/.
10. Kumar A, Handa R, Upadhyaya SK, GuptaSJ . Validation of Hindi version of the Pittsburg Sleep Quality Index. J Assoc Physicians India [Internet]. 2021 [cited 2022 Aug 9];69(4):11-2. Available from: https:// pubmed. ncbi. nlm. nih. gov/ 34470185/.
11. John R, Pokale A, Chutke A, Narula APS, Shinde S, Deshmukh R. Prevalence of excess screen time among secondary school children in rural India. J Prev Med Hyg [Internet]. 2023 [cited 2024 Mar 7];64:457-62. Available from: https://www.researchgate.net/publication/378369996_Prevalence_of_excess_screen_time_among_secondary_school_children_in_rural_India.
12. Moitra P, Madan J, Verma P. Independent and combined influences of physical activity, screen time, and sleep quality on adiposity indicators in Indian adolescents. BMC Public Health [Internet]. 2021 [cited 2022 Aug 9];21:2093-105. Available from: https://doi.org/10.1186/s12889-021-12183-9.
13. Pooja RS, Joseph M, John DM, John J, Biradar B, Naidu C et al. Is excessive screen time a problem among rural adolescents? A cross-sectional study in four schools of Magadi Taluk, Ramanagara district, South Karnataka. Ann Community Health [Internet]. 2021 [cited 2022 Aug 9];9(1):41-7. Available from: https://www.researchgate.net/publication/351108772_Is_excessive_Screen_Time_a_problem_among_rural_adolescents_A_crosssectional_study_in_four_schools_of_Magadi_Taluk_Ramanagara_District_South_Karnataka.
14. Babic MJ, Smith JJ, Morgan PJ, Eather N, Plotnikoff RC, Lubans DR. Longitudinal associations between changes in screen-time and mental health outcomes in adolescents. Ment Health Phys Act [Internet]. 2017 [cited 2024 Mar 7];12:124-31. Available from: doi: 10.1016/j.mhpa.2017.04.001.
15. Shin J. Osong Public health and research perspectives. Osong Public Health Res Perspect [Internet]. 2018 [cited 2022 Aug 7];9(4):207−12. Available from: https://ophrp.org/.
16. Hysing M, Pallesen S, Stormark KM, Jakobsen R, Jakobsen AJ, Sivertsen B et al. Sleep and use of electronic devices in adolescence: results from a large population-based study. BMJ Open [Internet]. 2015 [cited 2022 Aug 9];5:6748. Available from: http://bmjopen.bmj.com/.
17. Jain S, Shrivastava S, Mathur A, Pathak D, Pathak A. Prevalence and Determinants of Excessive Screen Viewing Time in Children Aged 3-15 Years and Its Effects on Physical Activity, Sleep, Eye Symptoms and Headache. Int J Environ Res Public Health [Internet]. 2023 [cited 2024 Mar 7];20(4):3449. Available from: doi: 10.3390/ijerph20043449.