Original Article

Relationship between Cellphone Screen Time (Including Social Media apps like Whatsapp, Instagram, Facebook) and its Effect on Sleep Quality in Medical UG Students

Harshil J Shah[1], Hemang M Shah[2], Minakshi N Parikh[3], Tejas V Patel[4]

[1]Senior Resident, Department of Psychiatry, B.J. Medical College & Civil Hospital, Ahmedabad, [2]Professor of psychiatry, Dr N D Desai faculty of medical Sciences and research, Nadiad, [3]HOD and Professor, Department of Psychiatry, B.J Medical college and Civil Hospital, Ahmedabad, [4]Associate Professor, Dept. of Psychiatry, Sal Institute of Medical Sciences, Ahmedabad.

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Abstract

Background: Over half of the population in most nations uses mobile phones, and the mobile phone market is expanding rapidly. The amount of time spent using a screen-enabled device like a smartphone, computer, television, or video game console is known as screen time. In addition, increased screen time has also been quite prevalent amongst medical students due to the recent trend of screen-based readings and various other reasons.

Aims & Objectives: To demonstrate that medical undergraduate students suffer from poor-quality sleep as a result of excessive screen time.

Methodology: A cross sectional study was conducted among 279 medical UG (Undergraduate) students of BJ Medical College from August 2021 to September 2022.

Results: There was a positive correlation between MRSRF(Mobile Related Sleep Risk Factors Questionnaire) factors like "screen usage time", "time spent on social media", "duration of mobile use after lights have been turned off", "keeping mobile phone near pillow/bed while sleeping" and sleep parameters(PSQI components) like daytime dysfunction, sleep disturbance, sleep latency and worsening of subjective sleep quality and this correlation was statistically significant.

Conclusion: Total screen time, time spent on social media, duration of mobile use after lights have been turned off, and keeping a mobile phone on the bed an near the pillow while sleeping worsens the quality of sleep and also leads to daytime dysfunction, sleep disturbance, sleep latency, and worsening of subjective sleep quality.

Keywords: Screen time, Sleep Quality, Social media, Mobile use.

Corresponding Author: Tejas V Patel, Associate Professor, Dept. of Psychiatry, Sal Institute of Medical Sciences, Ahmedabad.

E-mail: tejasmdpsychiatry@gmail.com

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Introduction

Nowadays, mobile phones also known as cell phones are essential to modern communication and widely used by more than half of the population globally. The amount of time spent using a screen-enabled device like a smartphone, computer, television, or video game console is known as screentime[1]. Studies indicate screen time has a direct impact on mental and physical health.[2]

While using electronic devices before bed is common, research shows that these devices can disrupt sleep by suppressing melatonin production (natural hormone facilitating sleep) and causing neurophysiological arousal, which keeps individuals alert when they should be relaxing. [3]

Adults in good health have a 24-hour sleep-wake cycle in their bodies. Melatonin, a natural hormone secreted by pineal gland that causes feelings of drowsiness, is released into the body after sunset. Short-wavelength enriched light, also known as blue light, is produced by electronic back-lit devices like computers, tablets, readers, and phones. Blue light from fluorescent and LED lights has also been shown to reduce or delay the natural production of melatonin at night. Blue light can also shorten the amount of time you spend in slow-wave and rapid-eye-movement (REM) sleep, which is critical for cognitive function. In addition, increased screen time has also been quite prevalent amongst medical students due to the recent trend of screen-based readings and various other reasons.

Aims & Objectives: To demonstrate that medical undergraduate students suffer from poor-quality sleep as a result of excessive screen time.

While many studies have investigated the general population's screen time and sleep quality, there is a specific need to focus on medical students due to their unique lifestyle, stress levels, and academic pressures. These factors can amplify the effects of screen time on sleep quality. This study aims to provide a detailed analysis of various screen-related behaviours and their specific impacts on different aspects of sleep quality among medical students.

Methodology: A cross sectional study was conducted among 279 UG (Undergraduate) students of Medical College at Ahmedabad, Gujarat from September 2021 to March 2022. Subjects who had been diagnosed with sleep disorder, any chronic physical or mental illness affecting sleep, using psychotropic drugs/sedatives, consuming caffeine, alcohol/any other substance on regular basis were excluded from study. While, we included UG medical students of > 18 years, studying in Medical College at Ahmedabad, Gujarat, using mobile phones for educational, social & entertainment purposes, who are generally healthy and devoid of any chronic medical/ psychological conditions that affect sleep.

After a consent form, the participants filled a semi-structured proforma, followed by PSQI (Pittsburgh Sleep Quality Index), MRSRF(Mobile related sleep risk factors questionnaire).

The PSQI includes a scoring key for calculating a patient's seven subscores, each of which ranges from 0 to 3.[4] 0 score indicates no difficulty and 3 indicates severe difficulty.

The 7 component scores are then added to make a global score with a range of 0– 21.

- 0 means no difficulty.
- 5 or more indicates poor sleep quality.
- 21 means severe difficulties in all areas. (The higher the score, the worse the quality).

MOBILE-RELATED SLEEP RISK FACTOR QUESTIONNAIRE (MRSRF)[5]:

MRSRF Questionnaire includes seven items that focus on the following areas: Total duration of mobile use/day, hours spent on social media apps/day, using mobile while in bed after the lights have been turned off, using blue light filters on mobile, keeping the mobile on the bed and near pillow while sleeping, keeping the mobile 2 meters away from the bed while sleeping and putting the mobile on airplane mode while sleeping.

Data analysis:

Data analysis were performed using SPSS version 22. Categorical data was represented in the form of Frequencies and proportions. The chi-square test was used as a test of significance for qualitative data. P value (Probability that the result is true) of <0.05 was considered statistically significant after assuming all the rules of statistical tests. As data were not normally distributed, Non-Parametric tests in form of the Wilcoxon-Mann-Whitney Test were used

to compare the two groups for statistical inference and Non-parametric tests like Spearman Correlation was used to explore the correlation between the two variables.

Results

Table 1: Association between PSQI Global Score Category and Parameters

Parameters	PSQI Global Score Category		p value
	<5(Normal sleep quality) (n = 100)	≥5(Poor Sleep Quality) (n = 179)	
Age (Years)	21.06 ± 1.83	21.22 ± 1.72	0.454[1]
Gender			0.304[2]
Male	60 (60.0%)	96 (53.6%)	
Female	40 (40.0%)	83 (46.4%)	
Year of MBBS			<0.111[2]
First Year	26 (26.0%)	41 (22.9%)	
Second Year	9 (9.0%)	46 (25.7%)	
Third Year	10 (10.0%)	37 (20.7%)	
Final Year	55(55.0%)	55(30.7%)	
PSQI: 1*** (Subjective sleep quality)	0.49 ± 0.50	1.50 ± 0.71	<0.001[1]
PSQI: 2*** (Sleep Latency)	0.64 ± 0.66	1.97 ± 0.94	<0.001[1]
PSQI: 3*** (Sleep Duration)	0.68 ± 0.60	1.50 ± 0.90	<0.001[1]
PSQI: 4*** (Habitual Sleep Efficiency)	0.12 ± 0.48	0.47 ± 0.80	<0.001[1]
PSQI: 5*** (Sleep Disturbances)	0.46 ± 0.52	0.98 ± 0.37	<0.001[1]
PSQI: 6 (Use of sleep medications)	0.00 ± 0.00	0.00 ± 0.00	—
PSQI: 7*** (Daytime Dysfunction)	0.31 ± 0.61	2.15 ± 1.36	<0.001[1]
PSQI: Global Score***	2.68 ± 1.29	8.70 ± 2.86	<0.001[1]
MRSRF: Screen Time***	5.62 ± 2.88	6.04 ± 1.94	0.015[1]
MRSRF: Time on Social Media***	1.94 ± 1.25	2.39 ± 1.58	0.002[1]
MRSRF: Mobile Phone Useage After Light-Out (Yes)	77 (77.0%)	153 (85.5%)	0.074[2]
MRSRF: Duration of Mobile Phone Useage After Light-Out***	46.36 ± 32.07	74.97 ± 44.66	<0.001[1]
MRSRF: Mobile Near Bed While Sleeping (Yes)***	69 (69.0%)	150 (83.8%)	0.004[2]
MRSRF: Mobile 2 Metres Away While Sleeping (Yes)***	29 (29.0%)	31 (17.3%)	0.023[2]
MRSRF: Airplane Mode While Sleeping (Yes)	16 (16.0%)	22 (12.3%)	0.386[2]
MRSRF: Blue Light Filters Used (Yes)***	58 (58.0%)	77 (43.0%)	0.016[2]

****Significant at p<0.05, 1: Wilcoxon-Mann-Whitney U Test, 2: Chi-Squared Test, 3: Fisher's Exact Test.* The following variables were significantly associated (p<0.05) with the variable 'PSQI Global Score Category': PSQI: 1(Subjective Sleep Quality), PSQI: 2(Sleep Latency), PSQI: 3(Sleep Duration), PSQI: 4 (Habitual Sleep Efficiency), PSQI: 5(Sleep Disturbances), PSQI: 7(Daytime Dysfunction), PSQI: Global Score, MRSRF: Screen Time, MRSRF: Time on Social Media, MRSRF: Duration of Mobile Phone Usage After Light-Out, MRSRF: Mobile Near Bed While Sleeping, MRSRF: Mobile 2 Metres Away While Sleeping, MRSRF: Blue Light Filters Used. [Table 1]

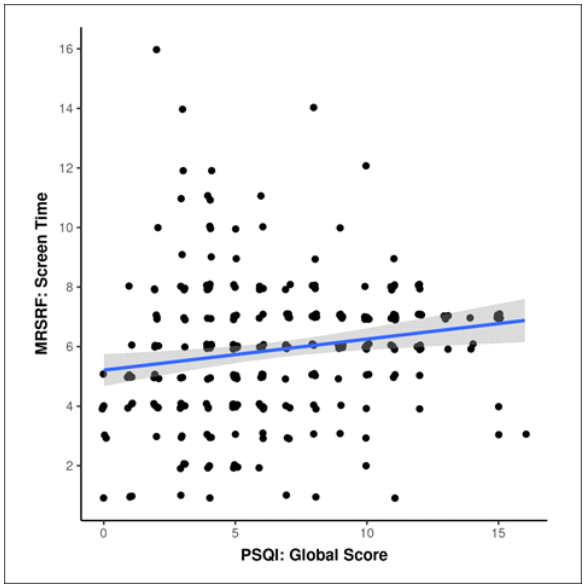

Figure 1: Correlation between "PSQI: Global Score" and "MRSRF: ScreenTime" (n = 279)

The above scatterplot depicts the correlation between "PSQI: Global Score" and "MRSRF: Screen Time". Individual points represent individual cases. The blue trendline represents the general trend of correlation between the two variables. The shaded grey area represents the 95% confidence interval of this trendline.

Non-parametric tests (Spearman Correlation) were used to explore the correlation between the two variables, as at least one of the variables was not normally distributed. There was a weak positive correlation between "PSQI: Global Score" and "MRSRF: Screen Time" and this correlation was statistically significant (rho = 0.25, p = <0.001). For every 1 unit increase in MRSRF: Screen Time, the PSQI: Global Score increases by 0.27 units. [Figure 1]

Table 2: Odds Ratios and Relative Risk

Predictor/Risk Factor	Outcome	Odds Ratio (95% CI)	Relative Risk (95% CI)
MRSRF: Mobile Phone Usage After Light-Out: Yes	PSQI Global Score Category: <5	0.57 (0.3-1.06)	0.71 (0.52-1.04)
MRSRF: Mobile Phone Usage After Light-Out: Yes*	PSQI Global Score Category: ≥5	1.76 (0.94-3.28)	1.25 (0.98-1.71)
MRSRF: Mobile Phone Usage After Light-Out: No	PSQI Global Score Category: <5	1.76 (0.94-3.28)	1.4 (0.97-1.94)
MRSRF: Mobile Phone Usage After Light-Out: No	PSQI Global Score Category: ≥5	0.57 (0.3-1.06)	0.8 (0.58-1.02)

*As shown above, there is significant association between the two variables, with increased odds of poor sleep quality on using a cellphone after lights have been turned out. [Table 2]

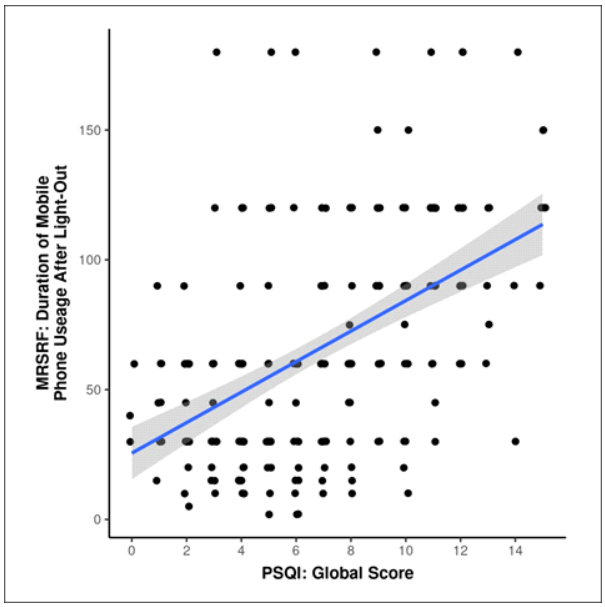

Figure 2: Correlation between "PSQI: Global Score" and "MRSRF:Duration of Mobile Phone Usage After Light-Out" (n = 230)

The above scatterplot depicts the correlation between "PSQI: Global Score" and "MRSRF: Duration of Mobile Phone Usage After Light-Out". Individual points represent individual cases. The blue trendline represents the general trend of correlation between the two variables. The shaded grey area represents the 95% confidence interval of this trendline. Non-parametric tests (Spearman Correlation) were used to explore the correlation between the two variables, as at least one of the variables was not normally distributed.There was a moderate positive correlation between "PSQI: Global Score and MRSRF: Duration of Mobile Phone Usage After Light-Out", and this correlation was statistically significant (rho = 0.5, p = <0.001).

For every 1 unit increase in "MRSRF: Duration of Mobile Phone Usage After Light-Out", the" PSQI: Global Score" increases by 0.04 units. Hence, as the duration of mobile phone usage(screentime) after lights have been turned off increased, the quality of sleep worsened. [Figure 2]

Table 3: Correlation of various sleep parameters with "Mobile relatedsleep risk factors"

		Daytime Dysfunction (PSQI 7)	Sleep disturbance (PSQI 5)	Sleep Latency (PSQI 2)	Worsening of subjective sleep quality (PSQI 1)
Screen Usage time	Spearman Correlation Coefficient=	0.1	0.2	0.3	0.3
	P Value=	0.019	0.002	<0.001	<0.001
Time on social media	Spearman Correlation Coefficient=	0.2	0.2	0.4	0.3
	P Value=	0.009	0.001	<0.001	<0.001
Duration of mobile use after lights have been turned off	Spearman Correlation Coefficient=	0.2	0.3	0.5	0.5
	P Value=	<0.001	<0.001	<0.001	<0.001
Mobile phone on bed and near pillow while sleeping (Yes, No)	Point- Biserial Correlation Coefficient=	0.13	0.14	0.32	0.23
	P Value=	0.007	0.017	<0.001	<0.001

There was a positive correlation between mobile related risk factors and sleep parameters as above mentioned and this correlation was statistically significant. As mobile related risk factors like (1)

screen usage time, (2) time spent on social media, (3) duration of mobile use after lights have been turned off, (4) keeping a mobile phone on the bed and near the pillow while sleeping : got increased, there was an increase in sleep parameters like (1)daytime sleepiness, (2)sleep disturbance, (3)sleep latency, and (4)worsening of subjective sleep quality. [Table 3]

There was a positive correlation between mobile related risk factors and sleep parameters as above mentioned and this correlation was statistically significant. Also, as mentioned in "figure 1" for every 1 hour (1 unit) increase in screen-time , the quality of sleep declined by 27% (0.27 units).

Discussion

Over the past few decades, there has been an increase in sleep issues among adults and adolescents. This is concerning since sound physical, cognitive, and psychological growth depends on getting enough sleep. Research has focused more and more on the function of electronic media usage in identifying risk factors for sleep issues and has discovered shorter sleep durations with more amounts of screen time spent.[6] In this study, the median screen time(hours) was 6 hours, while in a study conducted by Yeluri et the median screen time averaged 5.13 hours[7]. In a study done by Baby et al, the same was 5.25 hours.[8]

There are many longitudinal studies which shows the long term impact of screen usage on sleep quality. Such as longitudinal study by Twenge et al (2018) found that increased screen time over several years is associated with a gradual decline in sleep duration and quality among adolescents.[12]Another research done byKing et al (2019) followed adults over five years and found that those with higher screen time had more significant sleep disturbances and reduced sleep efficiency over time.[13] These studies indicate that the long-term impact of screen time on sleep quality can be substantial, reinforcing the importance of managing screen usage to maintain good sleep health.

In present study, about 82.4% of participants reported of using cellphone, after lights have been turned off, while an almost consistent finding was found in a similar study by Rafique et al, where about 88.7% of participants reported the same use.[5] In this study, 35.8% of the participants had PSQI Global Score Category: <5(Normal sleep quality) while, 64.2% of the participants had PSQI Global Score Category: ≥5(Poor sleep quality). The findings were close to a study done by Akcay et al, where 66.6% of adolescent participants had poor sleep quality[9]. A study by Baby et al, where 66% of engineering students had poor sleep quality.[8]

With respect to sleep quality (PSQI Global Score-Category), there was a significant difference between the 2 groups in terms of "screen time" (W = 7389.500, p = 0.015), with the median screen time being highest in the group with poor sleep quality(≥5), but there was only weak positive correlation between the two. An almost similar finding was present in study conducted by Rafique et al, where screen usage time of >8 hours was positively but weakly correlated with sleep disturbances and a decrease in the length of actual sleeping time (P value 0.023 and 0.022, respectively). [5]

There was a significant difference between the 2 groups in terms of "Duration of Mobile Phone Usage After lights have been turned out" (W = 3632.500, p = <0.001), with the median "Duration of Mobile Phone Usage After Light-Out" being highest in the group with poor sleep quality (≥5). There were increased odds of poor sleep quality on using a cell phone after lights have been turned out. Also, there was a moderate positive correlation between, the "Duration Of Mobile Phone Usage After Lights have been turned out" and poor sleep quality and this correlation was statistically significant (rho = 0.5, p = <0.001). This finding has been consistent with many similar studies like, a Study by Yeluri et al, bedtime gadget use had a significant adverse relationship with sleep quality, quantity, and time taken to fall asleep (sleep latency).[7]

As per a study conducted by Rafique et al, using a mobile after the lights have been turned off for at least 30 minutes (without a blue light filter in the mobile) showed a positive but weak correlation with daytime sleepiness, sleep disturbances and increased sleep latency (p= 0.003, 0.004 and 0.001).[5]As per a study conducted by Alshobaili et al, as the time of smartphone usage at bedtime increased, the quality of sleep worsened.[10]

There was a significant difference between the various groups in terms of distribution of "MRSRF: Mobile On The Bed And Near The Pillow, While Sleeping" ($\chi 2 = 8.324$, $p = 0.004$). There were increased odds of poor sleep quality on keeping cell phones on the bed and near the pillow while sleeping. This finding was consistent with another quite resembling study conducted by Rafique et al, where keeping the mobile near the pillow while sleeping was positively but weakly correlated with daytime sleepiness, sleep disturbances, and increased sleep latency ($p = 0.003$, 0.004 and 0.001) and hence poor sleep quality.[5]

Mobile use and sleep-related parameters- In the present study, there was a positive correlation between MRSRF(Mobile Related Sleep Risk Factors Questionnaire) factors like "screen usage time", "time spent on social media", "duration of mobile use after lights have been turned off", "keeping the mobile phone on the bed and near the pillow, while sleeping" and sleep parameters(PSQI components) like daytime sleepiness, sleep disturbance, sleep latency and worsening of subjective sleep quality and this correlation was statistically significant. Also in research done by Demïrcï et al, quite close results were obtained where, the smartphone use severity was positively correlated with PSQI global scores ($r = 0.156$, $p = 0.014$), and PSQI components like subjective sleep quality ($r = 0.138$, $p = 0.030$), sleep disturbance ($r = 0.153$, $p = 0.016$), and the daytime dysfunction ($r = 0.244$, $p < 0.001$).[11]

Conclusion

Total screen time, time spent on social media, duration of mobile use after lights have been turned off, and keeping a mobile phone on the bed and near the pillow while sleeping worsens the quality of sleep and also leads to daytime dysfunction, sleep disturbance, sleep latency, and worsening of subjective sleep quality. Using a blue light filter while sleeping seemed to have some protective effect as a larger proportion of participants in the group with normal sleep quality reported of using the blue light filter, while those in the group with poor sleep quality denied using it. Interventions to reduce screen time, particularly before bed, and to educate students about the importance of sleep hygiene are essential to improve their overall health and academic performance.

Ethical Clearance*:* Above study had been given Ethical Clearance by below mentioned Ethical Committee.

Name: The Institutional Ethics Committee, B.J. Medical College & Civil Hospital, Ahmedabad. Date: 28-08-2021, Number :185/2021

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Conflicts of interest statement : NA

References

1. Merriam-Webster, MW. Screen time. In Merriam-Webster.com dictionary,MW, Merriam-Webster. Inc.,Apr.2008.Accessed on August 13, 2023, from https://www.merriam-webster.com/dictionary/screen%20time.
2. Stiglic N, Viner RM. Effects of screentime on the health and well-being of children and adolescents: a systematic review of reviews. BMJ open. 2019 Jan 1;9(1):e023191.Doi:10.1136/bmjopen- 2018-023191. PMC 6326346. PMID 30606703
3. Shechter A, Kim EW, St-Onge MP, Westwood AJ. Blocking nocturnal blue light for insomnia: A randomized controlled trial. Journal of psychiatric research. 2018 Jan 1;96:196-202.
4. 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 research. 1989 May 1;28(2):193-213.
5. Rafique N, Al-Asoom LI, Latif R, Al Sunni A, Wasi S. Comparing levels of psychological stress and its inducing factors among medical students. Journal of Taibah University Medical Sciences. 2019 Dec 1;14(6):488-94. doi:10.2147/NSS.S253375
6. Foerster M, Henneke A, Chetty-Mhlanga S, Röösli M. Impact of adolescents' screen time and nocturnal mobile phone-related awakenings on sleep and general health symptoms: a prospective cohort study. International journal of environmental research and public health. 2019 Feb;16(3):518. doi:10.3390/ijerph16030518.
7. Yeluri K, Hs K, H BG, Bj SC. Electronic Gadget Screen-time, Perceived Sleep Quality & Quantity and Academic Performance in Medical Students. J Assoc Physicians India. 2021 Nov;69(11):11-12. PMID: 34781611.

8. Baby RS, Issac A, Vasudev A, Sabu DK, Gopika TS, Pal M, Sahu R. Impact of screen time on sleep quality. Indian Journal of Psychiatric Nursing. 2021 Jan 1;18(1):29-32.

9. Akçay D, Akçay BD. The influence of media on the sleep quality in adolescents. The Turkish Journal of Pediatrics. 2018 Jun 25;60(3):255-63.

10. Alshobaili FA, AlYousefi NA. The effect of smartphone usage at bedtime on sleep quality among Saudi non-medical staff at King Saud University Medical City. Journal of family medicine and primary care. 2019 Jun 1;8(6):1953-7.doi:10.4103/jfmpc.jfmpc_269_19.

11. Demirci K, Akgönül M, Akpinar A. Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students. Journal of behavioral addictions. 2015 Jun;4(2):85-92. doi:10.1556/2006.4.2015.010

12. Twenge JM, Campbell WK. Associations between screen time and lower psychological well-being among children and adolescents: Evidence from a population-based study. Preventive medicine reports. 2018 Dec 1;12:271-83.

13. Hale L, Guan S. Screen time and sleep among school-aged children and adolescents: a systematic literature review. Sleep medicine reviews. 2015 Jun 1;21:50-8.