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Impact of Social Media Use on Sleep Patterns in Adolescents - A Cross-Sectional Study

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ABSTRACT

OBJECTIVE: To assess the Impact of social media use (SMU) and adolescent sleep patterns.
METHODOLOGY: This analytical cross-sectional study was conducted at the Armed Forces Institute of Mental Health, Rawalpindi, from March - September 2024. A total of 380 adolescents aged 10–19 years were selected by applying a non-probability consecutive sampling technique taken into account inclusion and exclusion criteria. Sociodemographic data and the Pittsburgh Sleep Quality Index (PSQI) were employed to assess SMU and sleep quality at bedtime. Poor quality sleep was noted by a PSQI global score of more than 5. Ethical approval was obtained, and all participants were given informed consent.
RESULTS: Of the participants, 60% reported using social media, with TikTok being the most frequently used platform (17.4%). The prevalence of poor quality of sleep among participants was 44.2%. Adolescents who used social media for extended hours, particularly during the evening or nighttime, had significantly higher PSQI scores ($p < 0.001$). A strong association was found between bedtime social media use and poor sleep quality. Among those with poor sleep quality, 88.1% were social media users in comparison with 11.9% who were non-users ($p < 0.001$).
CONCLUSION: This study demonstrates a significant association between SMU patterns and adolescent sleep quality. These findings suggest that increased exposure to social media, especially during critical hours preceding sleep, may adversely affect sleep latency, duration, efficiency, and overall sleep quality.

KEYWORDS: Adolescents, Bedtime Use, PSQI, Sleep Quality, Social Media Use, TikTok

INTRODUCTION

More than 4.8 billion people across the globe used social media in 2023, representing 59.9% of the world's total population, reflecting exponential growth in social media usage (SMU)[1]. In January 2024, 71.70 million Pakistanis were active on social media, representing 29.5% of the country's population. Facebook and YouTube remain the most widely used social media platforms, followed closely by WhatsApp and Twitter. Most of the country's internet and social media audience is aged 5 to 17, representing 30% of all social media users[2].

Social media websites are internet sites where users can interact in multiple ways across various websites. Facebook, Instagram, Snapchat, and Twitter are just a few of these websites, but new ones are constantly being developed[3]. The age, developmental stage, and personality characteristics of the child, alongwith specific information consumed and how it is perceived, all potentially affect whether or not any benefits are derived from these websites[4].

Adolescence is the most vital transition phase regarding behavior and mental and bodily growth. Parts of the brain which go through deep changes of growth during adolescence are predominantly impaired by SMU[5]. Sleep is crucial in good health, specifically during adolescent physical and mental growth[6].

There is a significant amount of evidence connecting adolescent's poor health habits, poor school performance, and various physical and mental health conditions to lack of sleep. This effect is particularly evident when individuals actively communicate through digital media, such as social media and social messaging, rather than passive media use, such as TV watching[7].

Adolescents' sleep duration and sleep-related issues have been associated with using several screen media, including social media, watching online news, and other electronic devices, for over two hours daily. Even if the lights are switched off, it continues and lengthens the falling asleep time[8]. As per previous findings, shorter sleep duration and delayed bedtime are also linked with SMU among adolescents[9].

Results of various studies remain inconclusive; some indicated a strong correlation between SMU and sleep-related disorders, whereas others reported no correlation[10]. The variation in measuring SMU is the cause of the problem. Whereas some studies concentrate on how much time is dedicated to social media, others look at the number of sites used, and others investigate problematic SMU[11,12].

As in other regions of the globe, SMU is now a central part of everyone's daily life, including Pakistan. It is used extensively for various activities, like e-commerce, learning, and communication[13].

The current study was designed to assess the Impact of social media use on sleep patterns in adolescents in our population. Most of the evidence now available is from high-income countries, with context-specific limitations like environmental and cultural factors impacting sleep in South Asian adolescents. In addition, there is a scarcity of data relating Pakistani adolescents' use of social media to sleep quality using validated measures such as the Pittsburgh Sleep Quality Index (PSQI). This research may bridge this critical gap by investigating the Impact of SMU and sleep patterns among adolescents.

The study can potentially help in public health awareness, drafting of informed policy & guidelines, early intervention and prevention, parental education & awareness, and support for mental health programs.

METHODOLOGY

This Analytical cross-sectional was performed at the Armed Forces Institute of Mental Health, Rawalpindi, Pakistan, within 6 months from March - September 2024. A sample of 384 adolescents was calculated utilizing the prevalence of sleep problems as 48.5%(14), at 95% confidence level and 5% margin of error. The calculated sample size was extended to 422 adolescents by adding a 10% rate of non-response/missing observations. A non-probability, consecutive sampling technique was applied. The Armed Forces Institute of Mental Health, Rawalpindi Ethical Committee approved the study protocol.

Inclusion criteria

- Age 10-19 years
- Both Gender
- Adolescents who came as attendants with different patients represent different community groups.

Exclusion criteria

- Adolescents with any health abnormality
- With a known history of psychiatric disorders

Written permission was secured from the attendants or guardians of all adolescents before data collection commenced. Their demographic data, social media profiles, and sleep patterns were evaluated using a proforma by the committed author of this study. Self-reported answers on daily length (average hours per day), platform type, peak usage periods, and interaction within an hour before bedtime were utilized to gauge social media use. Additionally, participants reported how long they spent on social media before bed and if they routinely utilized it.

Sleep assessment was done using the Pittsburgh Sleep Quality Index (PSQI), which comprises 24 items, 19 of which are self-rated; the remaining five (answered by a bed partner or roommate) were excluded from scoring and used for clinical reference. The Pittsburgh Sleep Quality Index (PSQI) was developed by Buysse DJ, Reynolds CF, Monk TH, Berman SR, and Kupfer DJ in 1989 at the University of Pittsburgh. PSQI is a validated and widely used instrument for assessing subjective sleep quality over the past month[15,16]. It has been validated across different populations, including adolescents, adults, elderly individuals, and patients with psychiatric or medical conditions[17]. The scoring is based on seven components:

1. subjective sleep quality
2. sleep latency
3. sleep duration
4. habitual sleep efficiency
5. sleep disturbances
6. use of sleep medication, and
7. daytime dysfunction.

Each component is scored from 0 to 3, yielding a total score ranging from 0 to 21. A score >5 indicates poor sleep quality, while ≤5 indicates good sleep[18]. Higher scores reflect poorer sleep. This tool is also reliable and validated in Urdu[19], and in this study, the tool's reliability was seen in Data analysis using the latest version of SPSS. Data was presented as mean ± S.D for quantitative data, while categorical data was presented as frequency (%). The Chi-square test was applied to assess associations between social media use and sleep quality, p-value ≤0.05 was taken as significant.

RESULTS

The participant's mean age is 14.36±2.84 years. The majority were male (206, 54.2%), and females comprised 45.8% (n = 174) of the sample. A significant proportion of adolescents (228, 60.0%) reported using social media, while 40.0% (n = 152) indicated no usage. In terms of daily usage duration, 40.0% (n = 152) did not use social media at all, whereas among users, 17.1% (n = 65) used it for less than 1 hour, 14.2% (n = 54) for 1–2 hours, 15.3% (n = 58) for 2–4 hours, and 13.4% (n = 51) used it for more than 4 hours daily. TikTok was the most commonly used platform (66, 17.4%), followed by Snapchat (36, 9.5%), Facebook (33, 8.7%), Twitter (32, 8.4%), Instagram (30, 7.9%), and YouTube (14, 3.7%). Additionally, 4.5% (n = 17) reported using other platforms. The most common time for social media usage was the afternoon (91, 23.9%), followed by the evening (57, 15.0%) and night after 9 pm (55, 14.5%), while 6.6% (n = 25) reported usage in the morning. A large majority (325, 85.5%) did not use social media before bed; however, 14.5% (n = 55) did. Regarding time spent on social media in the hour before sleep, 85.5% (n = 325) reported no use, while 3.7% (n = 14) used it for less than 30 minutes, 5.8% (n = 22) for 30 minutes to 1 hour, 2.9% (n = 11) for 1–2 hours, and 2.1% (n = 8) for more than 2 hours. **Table I**

The mean global Pittsburgh Sleep Quality Index (PSQI) score of 6.60 ± 4.06 indicates moderate sleep disturbances within this group. In terms of subjective sleep quality, 45.3% (n = 172) rated their sleep as very good, 19.7% (n = 75) as fairly good, 18.9% (n = 72) as fairly bad, and 16.1% (n = 61) as very bad. Regarding sleep latency, 24.5% (n = 93) fell asleep within 15 minutes, while the majority (39.2%, n = 149) reported a latency of 31–60 minutes, followed by 16–30 minutes in 20.0% (n = 76), and >60 minutes in 16.3% (n = 62). Sleep duration was more favorable, with over half (50.8%, n = 193) sleeping more than 7 hours, though 21.6% (n = 82) reported 6–7 hours, 12.6% (n = 48) had 5–6 hours, and 15.0% (n = 57) slept less than 5 hours. More than half (54.7%, n = 208) had sleep efficiency >85%, with 30.0% (n = 114) between 75–84% and 15.3% (n = 58) between 65–74%. Sleep disturbances were frequent, with 54.7% (n = 208) experiencing them once or twice a week, 26.8% (n = 102) less than once a week, and only 18.4% (n = 70) reporting none during the past month. The majority (94.5%, n = 359) did not use sleep medication, whereas a small proportion used them once or twice (0.8%, n = 3) or three or more times per week (4.7%, n = 18). Daytime dysfunction due to poor sleep was reported by 29.2% (n = 111) once or twice a week, 28.7% (n = 109) less than once, and 5.0% (n = 19) three or more times weekly. Overall, 44.2% (n = 168) of adolescents had poor sleep quality (PSQI >5), while 55.8% (n = 212) were classified as having good sleep quality. **Table II**, **Figure I**

The association between SMU and sleep quality is significant. A majority of those with poor sleep quality (148 (88.1%)) use social media, compared to 20 (11.9%) of those with poor sleep quality who do not use social media. This association was found to be highly significant ($p < 0.001$). Adolescents who use social media for more extended periods, particularly over four hours a day, are more likely to report poor sleep quality, with 27(16.1%) facing poor sleep quality compared to 24(11.3%) with good sleep quality. Similarly, among those who use social media predominantly in the evening, 36(21.4%) with poor sleep quality, 21(9.9%) with good sleep quality) and night 35(20.8%) with poor sleep quality and 20(9.4%) with good sleep quality) hours had poorer sleep quality ($p < 0.001$). A significant difference in sleep quality was observed based on social media usage before bedtime. Of those who do not use social media before bed, 133(79.2%) had poor sleep quality, and 192(90.6%) had good sleep quality ($p = 0.001$). In contrast, among those who used social media before bed, 35(20.8%) had poor sleep quality, and

20(9.4%) had good sleep quality. Additionally, adolescents who used social media for more than one hour before sleep had higher levels of sleep disturbance. For example, 9(5.4%) adolescents who use social media for less than 30 minutes before bed had poor sleep quality, while 4(2.4%) adolescents who use it for more than two hours before bed also had poor sleep quality. These findings highlight the negative Impact of excessive and nighttime social media use on adolescent sleep quality, p-value < 0.001. **Table II**

Table I: Sociodemographic and social media profile of adolescents (n=380)

Sociodemographic and social media profile	Mean ± S.D	Range [Minimum – Maximum]	
Age (years)	14.36 ± 2.84	9.00 [10 – 19]	
Global PSQI Score	6.60 ± 4.06	15.00 [0 – 15]	
	Category	**Frequency**	**Percent %**
Gender	Male	206	54.2
	Female	174	45.8
Do you use social media	No	152	40.0
	Yes	228	60.0
On average, how many hours a day do you use social media?	Don't use	152	40.0
	< 1 hour	65	17.1
	1-2 hours	54	14.2
	2-4 hours	58	15.3
	> 4 hours	51	13.4
What social platforms do you use?	No	152	40.0
	Facebook	33	8.7
	Instagram	30	7.9
	Twitter	32	8.4
	TikTok	66	17.4
	Snapchat	36	9.5
	YouTube	14	3.7
	Others	17	4.5
When do you spend the most time on social media?	None	152	40.0
	Morning	25	6.6
	Afternoon	91	23.9
	Evening	57	15.0
	Night (after 9 pm)	55	14.5
Do you check social media right before bed?	No	325	85.5
	Yes	55	14.5
In the hour before bed, how much time do you typically spend on social media?	Don't use before bed	325	85.5
	Less than 30 minutes	14	3.7
	30 minutes to 1 hour	22	5.8
	1-2 hours	11	2.9
	More than 2 hours	8	2.1

Figure I: Sleep assessment using the Pittsburgh Sleep Quality Index (PSQI) (n=380)

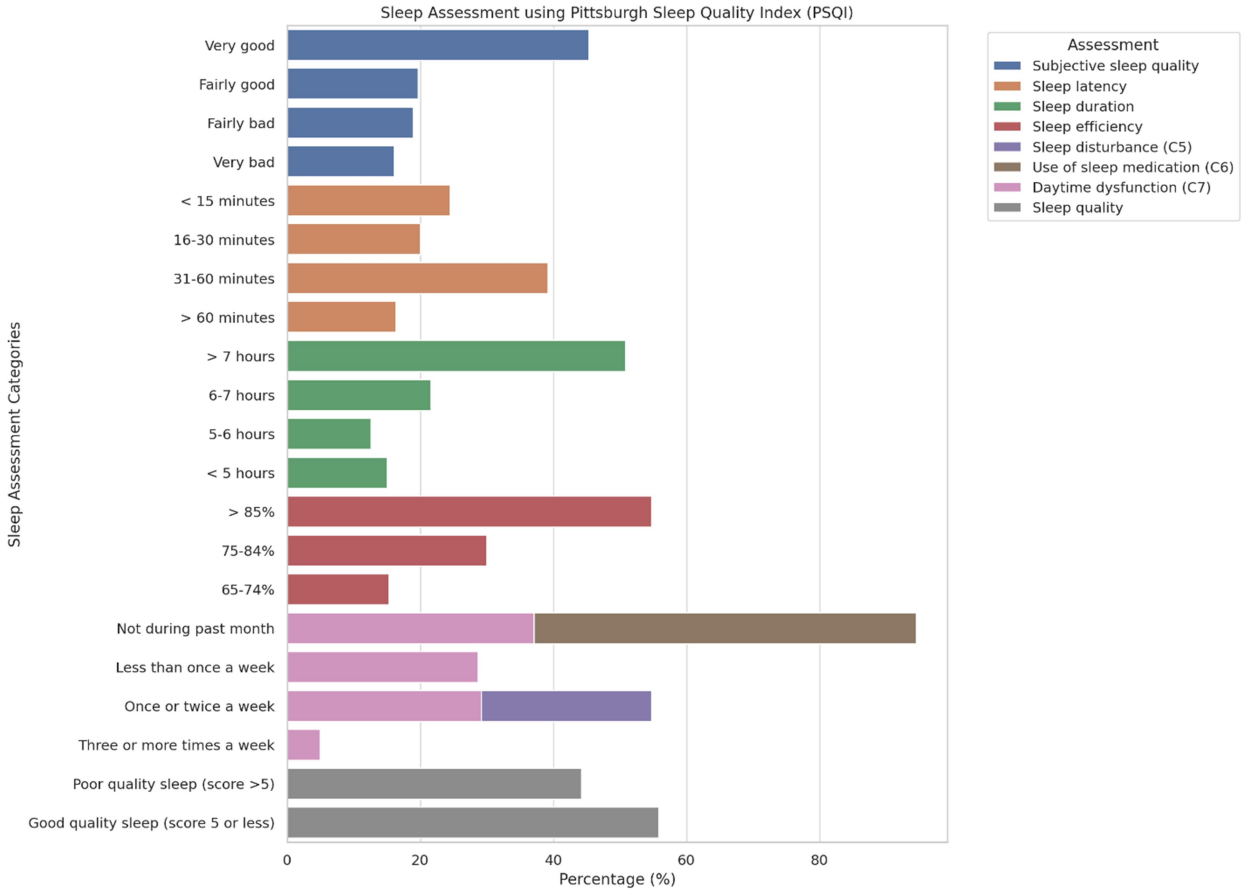

Table II: Comparison of sleep quality with social media usage and its type

Variable	Category	Poor Quality Sleep	Good Quality Sleep	p-value
Do you use social media?	No	20 (11.9%)	132 (62.3%)	<0.001
	Yes	148 (88.1%)	80 (37.7%)	
How many hours per day do you spend on social media (on average)?	Don't use	20 (11.9%)	132 (62.3%)	<0.001
	< 1 hour	40 (23.8%)	25 (11.8%)	
	1-2 hours	40 (23.8%)	14 (6.6%)	
	2-4 hours	41 (24.4%)	17 (8.0%)	
	> 4 hours	27 (16.1%)	24 (11.3%)	
Which social media do you use?	No	20 (11.9%)	132 (62.3%)	<0.001
	Facebook	25 (14.9%)	8 (3.8%)	
	Instagram	22 (13.1%)	8 (3.8%)	
	Twitter	21 (12.5%)	11 (5.2%)	
	TikTok	39 (23.2%)	27 (12.7%)	
	Snapchat	20 (11.9%)	16 (7.5%)	
	YouTube	13 (7.7%)	1 (0.5%)	
	Others	8 (4.8%)	9 (4.2%)	
What time of day do you mostly use social media?	None	20 (11.9%)	132 (62.3%)	<0.001
	Morning	19 (11.3%)	6 (2.8%)	
	Afternoon	58 (34.5%)	33 (15.6%)	
	Evening	36 (21.4%)	21 (9.9%)	
	Night (after 9 pm)	35 (20.8%)	20 (9.4%)	
Do you use social media before going to bed?	No	133 (79.2%)	192 (90.6%)	0.001
	Yes	35 (20.8%)	20 (9.4%)	
On average, how much time do you spend on social media in the hour before you sleep?	Don't use before bed	133 (79.2%)	192 (90.6%)	0.029
	Less than 30 minutes	9 (5.4%)	5 (2.4%)	
	30 minutes to 1 hour	14 (8.3%)	8 (3.8%)	
	1-2 hours	8 (4.8%)	3 (1.4%)	
	More than 2 hours	4 (2.4%)	4 (1.9%)	

DISCUSSION

Adolescence is a period of growth and development, and adequate sleep is required for optimal physical, mental, and emotional well-being. However, based on existing studies of Pakistani young adults, nearly 90% of them utilize social media, which provokes queries about the influence of social media utilization on sleep health[20]. Excessive or inappropriately timed SMU has been cited in various studies as one of the causes of sleep disturbances, including delayed onset of sleep, reduced sleep interval, and decline in overall sleep quality[21].

This study casts significant insight into the escalating concern regarding the SMU and its Impact on adolescent sleep patterns. Participants' mean age was 14.36 years, and there was a little male predominance. These findings are consistent with those of the early to mid-adolescent group, which is known to be quite engaged on digital platforms. Interestingly, 60% of the adolescents in this study indicated that they used social media, which corroborates other findings that children use technology extensively[22].

One of the primary findings of our study is the association between social media usage and sleep quality. Based on PSQI scores, 44.2% of the participants reported poor sleep quality, consistent with previous research. Based on recent studies in Brunei and Saudi Arabia, PSQI scores labeled 52% and 34.7%, respectively, as poor sleepers[23,24]. The differences in the percentages (34.7% vs. 44.2% vs. 52%) indicate that factors related to the environment or circumstances (e.g., lifestyle, social standing, cultural traditions) can affect the sleep quality of adolescents.

In our study, 14.5% of participants used social media before bedtime, and a significantly higher number reported poor sleep quality among them. For instance, 88.1% of those with bad sleep quality used social media compared to only 11.9% of those who did not ($p < 0.001$). Adolescents who use social media for more extended periods, particularly over four hours a day, are more likely to report poor sleep quality, with 16.1% experiencing poor sleep quality compared to 11.3% with good sleep quality.

These findings are supported by a Hong Kong large-scale study of 3,455 adolescents, which similarly concluded that excessive electronic media use (EMU), particularly for over 2 hours per day or within 1 hour before bedtime, was significantly associated with poor mental health, sleep problems, behavioral, social, and emotional problems ($p < 0.05$). EMU and these difficulties were found to be mediated by sleeping problems, such as social jet lag, insomnia, and sleep deprivation[5].

The same effects were observed by **Kortesoja et al. (2023)**, and it was concluded that pre-sleep SMU correlated with short sleep length, more poor-quality sleep, and drowsiness in the daytime. Additionally, late-night SMU strengthened the link between screen-based stimulation and sleep delay by mediating the relationship between diurnal type and sleep quality[25]. Similarly, a descriptive survey of 150 adolescents indicated a small but substantial association between bedtime SMU and sleep quality ($r = 0.262$, $p = 0.001$). The study also highlighted strong correlations between sleep quality and variables such as academic grade, bedtime routine, weekly sleep duration, and bedtime SMU[26].

An extensive multinational study that analyzed data from over 212,000 adolescents in 40 countries adds further weight to our results. This research found that sleep-onset problems were significantly associated with intensive and problematic SMU, with problematic use showing higher correlations (OR 2.20 in girls, OR 1.88 in boys). These findings indicate the importance of assessing screen time, usage habits, and compulsivity, particularly at night[27]. Another study in Northern Italy with over 3,100 children aged between 11 and 15 years further reinforces the

findings and concluded that more than one in three students (34.3%) said they had trouble falling asleep[28].

Among the platforms used, TikTok was the most common (17.4%), followed by Snapchat, Facebook, and others in our study. These findings mirror the previous conclusions in a cross-sectional study conducted in the Aseer region of Saudi Arabia, involving 961 public secondary school students. In that study, prolonged use of social media—particularly TikTok (OR 1.33, 95% CI 1.01–1.77) and the number of hours spent on social media daily (OR 1.26, 95% CI 1.16–1.37) were significant predictors of poor sleep quality. The relevance of this association lies in the fact that TikTok's short, engaging videos and algorithm-driven content can lead to extended screen time, especially during nighttime, thereby disrupting sleep patterns.

In this study, the most used platform was TikTok (17.4%), followed by Facebook, Snapchat, and other websites. This aligns with previous findings from a cross-sectional study that surveyed 961 public secondary school students in the Aseer region of Saudi Arabia. The number of hours spent on social media per day (OR 1.26, 95% CI 1.16–1.37) and prolonged SMU, particularly TikTok (OR 1.33, 95% CI 1.01–1.77), were strong predictors of poor sleep quality in that study. This association is pertinent because TikTok's algorithm-based content and short, engaging videos may lead to more screen time by users, especially in the evening, which disrupts sleep patterns (24). These findings support our research's results that individuals who spent more time on social media, especially in the evening or late at night, and those who used TikTok most frequently had much higher sleep disturbance and poor quality sleep.

Moreover, our study identified that while most adolescents slept for over 7 hours, a notable proportion (15%) reported sleeping for less than five hours, which is lower than the suggested level. Our findings are supported by a cross-sectional study of 576 Iranian high school students, demonstrating a statistically significant relationship between teenage social media usage and poor sleep quality ($P = 0.02$). As per the study findings, over 62% of the people left their phones on while sleeping, and the mean screen time was 7.5 ± 4.4 hours daily. Also, a strong association existed between SMU and depressive symptoms (Spearman's rho = 0.171; $P < 0.001$), yet an inverse correlation existed between the duration of sleep and electronic device usage (Spearman's rho = –0.17; $P = 0.03$) [22]. The present study's results align with the above findings since the increased duration of social media use was associated with increased daytime dysfunction, poorer quality of sleep, and longer sleep latency.

This study highlights the negative Impact of excessive and poorly timed social media use (SMU) on adolescent sleep health. However, its cross-sectional design, reliance on self-reported data, limited geographic scope, and lack of objective sleep measures or control for confounding variables limit causal inferences. Still, the findings underscore the need for targeted interventions promoting digital hygiene and healthy sleep habits among teenagers.

This cross-sectional design limits causal inferences, and reliance on self-reported data may involve minor recall bias. However, validated tools and a representative adolescent sample strengthen the reliability and relevance of our findings.

CONCLUSION

This study demonstrates a significant association between social media usage patterns and sleep quality among adolescents. A substantial proportion (44.2%) of the adolescents reported poor sleep quality, as measured by the Pittsburgh Sleep Quality Index (PSQI). Social media usage was prevalent, with 60.0% of participants engaging on these platforms. Adolescents who used social media—particularly for longer durations, during nighttime hours, and immediately before bedtime—were significantly more likely to experience poor sleep quality ($p < 0.001$). These findings suggest that increased exposure to social media, especially during critical hours preceding sleep, may adversely affect sleep latency, duration, efficiency, and overall sleep quality. Interventions promoting responsible social media use, especially by limiting screen time before bedtime, may be beneficial in improving sleep health among adolescents.

Ethical permission: Armed Forces Institute of Mental Health, Rawalpindi, Pakistan, ERC letter No. ERC/2503.
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AUTHOR CONTRIBUTION

Muhammad S: Idea conception, study designing, data collection, results and interpretation, manuscript writing and proof reading
Iqbal H: Idea conception, study designing, data collection, results and interpretation, manuscript writing.
Ullah A: Literature search, data collection, results and interpretation
Hanif A: Data analysis, results and interpretation, proofreading
Hidayat N: Literature search, data collection, results and interpretation
Waseem A: Literature search, data collection, results and interpretation questionnaire design

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