

**The Effect of Pre-Sleep Smartphone Usage and Sleep Duration on the Daytime
Alertness of Adolescents and Young Adults**

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ABSTRACT

This is a study on "The Effect of Pre-sleep Smartphone Usage and Sleep Duration on the Daytime Alertness of Adolescents and Young Adults". A cross-sectional study design with 300 participants (150 adolescents and 150 young adults) was used, sampling from four places of Pakistan (Haripur, Islamabad, Abbottabad and Mansehra). Three valid instruments were used to gather participants' responses: the Smartphone Addiction Scale (SAS), the Sleep Quality Scale (SQS), and the Epworth Sleepiness Scale (ESS). The analysis, which was done with SPSS, showed important relationships among the use of a smartphone before sleep, the duration of sleep and feeling alert in the day. In particular, young people (aged 13 to 17) who use their smartphones before sleep indicated poorer sleep quality and shorter sleep duration. These results provide interventions in different contexts (school, home, and clinic) to reduce use of screens at night, promote sleep hygiene, and increase daytime functioning, which may lead to better academic performance, mood, memory, and general well-being, and add to knowledge in this field.

Keywords: *smartphone usage, pre-bed screen time, sleep duration, daytime alertness, adolescents, young adults, SAS, SQS, ESS.*

INTRODUCTION

Smartphones are an integral part of everyday life, particularly for adolescents and young adults. These devices allow convenience for communication, education, entertainment and social interaction but overuse of a smartphone before sleep has aroused growing concerns about its negative impact on sleep and daytime activities.

Adolescents and young adults are especially prone to using their phone before bedtime; they often use the phone to check social media, play games, text, or watch videos at night. Smart phone usage before bed refers to the use of mobile devices, up to an hour before sleep, for social networking, entertainment and online communication.

Before going to bed, Carter et al. (2016) explained that people are exposed to high levels of blue light from their smartphones and significant mental stimulation, which disrupts sleep patterns and negatively impacts sleep onset and sleep quality. The way that smartphones are used can impact sleep differently. Passive use of a smartphone is where users scroll through social feeds or watch videos, whereas interactive use is when communicative and engaging with digital content.

The current study uses Displacement Theory, which states that the more time people spend on a particular activity the less they can spend on other critical activities. Overuse of a smartphone can crowd

out activities of importance like sleep, study, and in-person interactions, according to Kushlev and Leita0 (2020).

Sleep duration indicates how much sleep a person gets during one night, and is one of the factors that play a role in physical and psychological well-being. Hirshkowitz et al. (2015) viewed sleep duration as the actual amount of sleep over the 24-hour period, without any consideration of wakefulness. Good sleep is required for emotional balance, thinking, memory and daytime energy.

The present study also relies on Arousal Theory which states that people work best at an optimal level of physiological and psychological arousal. Too much stimulation, including the use of a smartphone, can lead to an increase in cognitive and psychological arousal which makes it hard for people to relax and get to sleep. Hebb (1955) and Berlyne (1960) have pointed out that over-arousal can have negative consequences on performance, sleep quality and emotional functioning.

Daytime alertness is the person's capacity to be awake, attentive, and mentally active during the daytime. Daytime alertness was defined as the capacity to remain awake without falling asleep at an inappropriate time by Johns (1991). Short and poor sleep can lead to less alertness, tiredness during the day, slower response time and problems with concentration.

Sleep is believed to be regulated by two main processes, homeostatic sleep drive and circadian rhythm, according to the characteristics of sleep proposed by Borb ly (1982) in the Two-Process Model of Sleep Regulation. This model proposes that sleep timing, sleep time and sleep quality is determined by both biological and behavioral factors. Excessive pre-sleep use of the smartphone may disrupt these processes either by delay in sleep onset and/or by decreasing sleep duration.

There have been several studies on the link between smartphone use, sleep, and wakefulness. Both shorter sleep duration and higher levels of daytime sleepiness were significantly related to lower levels of alertness in adolescents for Leone and Sigman (2020). Calderon et al. (2021) found that lack of good sleep had a negative impact on concentration and academic achievement.

Patel, Nguyen, and Smith (2022) concluded that a strong correlation between excessive nighttime smartphone usage and shortened sleep duration and increased daytime drowsiness in teenagers was found. Leone et al. (2023) also found that the negative effect of smartphone use at night on sleep duration was also associated with decreased alertness levels during the day.

Thus, the current study is set to explore the connection between usage of smartphone before sleep, the time spent in bed, and alertness during the day among adolescents and young adults. The findings of this study might also inspire more healthy phone usage habits before bed, and emphasize the importance of a good night's sleep for better thinking, emotional regulation, and health.

Objectives

Objectives of the present research are

1. To examine the relationship between smartphone usage before bed and sleep duration among adolescents and young adults.
2. Higher sleep duration predicts daytime alertness among adolescents and young adults.

Hypothesis

1. There is significant relationship between smartphone addiction before bed, sleep duration daytime alertness among adolescents and young adults.
2. Higher sleep duration positively predicts daytime alertness.

RESEARCH METHODOLOGY

In current study cross-sectional survey design was employed to collect data from matric ,intermediate and undergraduate students from schools, colleges and universities of Haripur for exploring the pattern of smartphone addiction , sleep duration and daytime alertness.

Sample

The sample of this study was male and female students of colleges of Haripur. The sample was selected on voluntary basis. Total sample size in this study was N=300 students. Among this N=(n=150) were male students and (n=150) were female students. Participants were selected from schools and universities through purposive sampling.

Inclusion Criteria

Participants aged 15–25 years who were enrolled in schools or undergraduate programs were included in the study. All participants were regular smartphone users and provided informed consent.

Exclusion Criteria

Participants above 25 years of age and individuals outside Haripur were excluded from the study. Illiterate as well as those those who were suffering from any psychological disorder or under psychological treatment participants were not included in the research.

Instruments

Smartphone Addiction Scale (SAS)

The Smartphone Addiction Scale includes 10 items scored on a 6 point Likert to measure smartphone addiction.it has strong reliability with a cronbach's alpha of 0.967and has been tested with both adolescents and adults (Kwon, Kim, Cho, & Yang , 2013).

Sleep Quality Scale (SQS)

The Sleep Quality Scale includes 28 items rated on a 4-point Likert scale to assess sleep quality. The scale shows high internal reliability with a Cronbach's alpha of 0.92 and strong psychometric validity (Yi, Shin & Shin, 2006).

Epworth Sleepiness Scale (ESS)

The Epworth Sleepiness Scale consists of 8 items measuring daytime sleepiness on a 4-point Likert scale. The scale has good reliability with a Cronbach's alpha of 0.88 and is widely validated for clinical and research use (Epworth, 1988).

Procedure

Data collection commenced after the approval of the research topic related to smartphone usage, sleep duration, and daytime alertness among adolescents and young adults. An official permission letter was obtained from the Department of Psychology, confirming that the study was conducted as part of the Bachelor of Science degree requirements in Psychology.

Before data collection, participants were informed about the purpose of the study, and informed consent was obtained from all participants. They were requested to complete the questionnaires honestly, and confidentiality and anonymity were ensured throughout the research process. The collected data were entered and analyzed using SPSS version 20.

RESULTS

Table 1

variable	n	M	SD	SAS	SQS	ESS
SAS	300	36.43	10.80	—		
SQS	300	65.98	9.61	.29**	—	
ESS	300	18.61	4.20	.22**	.32**	—

Note. N=number of sample, M=mean, SD=standard deviation, SAS= Smart Phone Addiction scale, SQS=Sleep Quality Scale, ESS=Epworth Sleepiness Scale.

Table 1 presents the means, standard deviations, and Pearson correlation coefficients among smartphone addiction, sleep quality, and excessive daytime sleepiness among participants

(N = 300). The results showed that participants obtained a mean score of 36.43 (SD = 10.80) on the Smartphone Addiction Scale (SAS), 65.98 (SD = 9.61) on the Sleep Quality Scale (SQS), and 18.61 (SD = 4.20) on the Epworth Sleepiness Scale (ESS). A Pearson product-moment correlation analysis was conducted to examine the relationships among the study variables. Results showed a significant positive link between smartphone addiction and sleep quality, $r = .29, p < .01$. This suggest that students with higher smartphone addiction tended to have worse sleep quality. In addition higher smart phone addiction was also linked to increased daytime sleepiness, $r = .22, p < .01$. furthermore, sleep quality was significantly and positively related to daytime sleepiness, $r = .32, p < .01$. This indicates that poorer sleep quality was connected to higher level of daytime sleepiness. These findings support the hypothesis that smartphone addiction is significantly related to sleep disturbances and daytime alertness problems among participants. Hence hypothesis has been accepted.

Table 2: Simple Linear Regression Predicting Daytime Alertness From Sleep

variable	B	SE	t	p	95% CI
constant	1.158	.200	5.801	<0.001	(.765,1.550)
SQS	0.43	0.11	3.68	<0.001	(.331,.661)

Note. CI=Confidence Interval

Table 2 presents the results of a simple linear regression analysis examining the predictive role of sleep quality on daytime alertness. The regression coefficient showed that sleep quality had a positive effect on daytime alertness ($B = 0.43, SE = 0.11, t = 3.68, p < .001$), suggesting that better sleep quality was associated with higher levels of daytime alertness. The 95% confidence interval for the regression coefficient ranged from .331 to .661, indicating a reliable positive relationship between the variables. In addition, the constant value was significant ($B = 1.158, SE = .200, t = 5.801, p < .001$), with a confidence interval ranging from .765 to 1.550. Overall, the findings suggest that hypothesis has been accepted.

DISCUSSION

The present study aimed to investigate the relationship between smartphone addiction, sleep quality and alertness during the day in adolescents and young adults. Although the smartphones have their advantages like education, social and entertainment purposes, excessive usage of smartphone is also affecting the way of living.

The current study was aimed at assessing the correlation between the use of the smartphone, the quality of sleep and alertness during the day among adolescents and young adults. Smartphones are an integral part of everyday life and they offer a lot of advantages, but they can also impact sleep and daily

functioning when used excessively. Results of this study suggest that the use of smartphones might become a growing influence in the well-being of young people, and it is important to understand how the use of smartphones might affect sleep and daytime functioning.

The research also showed how the quality of sleep is vital to being at your best during the day and in your general health. Good and sufficient sleep enables a person be well alert, active and concentrative in day-to-day activities. So, fostering healthy sleep routines and balanced smartphone use could positively impact psychological health, academic outcomes and daytime functioning among adolescents and young adults.

The first hypothesis suggested that there would be a strong relationship between the variables: smartphone addiction, sleep quality, and excessive daytime sleepiness. The results corroborated this hypothesis and showed that all the study variables were significantly positively related. The results are similar to other studies. Demirci et al. (2015) also discussed that smartphone addiction has connection with sleep quality. Likewise, Lemola et al. (2015) reported a correlation between excessive use of the smartphone during nighttime and shorter sleep duration and higher daytime sleepiness. Similar conclusions have been reached by Munezawa et al. (2011) and Exelmans and Van den Bulck (2016) on the association between problematic SPU and sleep disturbances and daytime sleepiness in youth. Thus, the first hypothesis was accepted.

The second hypothesis suggested that sleep quality would be an important determinant of alertness during the day. This was confirmed by the results, which showed that higher sleep quality was linked to higher alertness and functioning during the day. The results corroborate those of Dewald et al. (2010) who found a positive correlation between attention and academic performance and sleep quality. Similarly, Lund et al. (2010) found that good sleep patterns enhance concentration and alertness during the day and Killgore (2010) highlighted how important adequate sleep is for optimal cognitive functioning and emotional control. So, the second hypothesis was accepted.

To put it simply, this study reveals that the addiction to smartphones significantly affects students' sleep quality and their daytime functioning. More use of the smartphone was linked to poorer sleep quality, which in turn was linked to greater daytime sleepiness and decreased alertness. The results highlight the significance of fostering good mobile phone habits, technology balance and sleep hygiene. Awareness programs and educational interventions can be used to enhance sleeping quality, psychological wellbeing and academic achievement of adolescents and young adults.

LIMITATIONS OF THE STUDY

1. The study used a purposive sampling technique, which may limit the generalizability of the findings to the broader population.
2. Data were collected through self-report questionnaires, which may involve response bias and socially desirable answers from participants.
3. The sample was limited to adolescents and young adults only; therefore, the findings cannot be generalized to older age groups.
4. A cross- sectional research design was adopted for this study, which makes it difficult to establish causal relationships among smartphone addiction, sleep quality, and daytime alertness.
5. Environmental and psychological factors such as stress, anxiety, academic workload, and family environment were not examined in the present study.

RECOMMENDATIONS

1. Awareness programs should be conducted in educational institutions to educate students about the harmful effects of excessive smartphone use on sleep and mental health.
2. Students should be encouraged to limit smartphone usage, particularly before bedtime, in order to improve sleep quality and daytime functioning.
3. Educational institutions should promote healthy sleep hygiene practices through seminars, counseling sessions, and wellness activities.
4. Longitudinal studies should be conducted to better understand the long-term effects of smartphone addiction on sleep and psychological well-being.

IMPLICATIONS OF THE STUDY

1. The study highlights the importance of healthy smartphone usage for maintaining good sleep quality and daytime alertness among students.
2. The findings may help psychologists and counselors develop intervention programs to reduce smartphone addiction and improve sleep behaviors.
3. Educational institutions can use the findings to design awareness campaigns regarding digital well-being and sleep hygiene.
4. Parents may benefit from understanding the impact of excessive smartphone use on their children's academic performance and mental health.
5. Healthcare professionals may use the findings to encourage preventive strategies for sleep-related and behavioral problems among young individuals.

CONCLUSION

The present study was conducted to investigate the relationship among smartphone addiction, sleep quality, and daytime alertness among adolescents and young adults. The findings revealed that smartphone addiction has a significant negative impact on sleep quality, and poor sleep quality leads to increased daytime sleepiness and reduced alertness among participants. Moreover, sleep quality emerged as a significant predictor of daytime alertness, indicating that better sleep is associated with improved concentration and cognitive functioning. Overall, the study highlights the importance of balanced smartphone use and healthy sleep habits for better academic performance and psychological well-being.

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