

## Original Article

# Effects of smartphone overuse on quality of sleep and academics among university students

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## Abstract

**Objective:** To determine the association of smartphone addiction of male and female university students with quality of sleep and academic performance.

**Study design:** It is a comparative cross sectional study.

**Place and duration of study:** A three-month study was carried out in different universities of Rawalpindi and Islamabad. (from October 2017 to January 2018)

**Material and Methods:** Non probability purposive sampling technique was used for data collection. Students between the ages of 18 to 25 using smartphone more than two hours per day were included. Students suffering from diagnosed sleeping disorders and taking psychological treatment were excluded from the study. Data was collected by using Pittsburgh Sleep Quality Index (PSQI), Smartphone addiction scale (SAS), semester grade point average (SGPA) and cumulative grade point average (CGPA). Data was analyzed by using SPSS version 21.

**Results:** The mean age of the participants was  $20.70 \pm 1.52$  years, out of which 67% were males and 33% were females. Mean and standard deviation of global PSQI was  $7.31 \pm 3.33$  and SAS was  $93.05 \pm 21.4$  with no significant difference between males and females ( $P$  value  $> 0.05$ ). Mean and standard deviation of CGPA and SGPA were  $3.02 \pm 1.288$  and  $3.38 \pm 1.19$  with significant difference in SGPA ( $P$  value  $< 0.05$ ). SAS has showed association with PSQI and academic performance ( $P$  value  $< 0.05$ ).

**Conclusion:** Students spend a significant amount of time on smart phone thus developing addictive tendencies. It can be concluded that sleep quality and academics are directly associated with smartphone addiction in a negative way. There is no difference in sleep quality and smartphone addiction whereas academics were more affected in male students than female students.

**Keywords:** Academic performance, PSQI, SAS, Sleep quality, Smartphone addiction

## 1. Introduction

Smart phone has been labelled as one of the greatest inventions of 20<sup>th</sup> century with highly boosting abilities. The evolution of information technology brought a drastic change in our lives. It was predicted previously that mobile phone will replace the PCs for surfing web and will change the people's life in many aspects like; replacing our digital cameras, video players and would be a perfect substitute for our credit and debit cards. Now when we look at the present situation, not only mobile phone impacts are so obvious but has also penetrated our lives badly.<sup>1</sup>

Limiting the usage of smartphones, proves to be benevolence for the people in this century. However immense usage proves to be detrimental and unsafe for the user.

There are numerous positive effects of smart phone on human life. The smart phone has become fundamental and valuable part of people life. It allows user to connect with their cheerful moments digitally in the form of pictures, personal information, memories along with health, work and financial data in one tap. Transferring and storing data, checking emails and sharing information has become easier than ever.<sup>2</sup> Mobile phones along with internet access have brought people much closer. It is a matter of only one touch to get connected with anyone in the world. But on one hand it connected the people distant from us but has disconnected us from those living with us.<sup>3</sup>

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Smartphones work as a great source of entertainment; it has internet facilities which enables user to watch online TV, download and play online game.<sup>4</sup> As for the business industry, smartphones do provide a greater ease of management. Having own marketing apps on Android makes it easier for companies to look over their business quickly and easily. As far as the studies are concerned, the internet facilities in a smartphone have enabled students to access study related data easily. In addition, there are many study oriented applications that help in better understanding of the topics.<sup>5</sup> In case of life threatening emergencies, having a smartphone, one can easily get in touch with anyone or emergency care providers on the spot.<sup>6</sup>

However, besides so many positive effects of smart phone, there are multiple negative effects. One of major negative effect is its addiction Not only youngster but kids have also fallen perpetually prey to the addiction of mobile phones. They tend to dawdle their day by watching mindless videos, playing video games and using other apps. These poor addictive habits produce underachiever students who are low in studies and overall performance.<sup>7</sup> Extended periods of smartphone screen exposure can result in a deterioration of eyesight. The screen's glare can be detrimental to eye health, and prolonged smartphone usage, particularly during lengthy phone calls, can contribute to additional health issues like headaches.<sup>8</sup> Continuously carrying and using smartphones over extended durations can lead to the repeated utilization of particular muscles, resulting in muscle fiber damage, the accumulation of harm from sudden injuries, and a frequent occurrence of myogenic tension, primarily in the neck and shoulder area.<sup>9</sup> Straining the neck and shoulders through excessive pressure leads to muscle tiredness, reduced productivity, and impacts the musculoskeletal system. Persistent texting and scrolling on a smartphone's touchscreen can result in a medical condition known as "Text claw," characterized by cramped fingers, wrist discomfort, and muscle pain among those affected.<sup>10</sup> It usually occurs due to inflammation of the tendon known as tendonitis. In addition to that it aggravates the tendon inflammation further. The harmful radiations emitting from smartphone produces counterproductive effects on the mental health of the user.<sup>8</sup> According to expert researches, smartphone addiction negatively impacts on user's emotional, psychosocial, psychological,

behavioral and health factors. In order to keep one's self busy the user uses smart phone for infinite period makes the user feel lonelier and fall into depression. The feeling worsens if person doesn't use cell phone for some time mimicking feelings similar to withdrawal effects.<sup>11</sup> The smart phones increases person's availability for work and increases working hour even after signing off from work. This creates a ruinous communication gap between individual and their family, reducing the family time by being continuously sticking with phone. The person frequently checks, reply's to emails which viciously increases users level of stress.<sup>12</sup>

Smart phone is becoming one of the leading addiction among students and a primary gadget to be dependent upon. The excessive use of smart phone results in daytime sleepiness along with working for late hours. This imposes increased stress levels on student, affecting their body; mentally, physically and emotionally. Therefore, concerns about sleep related problems are increasing with increased use of smartphone. According to a study when animals, including humans are sleep deprived, many of their bodily systems fail to work properly. Not only memory, performance and attention span suffers but immune and endocrine systems are also impaired.<sup>13</sup>

Smart phone also raises fatigue among the users. Though it seems like our phone provide a way to destress before bedtime, but in reality, the blue light of screen actually has an opposite effect. The brain can be activated by the light emitted from smartphone's screen which makes it harder to fall asleep and even harder to get a sleep of good quality. It is therefore necessary for students to have "screen free" time before bed. According to studies, students who spend more than 4 hours a day looking at the screens of their smart phone had 49 percent more chances of taking longer to fall asleep and almost three and a half times more likely to sleep for less than five hours each night.<sup>14</sup> Many university students are sleep deprived, have poor sleeping habits, and experience poor sleep quality. Young adults are recommended a full eight to nine hours of high quality sleep a night.<sup>15</sup>

Due to these positive and negative effects of the smartphone and their effects on sleep and academic performance the current study was designed. The objectives of the study were to determine the association

of smartphone addiction with quality of sleep and academic performance of the students. The effects of sleep quality on academic record of both male and female university students were also determined.

## 2. Materials & Methods

It was a comparative cross sectional study conducted in different universities of Rawalpindi and Islamabad from October 2017 to January 2018. A total of 1000 students were recruited in the study after getting permission from the administration of different universities including; Riphah International university, Bahria university, National university of modern languages, Comsats, Air university and Arid Agriculture university. Non probability purposive sampling technique was used for data collection. Data was collected from six different departments including engineering, social sciences, management sciences, computer sciences, media sciences and biosciences. The university students between the ages of 18 to 25 using smartphone more than two hours from 9pm to 2am were included in the study. While all those students who were suffering from diagnosed sleeping disorders and were under any psychological treatment were excluded from the study. Data was collected from the students after taking informed consent by sharing all the information regarding the study with maintenance of their confidentiality. Data was collected by using Pittsburgh Sleep Quality Index (PSQI)<sup>35</sup> for measuring sleep quality, Smartphone addiction scale (SAS)<sup>36</sup> for measuring smart phone addiction and semester grade point average (SGPA) and cumulative grade point average (CGPA) for the measurement of academic performance. Besides these, demographic information was also taken from all the students included in the study. 1100 questionnaires were distributed but only 1000 were returned with complete responses whereas 100 were either incomplete or were not returned by the students. After collection, data was analysed by using SPSS version 21. Qualitative data was presented in form of frequencies and percentages and for quantitative data; mean with standard deviation was used. For inferential statistics; independent samples t test was used for comparisons between male and female students and Pearson's rank correlation was used to find associations between different variables.

## 3. Results

Total number of participants in the current study was 1000 out of which 670 (67%) were males and 330 (33%) were females. The mean age of the participants was  $20.70 \pm 1.52$  years. Data was collected from six different departments with highest percentage from engineering department i.e. 36.6 % and lowest from social sciences i.e. 4.8%. Students from management sciences were 193(19.3%), computer sciences were 183(18.3%), media sciences were 85(8.5%), biosciences were 125(12.5%) depending on their response rate. Mean and standard deviation of global Pittsburgh sleep quality index (PSQI) was  $7.31 \pm 3.33$ . The details of all components of PSQI were provided in table I.

Means and standard deviation of SAS was  $93.05 \pm 21.4$ . Total number of smartphone usage hours was  $7.96 \pm 4.70$  on average. The most common purpose of smartphone use was social media with frequency of 439 (43.9%) which was followed by communication i.e. 192(19.2%). Smartphone usage for study was 59(5.9%), entertainment 123(12.3%) and for all above mentioned purposes was 187(18.7%). Mean and standard deviation of CGPA and SGPA were  $3.02 \pm 1.288$  and  $3.38 \pm 1.19$  respectively.

**Table I:** Mean and standard deviation of different components of Pittsburgh sleep quality index (PSQI)

Components	Mean±SD
Subjective sleep quality	1.09±0.82
Sleep latency	1.27±0.97
Sleep duration	1.26±1.06
Habitual sleep efficiency	0.83±1.11
Sleep disturbance	1.26±0.57
Use of sleep medication	0.39±0.81
Daytime dysfunction	1.22±0.99

When comparisons were made between male and female students, it was found that the mobile usage hours of females are more than the males with a statistically significant difference (P value<0.05). Whereas no significant difference was found when smartphone

addiction scale and global score of PSQI was compared between male and female as P value > 0.05. In components of PSQI, significant differences were found in sleep disturbance, use of sleep medication as well as day time dysfunction (P value < 0.05). When academic performance of male and female students was compared, no statistically significant difference was obtained in CGPA but it was noted in SGPA where female students have shown improved performances than the male students (P value < 0.05) (table II).

**Table II:** Comparison Of Means Of Different Variables In Male And Female Students

Variables	Male (Mean±SD)	Female (Mean±SD)	P value
Mobile usage hours	7.70±4.56	8.49±4.95	0.01*
SAS	92.65±21.10	93.88±22.05	0.39
PSQI	7.32±3.31	7.31±3.37	0.96
Subjective sleep quality	1.10±0.84	1.08±0.76	0.81
Sleep latency	1.26±0.98	1.30±0.94	0.49
Sleep duration	1.31±1.06	1.26±1.06	0.03*
Habitual sleep efficiency	0.86±0.12	0.76±0.08	0.19
Sleep disturbance	1.23±0.57	1.33±0.56	0.009**
Use of sleep medication	0.42±0.08	0.32±0.07	0.05*
Daytime dysfunction	1.16±0.98	1.33±1.007	0.008**
CGPA	2.96±1.33	3.16±1.17	0.02*
SGPA	2.97±1.00	4.21±1.95	0.10

PSQI: Pittsburgh Sleep Quality Index, SAS: Smartphone addiction scale, SGPA: Semester grade point average, CGPA: Cumulative grade point average \* = P value < 0.05, \*\* = P value < 0.01

When associations were found between different variables, it was found that academic performance (both CGPA & SGPA) has a negative association with smart phone addiction as smart phone addiction increases academic performance decreases (P value < 0.05). Smart phone addiction has also showed positive association

with all components of sleep quality index showing as addiction of smartphone increases, sleep quality decreases (P value < 0.05). However no association was found between sleep quality and academic performance (P value > 0.05) (table III).

**Table III:** Association of different variables

Variable	Correlation coefficient	P value
SGPA & SAS	-.068*	0.032
CGPA & SAS	-.091**	0.004
PSQI & SAS	0.227***	<0.001
Subjective sleep quality & SAS	0.161***	<0.001
Sleep latency & SAS	0.132***	<0.001
Sleep duration & SAS	0.071*	0.025
Habitual sleep efficiency & SAS	0.083**	0.009
Sleep disturbance & SAS	0.104**	0.001
Use of sleep medication & SAS	0.075*	0.018
Daytime dysfunction & SAS	0.185***	<0.001
PSQI & CGPA	-0.06	0.06
PSQI & SGPA	-0.039	0.215

PSQI: Pittsburgh Sleep Quality Index, SAS: Smartphone addiction scale, SGPA: Semester grade point average, CGPA: Cumulative grade point average, \* = P value < 0.05, \*\* = P value < 0.01

#### 4. Discussion

According to current study, an increased smartphone usage is associated with an increase in poor quality of sleep and poor academic performance. Although females were found to use mobile phones more than males but there was no statistical difference in their sleep quality and CGPA but there is a difference in SGPA. There is association of sleep quality and smartphone addiction as well as smart phone addiction and academic performance. The results of the current study are in accordance with the results of the previous studies done in different regions of the world. According to the findings of a study by Majid Sadoughi done in Kashan, an increasing use of mobile phone had negative effects such as low sleep quality, high perceived stress and their undesirable effects on student's life. In both the studies sleep quality was assessed by Pittsburgh Sleep Quality Index (PSQI), the value of which in both these cases was

above 5 showing disturbed sleep quality. Soni et al, in their study reported that those who used smart phone excessively had high Global PSQI scores showing disturbances in the quality of sleep and DASS-21 scores showing high levels of depression, anxiety and stress. The results of their study support the results of the current study as in the current study, the PSQI scores were found to be high among those who were using smart phone excessively in addition to low performance in academics.

A survey was conducted by Cho et al to find the relationship between smartphone usage, sleep pattern and deprivation. It was found that though the rate of smartphone addiction was low in high school students but smart phone addiction and sleep deprivation had a positive relation. This is because the light stimulation from phone's screen disturbed sleep quality and thus sleep deprivation.

A research was conducted to find effects of sleep quality on the association between problematic mobile phone use and mental health symptoms in Chinese college students and it was reported that an increase in mobile phone usage was associated with poor quality of sleep which in turn was associated with mental health problems whereas in the current study the increase in mobile phone use showed an increase in poor quality of sleep which in turn affected their academic performance and resulted in poor GPAs at universities. In both the researches mobile phone overuse had a negative effect on quality of sleep with additional poor effects on mental health (as shown in previous study) and a poor effect on academics (as evident in the current study).

Ahn et al did a research to analyse the effects of mobile phone overuse on quality of sleep. He studied smart phone usage pattern, wake up time, time spent in bed and overall sleep quality and concluded that smart phone had a negative effect on quality of sleep. The result of current study is in accordance with the previous study as smart phone overuse in current study too had negative effects on quality of sleep. In both the studies there was an increase in late night mobile usage hours and an increase in the time spent in bed using mobile phone.

Tamura et al found the association between excessive mobile phone usage, insomnia and depression and found that those having an excessive mobile phone usage

usually more than 5 hours a day presented with an increased depression and insomnia, which shows poor sleep quality. Whereas in the current study an increase in smartphone usage usually more than 7 hours was found prevalent and it was associated with poor quality of sleep. In a study by Mohammad Beigi it was found that an increase in mobile phone use was associated with poor sleep quality as well as quantity. Similarly a study by Demicri et al found that increase in mobile phone usage led to increased depression and anxiety which in turn affected sleep quality in a negative way. The results of both studies are in accordance with the results of the current study.

Aman et al did a study to find out the relation between mobile phone overuse and academics, it was seen that an increase in mobile phone usage was associated with poor academic performance of students. In current study similar results were found i.e. an increase in smartphone usage was associated with poor academic performance. In both these studies GPA was used as a means to measure student's academic performances.

There are some limitations of the study. As smart phone addiction and its effect on sleep quality and academics is a highly prevalent problem, so in future, studies should be done with larger sample size and from different cities in order to generalize the results to whole population. All the participants of study were university students and male ratio was greater than females, studies with equal gender distribution are needed. As questionnaire includes information of academic performance, some students were reluctant to fill that section. All subjects were well-educated in the current study, the samples included people from backgrounds of different educational and varying age. The school curriculum, strenuous school activities and competing examinations causes psychological distress to student's mental health. It occurs more in youngsters and teens, attributing to increasing use of smart phones to combat stress. Association of all components of sleep quality with smartphone addiction should also be evaluated independently in future students.

#### **Conclusion:**

With the growing admiration of smart phone among university students addictive tendencies are also increasing. The current study indicated that sleep quality and academics are directly associated with smartphone

addiction and affects quality of all the components of sleep. The students having high addiction of smartphone showed poor academic performance. No significant association was found between sleep quality and academics thus sleep has no effect on academic performance of students. In comparison between male and female gender, no differences were found in sleep quality and smartphone addiction whereas academics were more affected in male students than the female students.

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