Research Article

Pattern of mobile phone usage and its effects on psychological health, sleep, and academic performance in students of a medical university

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Abstract

Background: Mobile phones have become increasingly popular in recent years, especially in young generation. Although these are convenient and useful, teenagers are becoming more and more dependent on them. **Aims and Objective:** This study was designed to assess the mobile phone usage pattern and its negative effects on psychological health, sleep, and academic performance in students of a medical university. **Materials and Methods:** A descriptive study was conducted on a total of 1,000 medical students aged between 17 and 24 years who were using mobile phone for at least 1 year. They were requested to fill a specially designed, self-administrated, pretested, questionnaire that comprised details of their frequency and pattern of using mobile phone and its effects on their psychological health, sleep-related behavioral issues, and academic performance. The data collected were statistically analyzed. **Result:** Among the total 1,000 students, all of them possessed their own mobile phone, with about 76.4% students having smart phones. Major purpose of using the phone was for communication, coordination of activities, and in emergency situations, while others were also using it for downloading games, music, videos, and for style. Nighttime usage of mobile phone was highly significantly ($p < 0.0001$) associated with difficulty in waking up, waking time tiredness, decline in study habits, difficulty in concentration, increase in missed classes, and going late for classes. Total time spent on mobile phones was significantly ($p < 0.05$) associated with waking time tiredness and difficulty in waking up and highly significantly ($p < 0.001$) with decline in study habits, increase in missed classes, and going late for classes. **Conclusion:** Besides the positive role of mobile phones in our daily lives, its overuse presents negative impact on psychological health, sleep, and academic performance of students. Hence, it is important to guide the students regarding efficient, safe, purposeful usage, and negative effects of mobile phones on health and environment.

KEY WORDS: Mobile Phone; Psychological Health; Sleep; Academic Performance

Introduction

Mobile phones have become a ubiquitous part of our daily lives. Initially, mobile phones were used only as a communication tool; but, these days, mobile phones function as mobile computers that serve us with music player, games, internet, video camera, calculator, alarm clock, and many more other perceived benefits as increased accessibility and social connectivity, reduced loneliness, and security in emergency situations.[1]

Owing to these countless perks, mobile phones are increasingly adopted and used by teenagers. Moreover, usage of mobile phones has increased dramatically owing to their more affordability and availability all over the world. Fixed telephone lines reached one billion users in 128 years, while mobile networks attained this milestone in simply over two decades. Worldwide, mobile phone subscriptions have reached six billion.[2] In India, people living in both rural and urban areas, literate or illiterate, and belonging to almost all age groups are now dependent on a mobile phone.

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Unfortunately, communication technology has some negative effects also. Constant usage and addiction to cell phones has affected the people physically, psychologically, and socially. Excessive mobile phone use has been found to be associated with health problems such as impaired concentration, headache, dizziness, fatigue, thermal sensations in and around ear, facial dermatitis, stress, sleep disturbances owing to nighttime use, and frustration.[3] Inappropriate use of mobile phone by students presents many deleterious effects, for example, usage of phones during lectures causes disturbances in classrooms affecting students' academic performances,[4] accidents while driving,[5] damaged relationships owing to preference to phone calls by ignoring other members,[6] and increased freedom from parents[7] along with decreased social freedom.[8] Psychologically, people get addicted to mobile phones that has led to emotional stress. Students may also show cognitive/behavioral salience in which they constantly think about their phones when they are not using it or keep on checking their mobile phones for missed calls or messages.[4]

Mobile phone addiction can be explained by the fact that students find the use of mobile phone to be exciting. Any behavior that gives satisfaction or helps to get rid of a negative behavior such as tension or boredom leads to intensification of that behavior for taking pleasure or getting rid of a negative situation as is the case with mobile phone.[9]

In spite of some knowledge on unfavorable health effects, mobile phones are gaining popularity, especially in young generation. The aim of this study, therefore, was to examine self-reported pattern of mobile phone usage among students of a medical university and to assess effects of mobile phones use on their psychological health in the form of their perceived stress, sleep quality, and academic performance.

Materials and Methods

A descriptive cross sectional study was conducted on a total of 1,000 students of a medical university for a period of 5 months from May 2015 to September 2015. Both male and female students of age between 17 and 24 years were included.

Inclusion Criteria

Students who were using mobile phones on a regular basis for more than 1 year were included in the study.

Exclusion Criteria

Subjects with history of alcohol or substance abuse and any psychiatric or sleep disorder were excluded from the study.

Study Design

Students were requested to fill a specially designed, self-administrated, questionnaire which comprised their socio-demographic characteristics, frequency and pattern of mobile phone usage, questions related to their psychological health, sleep-related behavioral issues, academic performance, and their awareness about effects of mobile phone. The questionnaire was pretested by a pilot study among 30 students, and appropriate modifications were done according to the experiences of pilot study.

Demographic details included age, sex, education, and socioeconomic status. Frequency of mobile phone usage included average time spent on various features of mobile phones such as calls and text messages. Pattern of mobile phone usage comprised number of persons calling/day; mode, purpose, and timing of mobile phone usage; usage at inappropriate or prohibited places; where they kept their phone during sleep; and whether they switched it off during sleep or not.

Questions related to psychological health included their accessibility stress, ringxiety, or whether they have ever thrown their phone because of angry conversation. Regarding sleep, they were asked whether they felt waking time tiredness and difficulty in waking up, which may be related to nighttime usage or total time spent on mobile phone.

Regarding academic performance, they were asked whether they have felt decline in study habits and grades, difficulty in concentration, increase in missed classes, and were late for classes.

The study was approved by Institutional Ethical Committee. Only the volunteer students willing to participate in the study were selected, and their informed consent was taken. Privacy of students was protected as they were told not to write their names on the questionnaire.

Statistical Analysis

The data were compiled and expressed as frequency and percentages. The data were analyzed statistically using χ^2-test to observe the relationship between late night usage of mobile phone and total time spent on mobile phone with their sleep-related issues and academic activities. Value of $p < 0.05$ was taken as significant.

Result

In this study, the mean age of subjects was 20.90 ± 1.81 years, and their mean age of first usage of mobile phone was 15.8 ± 1.29 years. Their average monthly expenditure on mobile phone was Rs. 323 ± 151.

Table 1 shows demographic characteristics of the study population. Table 2 shows pattern of mobile phone use among medical students. Figure 1 shows purpose of mobile phone use by students, and Figure 2 shows the average time spent on various features of mobile phones. Tables 3 and 4 show the problems related to sleep and academic activities observed in students, which were further correlated with late night mobile phone usage and total time spent on mobile phones, respectively. Table 5 shows the psychological health-related issues owing to the use of mobile phone among medical students. On statistical analysis, it was observed that late night usage of

Table 1: Demographic characteristics of the study population

Characteristics	Number of students, N = 1,000 (% age)
Gender	
Males	428 (42.8)
Females	572 (57.2)
Mode of residence	
Hostel	830 (83)
Family	170 (17)
Socioeconomic status	
High	64 (6.4)
Middle	904 (90.4)
Low	32 (3.2)

Table 2: Pattern of use of mobile phone among medical students

	Number of students, N = 1,000 (% age)
Pattern of mobile phone use	
Have own mobile phone	1000 (100)
Two phones	90 (9)
Dual sim phone	478 (47.8)
Smart phone	764 (76.4)
Internet on phone	704 (70.4)
Number of persons calling/day	
1–2	174 (17.4)
3–4	248 (24.8)
>5	578 (57.8)
Mode of use	
Ringing	730 (73)
Vibration	155 (15.5)
Silent	115 (11.5)
Use at places	
Home	960 (96)
Public places	710 (71)
Class	180 (18)
Eating	54 (5.4)
Driving	94 (9.4)
Time of maximum use	
Morning	36 (3.6)
Afternoon	70 (7)
Evening	624 (62.4)
Night	270 (27)
Where do you keep your mobile phone during sleep?	
At bed	906 (90.6)
At table near bed	94 (9.4)
Do you switch off your phone during sleep?	62 (6.2)

mobile phone was highly significantly ($p < 0.0001$) associated with difficulty in waking up, waking time tiredness, decline in study habits, difficulty in concentration, increase in missed classes, and going late for classes.

Moreover, total time spent on usage of mobile phone was significantly ($p < 0.05$) associated with difficulty in waking up and waking time tiredness and highly significantly ($p < 0.0001$) associated with decline in study habits, increase in missed classes, and going late for classes.

Discussion

Mobile phones are now indispensable in daily life. Owing to improved standard of living in India, mobile phone ownership is highly prevalent among teens and young adults. The findings of this study suggest specific mobile usage patterns, various compulsions caused by mobile use, and a number of important relationships between mobile phone usage, health-related behaviors, and academic activities among college students.

In our study, we observed that mobile phone use was very high among medical students of both the sexes, and all the students had their own mobile phone, similar to findings in other studies.[10] Moreover, the students from low socio-economic status families possessed their own mobile phones. The mobile phones that were earlier used by only high-income society are nowadays used by most people as they have got cheaper over time.

Average monthly phone bill of students under our study was limited to Rs 300–500. This amount was found to be much less than that spent by Malaysian students in another study.[11] However, this difference in expenditure may be owing to the disparity in purchasing power of parents or may be that Indian students try to keep check on their expenditure.

We observed that some students possessed another spare mobile phone, and many students were using dual sim phones, which suggest improper usage of mobile phones as they may be hiding their contacts, information or data from others, especially their family members.[12] Majority of the students were possessing smart phones along with Internet facility, and they frequently used it for taking pictures, recording videos, playing games, listening to music, and Internet surfing as was also found in another study.[13]

In our study, majority of the students used their phones for social interaction and sharing of thoughts with their parents and friends.[14] Besides calling, the second most common usage of mobile phone was as instrument for coordination of day-to-day activities such as alarm clock or reminder, for safety purposes, and emergency situations. These multifunction features of mobile phones cause an increase in mobile phone value, leading the users to perceive it as a must-have tool.[4,14] The disadvantage of having so many features on a single device is that if students lose their phone they would lose most of their contact numbers, recorded media, schedulers, and important personal data.

Some students think that mobile phone belongs to their style, and others admitted that they cannot imagine life without a mobile phone, which indicates their dependent behavior. This suggests that adolescents are more eager to adopt new

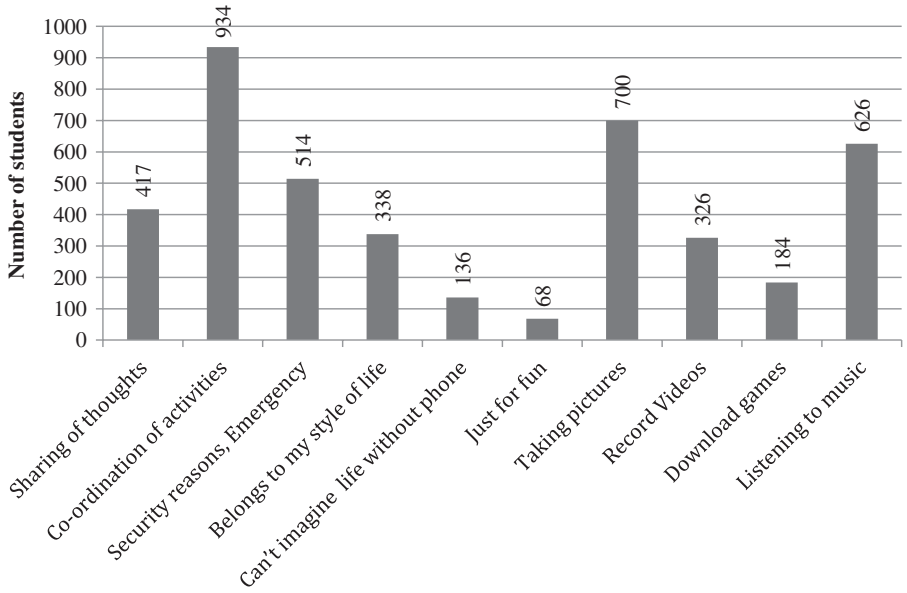

Figure 1: Purpose of mobile phone usage by students.

technologies and some consequent behavioral characteristics as they are more susceptible to fashion trends and styles.[7,14] In a study conducted on Australians adolescents, some of the participants were found to have very strong attachment to their cell phones and reported it to be an integral part of their life.[14,15]

Another common feature used on mobile phone was "WhatsApp™," an application which enables users to send and receive images, videos, audios, and text messages instantaneously to individuals and groups of friends. At present, WhatsApp is one of the most popular applications as it helps in easier social interactions among individuals leading to higher frequencies of chatting, planning, and group communications.[15] This shows that, sometimes, students use the peripheral features of phone more than using it as a communication tool only.[16]

As far as number of persons called per day is concerned, we observed that many students were calling more than five persons per day. Total cumulative time spent on all features of phone such as calling, messages, games, music, videos, Internet, WhatsApp, and other features was more than 1 h for 76.4% of students, with 17.8% of students using the mobile phone heavily (i.e., they were spending more than 3 h on their mobile phone).[17] In one study, it was interpreted that individuals with low self-esteem overuse their mobile phone as they have more propensity to seek reassurance. Moreover, the extraverts, who are essentially social in nature, tend to overuse their mobile

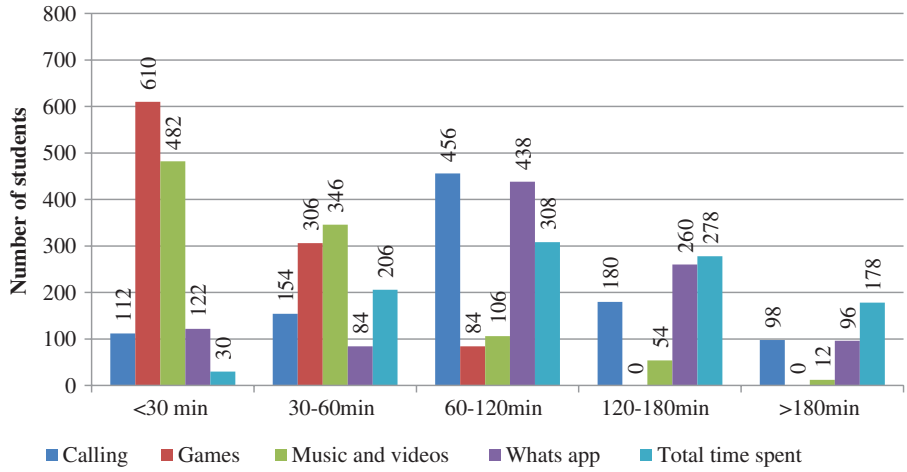

Figure 2: Average time spent on different features of mobile phone by students.

Table 3: Correlation of sleep-related issues and academic performance with late night usage of mobile phone

Sleep and academic performance	Late night mobile phone use (number of students = 1,000) (% age)						
	Daily, *N* = 270 (27)	Weekly, *N* = 106 (10.6)	Monthly, *N* = 108 (10.8)	Occasionally, *N* = 388 (38.8)	Not at all, *N* = 128 (12.8)	χ^2	*p*
Waking time tiredness, (*N* = 330)	94 (9.4)	78 (7.8)	50 (5)	76 (7.6)	32 (3.2)	123.28	0.0001*
Difficulty in waking up (*N* = 334)	98 (9.8)	80 (8)	56 (5.6)	64 (6.4%)	36 (3.6)	153	0.0001*
Decline in study habits and grades (*N* = 308)	150 (15)	56 (5.6)	36 (3.6)	32 (3.2)	34 (3.4)	196	0.0001*
Decrease in concentration (*N* = 246)	122 (12.2)	56 (5.6)	32 (3.2)	22 (2.2)	14 (1.4)	197	0.0001*
Increase in missed classes, (*N* = 244)	68 (6.8)	40 (4)	62 (6.2)	48 (4.8)	26 (2.6)	106	0.0001*
Being late for classes, (*N* = 274)	86 (8.6)	56 (5.6)	66 (6.6)	50 (5)	16 (1.6)	154	0.0001*

More than one sleep- and academic performance-related issues present in the same student.
*$p < 0.001$ = highly significant.

phone.[18] The preferred mode of using the mobile phone in our study was in ringing mode rather than in silent or vibration modes, which signifies that students do not want to miss any incoming call or text message at any time.

The use of mobile phones is prohibited in a growing number of public places such as banks, hospitals, and public transits as it is thought to disturb the social activities of people. In our study, mobile phones were used by 71% of students at public places, which may be because of their portability and requirement for constant communication. Mobile phones are thought to be a distressing element in educational institutes, and 18% of students in this study were using mobile phones in classrooms where they exchange text messages rather than voice calls. Sending messages during lectures affects the learning abilities of the students in a negative way for not being able to concentrate properly.[1] Mobile phones were also used by some students during driving, which is risky and may lead to accidents, even if they are using it with hands-free device as calling on phone reduces driver's attentiveness.[5] Some of the students were also using the phone while eating, which is thought to be inappropriate. This usage pattern shows their dependence on mobile phones as they cannot resist the attraction of using it even at places where it is prohibited, risky, or while doing other important works such as eating or studying. Most of the students were using their phones in evening or at night, which may be owing to their busy schedule of classes in morning or afternoon.

While sleeping, students used to keep their phone on bed or table near bed as is also found in other studies.[19] Only few students switched off their phones during sleeping. These observations suggest that people who are habitual mobile phone users get so much involved with it that they find it difficult to shut off their phones even at night time during sleeping.

Students were also found to use their phones during late night hours. According to a study, there is no safe amount or safe time to use a cell phone after lights out; even moderate use doubles the risk of long-term tiredness.[20] Mobile phones may also potentially affect students' academic performance. A highly significant correlation was found between nighttime use of mobile phone and difficulty in waking up, waking time tiredness, decline in study habits and grades, decrease in concentration, increased frequency of missed classes, and being late for classes. One possible explanation for this may be development of a hypervigilant attitude of individuals toward their mobile phones even in the late night hours. Our results are consistent with another study conducted in Japan in which 68% of the students, who received poor grades, owned a mobile phone.[21] In another study, talking on a cell phone, using e-mail, messaging services, and browsing the Internet were found to be the reasons for a significant amount of class tardiness and sleep deprivation.[22] This may be a disturbing factor as studies have shown that sleep disturbances and poor sleep quality show negative impact on general health and feeling of well-being along with impaired cognitive function and poor academic performance.[23]

In our study, a highly significant correlation was found between total time spent by the students on mobile phones and difficulty in waking up, waking time tiredness, decline in their study habits, increase in missed classes, and being late for classes. It can be interpreted that many college students may be sacrificing their academic position, emotional and physical health, and other aspects of life only to ensure that they do not miss a call, text message, or social networking post.[24]

Table 4: Correlation of sleep-related issues and academic performance with total time spent on mobile phone

Sleep and academic performance	Total time spent on mobile phone use (number of students = 1,000) (% age)						
	< 30 min, *N* = 30 (3)	30–60 min, *N* = 206 (20.6)	60–120, min, *N* = 308 (30.8)	120–180 min, *N* = 278 (27.8)	> 180 min, *N* = 178 (17.8)	χ^2	*p*
Waking time tiredness (*N* = 330)	16 (1.6)	78 (7.8)	92 (9.2)	88 (8.8)	56 (5.6)	9.6	0.04*
Difficulty in waking up (*N* = 334)	8 (0.8)	52 (5.2)	108 (10.8)	88 (8.8)	78 (7.8)	16.2	0.003*
Decline in study habits and grades (*N* = 308)	10 (1)	70 (7)	70 (7)	76 (7.6)	82 (8.2)	31.5	0.0001**
Decrease in concentration (*N* = 246)	12 (1.2)	48 (4.8)	64 (6.4)	74 (7.4)	48 (4.8)	7.6	0.108
Increase in missed classes (*N* = 244)	8 (0.8)	50 (5)	78 (7.8)	46 (4.6)	62 (6.2)	20	0.0001**
Being late for classes (*N* = 274)	4 (0.4)	50 (5)	66 (6.6)	108 (10.8)	46 (4.6)	28.1	0.0001**

More than one sleep- and academic performance-related issues present in the same student.
*$p < 0.05$ = significant; <0.001 = highly significant.

Some students admitted that they cannot live without a phone and will buy a new phone immediately if their phone breaks down, which indicates that mobile usage is unavoidable and has become an integral part of their life.[25]

On a stressful day, most of the students like to talk to their family members in person for getting an emotional and psychic support, which shows that mobile phone has not resulted in social anxiety and has not reduced face-to-face relationships. One possible explanation is that intimate contact with family and friends in person may be more stress-buffering than the less intimate contact while using communication technology to obtain social support. However, technology appears to be an excellent substitute for communication when in-person contact with family and friends is not practicable.

Students are expected to be always accessible by phone in every time and place by their family members and friends, which is a stressor of mobile phone use compared with actual frequency of use. Otherwise, they have to give reasons or make excuses for not being available. Moreover, they get poor sleep as they are stressed owing to possibility of being called during late night. Expectation of permanent availability and students' disability in controlling calls along with their secret relationships with peers out of family supervision and panic for transpiring these relationships may lead to apprehension, anxiety, and frustration.[26] Moreover, the constant accessibility of students via communication technology to other individuals who are in need of social support may lead to significant disruptions of their daily schedule regardless of their own actual frequency of technology use.[27] Some students believe a positive impact of mobile phones on their routine life, it to be an easy communication tool, and accessibility at all times as a great convenience. Young people also develop emotional attachments to their phones. These factors encourage increasing mobile phone use by the students, which can lead to dependence.[28]

Other factors contributing to mobile phone-related stress could be interruptions of work, disturbance by ring signals, feeling of never being free, feelings of guilt for not answering all the calls or messages, forgetting the phone at home, running out of batteries or calling range, and keeping the battery charged all the times.[29]

In our study, students frequently checked their phone owing to ringxiety or phantom ring, which is considered to be an indicator of mobile phone addiction.[30] With increase in number of individuals reporting mobile phone-related behavior problems, phantom ring may become a cause of concern for health professionals in coming years.[31] About one-third of students were aware of the fact that mobile phone is responsible for ecosystem disturbances and health ailments. But, this fact did not reduce the usage of mobile phones by students.

The findings of this study can be discussed by using stimulation-habituation assumption. Mobile phone usage stimulates adolescents by providing recent advances and interesting information desired by them. They develop a habit to spend much more time with their phone, which goes on increasing with time, and they become habitual of their phone. This habituation leads to health and behavioral problems in adolescents causing many difficulties in their daily activities and adjustment with family members.

The strength of the study was that it was done on a large number of subjects, and it represents people from variable regions of Punjab from different backgrounds. Moreover, the pro forma was validated beforehand in similar population. The study has certain limitations also as it is representing only one segment of society (i.e., medical students) but not the whole community, and the results depend upon the honesty of students in answering the questionnaire. A further study including general population is suggested.

Table 5: Psychological health-related issues owing to use of mobile phone among medical students

Psychological health-related issues	Number of students, *N* = 1,000 (% age)
What will you do if your phone breaks down?	
Wait for some time before buying new phone	792 (79.2)
Buy new phone immediately	194 (19.4)
Try to live without phone	14 (1.4)
On a stressful day, what will you prefer?	
Talk to your family and friends in person	754 (75.4)
Call them on phone	160 (16)
Send message to them	86 (8.6)
Expectation of your accessibility to others by phone	
Around the clock	328 (32.8)
All the day	304 (30.4)
Daily but not all the day	184 (18.4)
Now and then	96 (9.6)
Never	88 (8.8)
Do you feel accessibility to be stressful?	
Not at all	710 (71)
A little	214 (21.4)
Very much	76 (7.6)
Have you ever thrown phone owing to an angry conversation?	10 (1)
Ringxiety	556 (55.6)
Do you know that mobile phone is responsible for ecosystem disturbances?	346 (34.6)
Do you know that mobile phone is responsible for health problems such as hearing problems, cardiac problems, and infertility?	396 (39.6)

Conclusion

It was observed in our study that many students use mobile phones excessively and inappropriately (e.g., during driving, in classrooms, during late night hours) and give it preference over their health and academics. As mobile phone usage is highly prevalent among college students, their impact on mental health, sleep, academic performance, and environment should be discussed and judicial use recommended.

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