

ORIGINAL RESEARCH

A comparative study of smartphone users among different streams of undergraduate students of a medical university

¹Dr. Anil Yadav, ²Dr. Divya Saharan, ³Dr. Prashant Kumar, ⁴Dr. Poonam Sangwal, ⁵Dr. Rajiv Gupta

¹Additional Senior Medical Officer, Consultant Psychiatrist, Civil Hospital, Narnaul, Haryana, India

²Intern, World College of Medical Sciences Research and Hospital, Jhajjar, Haryana, India

³Medical Officer, Consultant Psychiatrist, Civil Hospital, Hisar, Haryana, India

⁴Additional Senior Medical Officer, Consultant Psychiatrist, Civil Hospital, Hisar, Haryana, India

⁵Head of Department cum CEO, Institute of Mental Health, PGIMS, Rohtak, Haryana, India

Corresponding author

Dr. Prashant Kumar

Medical Officer, Consultant Psychiatrist, Civil Hospital, Hisar, Haryana, India

Email: prashant.jangra77@gmail.com

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ABSTRACT

Aim: To compare the pattern of smartphone use among the students of different streams of medical university i.e. medical, dental, nursing and pharmacy. **Methodology:** The students studying in various streams of Medical university i.e. medical, dental, nursing and pharmacy (n=100 each) were provided with Semistructured proforma, Smartphone Addiction Scale (SAS-SV), and Modified Kuppaswamy's Socioeconomic Scale:2018. They were given instructions regarding each proforma and response on each item to be made was emphasized. Ten heavy users from each stream of undergraduate students who consented for personality assessment, were assessed further for personality profile using NEO - FFI scale. **Results:** SAS score was found to be significantly correlated with the DAS-S score (i.e. for stress) in all the study groups individually as well as overall. Such significant correlation for anxiety score, i.e. DAS-A with SAS, was observed for medical, dental as well as overall study sample. On the NEO-FFI scale, Neuroticism was found to be high in majority of dental (70%), nursing (70%) and pharmacy (90%) students but not among medical students. Score for Extraversion was found to be average for majority of students in all the study groups. Most of the students in all the study groups were found to be having high score for Openness, but the score was low in case of Agreeableness and Conscientiousness for most subjects in each group. Overall, there was no significant difference in any of the domains of NEO-FFI between the study groups. **Conclusion:** Psychiatrists need to be sensitized to the various issues of those afflicted with smartphone addiction, and must evaluate it and provide appropriate interventions for reducing their addiction level and thereby improving their quality of life.

Keywords: smartphone, addiction, psychological

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INTRODUCTION

Smartphones have become a major part of our lives due to their numerous benefits such as easy accessibility to information, social connectivity, workplace applications, convenience, mobility and size. Moreover, smartphones play a critical role in the health field as both health professionals and their patients seek to promote the good health of the patient. In addition, mobile character of smartphones enables individuals easy access and they become objects that people cannot easily take their eyes from screen of smartphones¹.

One of the key features of the smartphone is internet-based apps, many smartphone users have shown obsessive overuse and user dependence, as well as

other factors related to mental health symptoms. Excessive smartphone usage for more than 2 hours a day has been associated with increased sleep latency and daytime dysfunction. The mobile phone communicates through emission of radio signals, and the exposure to radiofrequency electromagnetic fields has been proposed to be a health risk.²

There is ample evidence that addictive behaviours and substance abuse begins during adolescence and young adulthood. There are few studies that address the addictive phenomenon regarding smartphone users. So, the index study aims to evaluate smartphone addiction and its psychological correlates. This study aims to investigate indicators of smartphone use, smartphone addiction, and their associations with

demographic and health behaviour-related variables in young people. There are fewer studies to compare use of mobile phones among various students in a medical university, the current study aims to compare the pattern of smartphone, use among the students of different streams of medical university i.e. medical, dental, nursing and pharmacy.

MATERIAL AND METHODS

A cross sectional multi group design study was carried on 400 students (100 each in medical, dental, nursing and pharmacy) at Pt. B. D. Sharma University of Health Sciences, Rohtak. A written informed consent from the undergraduate students was obtained prior to conducting the study. All the undergraduate students who are fulfilling the study criteria for inclusion will be taken for the study.

INCLUSION CRITERIA

- Either gender
- Age >18 years
- Willing to give informed consent
- Using smartphone

EXCLUSION CRITERIA

- Not willing to give informed consent.
- Not using smartphone

INSTRUMENTS

The following instruments were used in the study:

1. Semi-structured interview sheet:

Semi-structured interview sheet was designed which consisted of questions related to the socio-demographic profile of the study population as well as ten questions specifically related to smartphone use.

2. Smartphone addiction scale (SAS-SV)³:

Smart Phone Addiction Scale- Short version (SAS-SV) was used to assess the addiction of smartphone developed by Kwon et al (2013). This scale contains of 10 statements measures responses on 6-point scale from strongly disagree (1) to strongly agree (6). Score of this scale ranges from 10 to 60. The internal consistency and concurrent validity of SAS were verified with a Cronbach's alpha of 0.911. Higher the score respondents get on this scale, more they are dependent on their smartphone and higher they are addicted of smartphone. (Appendix-4)

3. Depression Anxiety and Stress Scales 21 (DASS 21)⁴:

The Depression Anxiety and Stress Scales (DASS, is a widely used screening tool to assess symptoms of depression, anxiety, and stress in community settings. This instrument comprises three sub-scales: (1) the Depression sub-scale which measures hopelessness, low self-esteem, and low positive affect; (2) the Anxiety scale which assesses autonomic arousal, musculo-skeletal symptoms, situational anxiety and subjective experience of anxious arousal; and (3) the Stress scale which assesses tension, agitation, and negative affect. There are two forms of the DASS, the

full 42-item and the short 21-item versions. Both assess the same domains.

NEO - FFI Scale⁵

The NEO Five-Factor Inventory (NEO-FFI) is most widely used instrument to assess personality on five dimensions namely Neuroticism, Extraversion, Openness, Agreeableness, and Conscientiousness. This inventory has a number of versions like 240, 180, 96 or 60 items inventory. However, the most applicable, to the study carried out, is the 60 items inventory, with least number of responses, within a 5-point scale from strongly disagree to strongly agree.

STUDY PROCEDURE

The students studying in various streams of Medical university i.e. medical, dental, nursing and pharmacy were proportionately selected randomly from different sections. The students were explained about the study as per the ethics guidelines and written informed consent was taken. After taking permission, pen-and-paper based questionnaire was administered. All students were provided with Semi structured proforma, Smartphone Addiction Scale (SAS-SV), and Modified Kuppaswamy's Socioeconomic Scale: 2018. They were given instructions regarding each proforma and response on each item to be made was emphasized. The forms were collected and students were given a brief psycho-educational session focusing on Problematic smartphone use and related harms. After analyzing all the data from students on the basis of scores obtained on smart phone addiction scale ten heavy users from each stream of undergraduate students who consented for personality assessment, were assessed further for personality profile using NEO - FFI scale. The data was subjected to statistical analysis using SPSS version 26.

RESULTS

The overall mean age of the patients was 20.42 years with female predominance (60.75%) patients were females. 98% patients were Hindus and 67.5% were urban residents. 57.75% patients belonged to upper middle class.

It was found that 42% of the students are addicted in all study groups, out of which 54.14% are males and 34.16% are females. Majority of the students belonged to the age-group of 18-20 years (n=99; 58.92%). Most of the addicted students from all the groups belonged to the upper-middle class (n= 96; 41.56%), while within a socio-economic class, maximum proportion of addicted individuals was found in middle class (n= 43; 48.31%). It was also noticed that most of them were Hindus (n=167; 99.40%) and belonged to urban background (n=115; 68.45%). (Table 1)

Table 2 showed the results of structured interview sheet filled by the student of various medical courses regarding the Pattern of smartphone use.

SAS score was found to be significantly correlated with the DAS-S score (i.e. for stress) in all the study groups individually as well as overall. Such significant correlation for anxiety score, i.e. DAS-A with SAS, was observed for medical, dental as well as overall study sample. DAS-D score (i.e. for depression) was not found to be significantly correlated with the SAS score in any of the study groups. (Table 3)

On the NEO-FFI scale, Neuroticism was found to be high in majority of dental (70%), nursing (70%) and

pharmacy (90%) students but not among medical students. Score for Extraversion was found to be average for majority of students in all the study groups. Most of the students in all the study groups were found to be having high score for Openness, but the score was low in case of Agreeableness and Conscientiousness for most subjects in each group. Overall, there was no significant difference in any of the domains of NEO-FFI between the study groups. (Table 4)

Table 1. Sociodemographic profile of subjects with smartphone addiction in each study group.

		Medical	Dental	Nursing	Pharmacy	Total	%
Age group (in years)	18-20	30	27	17	25	99	58.92
	21-25	12	26	10	17	65	38.69
	26-30	0	2	0	2	4	2.38
Gender	Male	32	16	0	37	85	50.59
	Female	10	39	27	7	83	49.40
Religion	Hindu	41	55	27	44	167	99.40
	Muslim	1	0	0	0	1	0.60
	Christian	0	0	0	0	0	0
Locality	Urban	25	51	13	26	115	68.45
	Rural	17	04	14	18	53	31.55
Socio-economic Status	Upper	5	5	2	3	15	8.93
	Upper-Middle	26	31	15	24	96	57.14
	Middle	7	15	10	11	43	25.59
	Lower-middle	4	3	0	5	12	7.14
	Lower	0	1	0	1	2	1.19
	Total addicted	42	55	27	44	168	

Table 2. Pattern of smartphone use among different groups.

	Medical	Dental	Nursing	Pharmacy	Total	p-value
Q1. How many hours do you spend with your smartphone in a day?						
<2 Hour	23	31	29	28	111 (27.75%)	0.006*
2-4 hr	47	32	36	23	138 (34.5%)	
4-6 hr	21	31	27	29	108 (27%)	
>6 hours	9	6	8	20	43 (10.75%)	
Q2. How many hours do you spend with social media (WhatsApp/Facebook/Instagram/Gaming etc.)?						
<2 Hour	69	60	79	55	263 (65.75%)	0.011*
2-4 hr	25	33	17	31	106 (26.5%)	
4-6 hr	3	5	3	12	23 (5.75%)	
>6 hours	3	2	1	2	8 (2%)	
Q3. How many hours do you spend with your smartphone for academic purposes?						
<2 Hour	92	95	86	79	352 (88%)	0.019*
2-4hr	7	5	12	17	41 (10.25%)	
4-6hr	1	0	2	4	7 (1.75%)	
>6 hours	0	0	0	0	0 (0%)	
Q4. Do you feel distressed with this time spending?						
Yes	51	47	11	35	144 (36%)	0.00001**
No	40	53	85	65	243 (60.75%)	
Sometimes	9	0	4	0	13 (3.25%)	
Q5. Number of selfies per day?						
> 5	78	74	81	86	319 (79.75%)	0.191
< 5	22	26	19	14	81 (20.25%)	
	Medical	Dental	Nursing	Pharmacy	Total	p-value
Q6. Do you check your smartphone while going to sleep or during night awakenings?						
Yes	77	69	13	52	211 (52.75%)	0.00001**

No	21	13	87	48	187 (46.75%)	
Sometimes	2	0	0	0	2 (0.5%)	
Q7. After how much time you check your smartphone phone after getting up in morning?						
<30 min	64	74	60	57	255 (63.75%)	0.068
>30 min	36	26	40	43	145 (36.25%)	
Q8. Do you carry your smartphone phone in bathroom/toilet?						
Yes	24	48	12	33	117 (29.25%)	0.00001**
No	76	52	88	67	283 (70.75%)	
Q9. Do you feel dependent on your smartphone?						
Yes	60	57	25	42	184 (46%)	0.00001**
No	40	43	75	58	216 (54%)	
Q10. Do you use the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, depression)?						
Yes	42	63	58	49	212 (53%)	0.015*
No	58	37	42	51	188 (47%)	

*p-value significant at <0.05, **p-value highly significant at <0.001

Table 3. Relationship of SAS with Depression, Anxiety & Stress in each study group.

Parameters	Medical	Dental	Nursing	Pharmacy	Overall
SAS VS DASS-D	0.188 (NS)	0.112 (NS)	0.161 (NS)	0.830 (NS)	0.736 (NS)
SAS VS DASS-A	0.017*	0.000178*	0.059 (NS)	0.871 (NS)	0.045*
SAS VS DASS-S	0.013*	0.00008*	0.000467*	0.0005*	0.0009*

*p-value significant at <0.05, NS-not significant

Table 4. Assessment based on NEO-FFI scale in most severe smartphone addicts from each group (n=10 in each group)

		Medical	Dental	Nursing	Pharmacy	p-value
Neuroticism	Low	2(20%)	2(20%)	0(0%)	0(0%)	0.892 (NS)
	Average	2(20%)	1(10%)	3(30%)	1(10%)	
	High	3(30%)	7(70%)	7(70%)	9(90%)	
	Very High	3(30%)	0(0%)	0(0%)	0(0%)	
Extraversion	Low	1(10%)	1(10%)	1(10%)	2(20%)	0.216 (NS)
	Average	9(90%)	8(80%)	9(90%)	8(80%)	
	High	0(0%)	1(10%)	0(0%)	0(0%)	
	Very High	0(0%)	0(0%)	0(0%)	0(0%)	
Openness	Low	1(10%)	3(30%)	1(10%)	2(20%)	0.365 (NS)
	Average	3(30%)	1(10%)	1(10%)	2(20%)	
	High	6(60%)	6(60%)	8(80%)	6(60%)	
	Very High	0(0%)	0(0%)	0(0%)	0(0%)	
Agreeableness	Low	10(100%)	9(90%)	9(90%)	8(80%)	0.892 (NS)
	Average	0(0%)	1(10%)	1(10%)	2(20%)	
	High	0(0%)	0(0%)	0(0%)	0(0%)	
	Very High	0(0%)	0(0%)	0(0%)	0(0%)	
Conscientiousness	Low	9 (90%)	9(90%)	8(80%)	9(90%)	0.194 (NS)
	Average	1(10%)	1(10%)	2(20%)	1(10%)	
	High	0(0%)	0(0%)	0(0%)	0(0%)	
	Very High	0(0%)	0(0%)	0(0%)	0(0%)	

NS-not significant

DISCUSSION

The present study is based on the concern that smartphone use is increasing in the undergraduate students of medical university due to necessity for academic goals, staying connected with friends and family, entertainment purposes as well as an escape when one feels low and distressed. However, such rampant use of smartphone in all domains of life has taken the current generation towards a grey zone with

apprehensions over screen use and the propensity to drive poor mental health as reflected from other studies also.^{6,7,8} Although the main concern is in the young population, there is some evidence that mental health problems are associated with overuse of smartphones and may even drive that behavior.

It was found that 42% of the students are addicted in all study groups, out of which 54.14% are males and 34.16% are females. Most of the addicted students

from all the groups belonged to the upper-middle class, while within a socio-economic class, maximum proportion of addicted individuals was found in middle class. It could be hypothesized that the affluent economic groups have access to better smartphone which tend to reinforce the high smartphone use.

Study by Chen et al⁹ established 29.8% of the study subjects to be smartphone addicted, among which proportion of males was 30.3% and 29.3% were females. The present study has found far more prevalence of smartphone addiction in medical students than those found by Chen et al⁴³. A specific symptom of smartphone addiction, nomophobia was found to be as prevalent as 57.29% in study by Sharma et al¹⁰ upon medical students, could be representative of high levels of smartphone addiction medical students as seen in the present study also.

Demirci et al⁶ in his study on 319 university students found that 39.8% of the users belonged to high smartphone use group, with increased association with disturbed sleep, anxiety and depression. Proportion of such high smartphone use group is comparable to the current study, and that it could be implied that smartphone use ubiquitous in all geographical regions and academic streams irrespectively. However, the prevalence of smartphone addiction among young people has been determined as 10.4% in a study from South Korea, which lies significantly below than what is being determined in the current study.¹¹ The higher prevalence in the present study compared with those in the literature may be due to factor that these studies were done 4-5 years back and now smartphone addiction has increased in these years.

On assessment using the semi-structured proforma, it was observed that maximum proportion of students in each study group were found to be using the smartphone daily for 2-4 hours. The use of smartphone to access social media as well as academic purposes by most number of students in each study group was up to 2 hours. The smartphone use for academic purposes by medical students in the study by Sharma et al¹⁰, was 3-6 hours/day, which could represent less emphasis on the use of information technology for teaching purposes at the research facility. While most of the subjects in the dental, nursing and pharmacy did not report any distress with the duration of smartphone use, most of the medical students were, on the contrary, very much distressed by the time spent on smartphone use. The medical students are under constant pressure of excessive academic burden, clinical postings and case presentations, can be considered to be more distressed with their smartphone use naturally. Overall, most of the users in all groups were not distressed by their time spent on smartphone.

The number of medical and dental students who accepted of checking their smartphones while going to sleep or during awakenings was quite significant, i.e. around two-third, while 87% of nursing students, who

are all females, refused doing so. This finding seems to be paradoxical as most of the addicted users tend to do so and most of the addicted users in the current study were found to be females. Most of the students in each study group were found to checking their smartphone within 30 minutes of getting up and approximately one-third of the students accepted carrying their smartphones to the bathroom, findings which corroborate the overall level of addiction in the study population. The number students feeling dependent on smartphone was quite comparable in dental and pharmacy groups but significantly different in medical and nursing groups. While 60% of medical students felt dependent, only 25% of nursing students had similar feelings. Most of the dental and nursing students used smartphone as a way of escaping from their problems or dysphoric mood, but same was not true for medical students, where maximum proportion of students denied such an escape with their smartphone. (Table 2)

SAS score of sample population was found to significantly correlated with the DAS-S score (i.e. for stress) in all the study groups individually as well as overall. Such significant correlation for anxiety score, i.e. DAS-A with SAS, was observed for medical, dental as well as overall study sample. DAS-D score (i.e. for depression) was not found to be significantly correlated with the SAS score in any of the study groups. Findings in the study by Kim et al⁸ support the observations of the current study, with sample showing positive association of depression, anxiety, stress and suicidal ideation with high addiction. The findings corroborate with that of Long et al¹² and Wang et al¹³ in research on undergraduate students in China. The addiction and psychological symptoms comprise vicious cycle with one leading to another, and various mechanism including that of catecholamine release under stress, increased expression of brain derived neurotrophic factor in various brain areas as well as past life events can be held responsible for contributing to the same.¹⁴

On the NEO-FFI scale, Neuroticism was found to be high in majority of dental, nursing as well as pharmacy students but not among medical students. Score for Extraversion was found to be average for majority of students in all the study groups. Most of the students in all the study groups were found to be having high score for Openness, but the score was low in case of Agreeableness and Conscientiousness for most subjects in each group. Overall, there was no significant difference in any of the domains of NEO-FFI between the study groups. Literature suggests that high Neuroticism and both low Conscientiousness and low Agreeableness to be positively associated with smartphone use disorder, while to be negatively correlated to Openness. The results in the present study support that of the literature with significant use of smartphone addiction as well as many pointers of a significant susceptible population.¹⁵

The comparative data for the study is given in table 5

S. No.	Review Study	Tools & Sample Size	Study Findings	Present Study
1.	Pattern of mobile phone usage Among medical students. Year:2019 Sharma et al ¹⁰	1642 nd year M,BBS students assessed for nomophobia to evaluate subjective symptoms because of mobile phone usage	The mean age of students 20.04 years. 57.29% of students were suffering from nomophobia, 26.82% of students were at risk of NMP. Nearly 58.53% of students had anxiety.	The age group of the sample population in the present study was 20.42 years. 42% of the students were addicted in all age groups.
2	.Association between psychological and self-assessed health status and smartphone overuse among Korean college students Year:2019 Kim et al ⁸	608 college students investigated by perceived psychological factors such as stress, depression symptoms and suicidal ideation.	Poor health was related with overuse of smartphones. Psychotic anxiety, stress, depression, and suicidal ideation showed significant associations with smartphone overuse.	Addiction was found to positively Correlated with the stress in all the study groups individually as well with anxiety.
3.	Personality association with Smart phone and internet use disorders: A comparative study links to impulsivity and social anxiety. Yur:2019. Peterka-Bonetta et al. ¹⁵	773 participants assessed with Internet Addiction Test and Interaction Anxiousness Scale(IAS)	Personality and IUD/SUD in the present associated to a large extent, with low Conscientiousness and high Neuroticism being mostly associated with higher IUD/SUD. Social anxiety and impulsivity showed positive correlations with IUD and SUD.	Neuroticism was found to be high in Majority of dental, nursing as well as pharmacy students but not among medical students. Extraversion was found to be average for majority of students, high score for Openness, but the score was low in case of Agreeableness and Conscientiousness for most subjects in each group.
4.	The association between problematic smartphone use, depression and anxiety symptom severity, and objectively measured smartphone use over one week. Year:2018 Rozgonjuk et al ¹⁶	301 college students assessed for self-reported levels of Problematic smartphone use, depression, anxiety, and daily depressive mood.	Daily depressive mood items did not predict objective smartphone use for the corresponding day. Average daily depressive mood over one week positively correlated with problematic smartphone use levels.	Depression was not found to be significantly correlated with the addiction score in any of the study groups
5.	Gender differences in factors associated with smartphone addiction :A cross-sectional study among medical college students. Year:2017 Chen et al ⁹	1441 undergraduate Medical Students of China. The Smart phone Addiction Scale short version(SAS-SV)	Addiction was 30.3% in males and 29.3% in females). Male used it for game apps, female used for multimedia applications, use of social networking services.	The subjects in medical and pharmacy were predominantly males, while in dental and nursing streams were females. 42% of the students are addicted in all study groups, out of which 54.14% are males and 34.16% are females
6.	Prevalence and correlates of problematic smartphone use in a large random sample of Chinese undergraduates. Year:2016 Long et al ¹²	1062 undergraduate assessed with Problematic Cellular Phone Use Questionnaire	Problematic use in 21.3%. The risk factors were, high monthly income from the family, serious emotional symptoms, high perceived stress, and perfectionism-related factors.	Most addicted students from all the Groups belonged to the upper- middle class, while within a socio- economic class, maximum proportion of addicted individuals was found in middle class. Affluent economic groups have access to better smart phone which tend to reinforce the high smartphone use.
7.	The role of stress and motivation In problematic	Sample of 600 typical smartphone users (Chinese college	Unresolved real-life problems facilitate problematic smart phone use.	Addiction was found to positively Correlated with the stress.

	smartphone use among college students. Year:2015 Wang et al ¹³	students)	suggesting that the resolution of these problems might be a good intervention for people excessively relying on smartphone.	
8.	Relationship of smartphone use severity with sleep quality, depression, and anxiety in university students Year:2015 Demirci et al ⁶	319 university students assessed with Pittsburgh Sleep Quality Index, Beck Depression Inventory, Beck Anxiety Inventory, Smartphone Addiction Scale.	39.8% of users were high smartphone users, young age and female gender have been positively associated with risk of smartphone addiction with increased association with disturbed sleep, anxiety and depression.	Addiction was found to be positively correlated with the stress in all the study groups individually as well with anxiety. Depression was not found to be significantly correlated with the addiction score in any of the study groups.

CONCLUSION

Psychiatrists need to be sensitized to the various issues of those afflicted with smartphone addiction, and must evaluate it and provide appropriate interventions for reducing their addiction level and thereby improving their quality of life. As smartphone addiction is still not recognized even as a problem behavior, future awareness programs and campaigns can be organized and studied.

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