

Smartphone Usage Practices, Preferences and its Perceived Effects in Medical Students at a Tertiary Care Medical College

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ABSTRACT

Background: Smartphone usage has increased over the past few years in both students, professionals and the common man. Owing to this a model of excessive smartphone and smartphone addiction has been developed. The aim of the study was to assess the amount and types of smartphone usage amongst medical students. **Methodology:** The setting was a tertiary care medical college and a cross sectional design was employed. The subjects were 145 undergraduate (UG) and post graduate (PG) students studying in a tertiary care medical college. They were divided into two groups UG and PG. They were administered a semi-structured proforma and the App Usage Tracker (AUT) and Whatsapp usage statistics (WUS) app was installed to assess their smartphone usage pattern. The study compared two groups and chi square test, Mann Whitney U test, odds ratio and Pearson's correlation was done using computerized statistical software. **Results:** There was no difference in data consumption and perceived time spent on smartphone between UG and PG groups. Undergraduates sent and received far greater messages than post graduates ($p=0.0385$ and $p=0.0004$). Participants who reported physical problems after smartphone use sent out significantly more number of messages on whatsapp over a period of 7 days ($p = 0.046$). Number of messages sent from whatsapp showed a significant positive correlation with number of messages received on whatsapp ($r = 0.729$, $p < 0.001$) and size of the media sent from whatsapp ($r = 0.338$, $p < 0.001$). Size of media sent from whatsapp correlated significantly with the number of messages received on whatsapp ($r = 0.561$, $p < 0.001$). **Conclusion:** Smartphone usage is an issue that needs to be looked at seriously amongst medical students and the emergence of problems related to smartphone usage in this population warrants further research.

Key words: Facebook, Medical Student, Post Graduate, Smartphone, Smartphone Usage, Whatsapp, Youtube.

INTRODUCTION

Smart-phones are powerful devices which combine the conventional functions of a mobile phone and advanced computing capabilities thereby helping users to access software applications (commonly termed 'apps').¹ Smartphones have also revolutionised medical care with applications like medical calculators, logbooks, medical reference tools, medical guidelines such as resuscitation algorithms and drug guidelines that help the busy doctor on the go.² Smartphones may also help in viewing a patients' radiological images and communicating with colleagues via groups and permit healthcare professionals to perform numerous tasks at the point of care.³

An extension of smartphone usage is clinical discussion groups based on mobile phone platforms such as WhatsApp which is similar to web-based forums, e-groups or Facebook groups. Uploading, downloading, saving and viewing images is much easier with WhatsApp.⁴ The disadvantages of the smartphone

use include more frequent interruptions throughout the day, reduced verbal communication, worsening of professional and personal relationships and unprofessional behaviour in some instances.⁵ It may also increase concerns regarding patient safety, quality of care, confidentiality of data and threats from cyber-attacks where this data may be lost or stolen forever.⁶ Smartphone usage has increased all over the world and more so in the medical fraternity – where one may use for both professional and personal use.⁷ There are studies worldwide that demonstrate the prevalence and occurrence of smartphone addiction which is a new age behavioural addiction leading to excessive smartphone use at the cost of one's personal, social and occupational life that may suffer.⁸ Excessive smartphone usage has also been linked to irritability and depression in youth.⁹ This simple exploratory study was aimed to study the smartphone usage pattern amongst medical students in a tertiary care medical college.

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HYPOTHESES

The objectives of this study are to 1) examine and compare smartphone usage (total time spent on smartphone in a 7 day period) between undergraduate and post-graduate students, 2) examine and compare time spent on different types of apps by the undergraduate and postgraduate students, 3) to examine whether smartphone usage or individual app usage is associated with any physical symptoms

Hypothesis 1: There will be impact of gender and designation on the individual's smartphone usage practices and preferences.

Hypothesis 2: There will be no impact of marital status on the individual's smartphone usage practices and preferences.

Hypothesis 3: Users with a higher smartphone usage will report more physical, emotional and psychosocial adverse effects.

METHODOLOGY

Study was conducted after approval from the Institutional Ethics Committee at a tertiary care municipal teaching hospital in Mumbai, Maharashtra. A total of 145 undergraduate and post-graduate students (72 male, 73 female), who were using an android smartphone at the time of assessment and volunteered to participate in the study, were recruited in the study. This group consisted of 89 undergraduate students and 56 post graduate medical students. Participation in the study entailed a written informed consent after being explained the aims and objective of the study as well as consent to installing the usage tracker app and resetting of their whatsapp usage statistics.

Measurement tools used in the study–Semi- structured proforma

This consisted of a 3 part questionnaire. The questionnaire was face validated by 5 experienced psychiatrists, with experience of ≥ 10 years in clinical research. The first part of the questionnaire evaluated the demographic data and professional status of the informant. The second part addressed the patterns of smartphone usage. It included the smartphone type and reason for changing to a new smartphone. The final part of the questionnaire assessed the perceived effects after smartphone use.

Mobile applications

The following mobile phone applications were part of the study –

- **App Usage Tracker (AUT)** – AUT is a free app, available on google play store for android smartphones. It can be downloaded and used without any fees or permission. It keeps a track of the duration spent by the user on every app and systems on the smartphone. The duration is recorded in minutes and seconds and is accurate to a second. AUT does not keep a track of any personal communication or media exchange, nor does it share the tracked data without the user's permission.
- **Whatsapp Usage Statistics (WUS):** The Whatsapp app on android smartphones has a feature called Whatsapp Usage Statistics. It can be accessed from the settings menu. It keeps a count of all the messages and media exchanged on whatsapp by the user. It does not store or archive or share any personal data. This statistic can be reset, by clicking on a button, after which all the counts are reset to zero and the app starts counting the messages and media exchanged from this point onwards. Resetting the WUS does not delete any messages or media or chats on whatsapp.

Both the apps above would track the smartphone usage of participants over a week post start of the study. Institutional ethics committee approval for the study was obtained. Study participants, after a written informed consent were first assessed on the 3-part questionnaire.

App Usage Tracker (AUT) was installed on the participants' smartphone from google play store. Participants were assured that the AUT would not keep track of any personal communications or media and would not share the tracked information on any social media. Once the participants were convinced then the tracker app was installed and tracking was switched on. Resetting the WUS followed this step. The procedure was demonstrated to the participants on the investigators' smartphones and was performed on the participants' smartphones once they consented. The participants were instructed to use their smartphones in a routine manner as they did before. They were asked not to switch off the AUT or reset the WUS again. Participants were contacted again on 7th day after installing the AUT and resetting the WUS at the same time as on day 1. The readings from both (AUT and WUS) were recorded at the end of 7 days. A Sunday was included in the 7 day period to judge a proper weekly pattern and not just a work week. At the end of the study period, the participants were advised to stop or uninstall the tracker app.

Statistical Analysis

The study sample consisted of both undergraduate and post-graduate students and a few assistant professors with clinical experience of less than 4 years post their degree. For ease of statistical analysis, they were included in the post-graduate group. Outcome variables consisted of quantitative variables like, 1) time spent on various apps in minutes, 2) data consumed in a 7-day period in MB, 3) number of messages and size of media exchanged on whatsapp in a 7-day period and qualitative variables like 1) perceived effects of excessive smartphone usage as a dichotomous variable. Time spent on each individual app was compared with unpaired test and Mann Whitney U test. Spearman's correlation was used to study the association between app usage statistics. Qualitative variables such as, perceived effects of smartphone usage and repetitive smartphone usage were analysed with Chi-squared test. The entire statistical analysis was done using computerised statistical software.

RESULTS

Basic findings regarding smartphone usage

It was interesting to note that members in both the post graduate and undergraduate student groups had a median of 2 smartphones per person. The groups did not differ significantly in terms of internet expenses per month and the number of hours of smartphone usage per day (Table 1). The smartphone app used for longest duration in the 7 day period for the entire sample was Whatsapp (Median [IQR]; 300[294]), followed by Facebook (Median [IQR]; 43[150]) and games (Median [IQR]; 15[96.50]). There was no impact of age, gender, designation or marital status on duration of use of Whatsapp, Facebook, YouTube or mobile games. Messages and media exchanged on whatsapp did not differ significantly across age, gender and designation (Table 2). The unmarried members of the sample sent and received significantly greater messages than those married and they also spent far greater time playing games on their phone. When undergraduate and post graduate students were compared here too undergraduates sent and received far greater messages than post graduates ($p=0.0385$ and $p=0.0004$ respectively). Undergraduate students also spent a significantly greater amount of time on YouTube ($p=0.0383$) (Table 3).

Perceived consequences in both the groups

One or more physical complaints were reported by 63% of the study participants after smartphone use (Table 4). Those who reported having to check their smartphones repeatedly for missed conversations perceived physical consequences significantly more frequently. Participants who reported physical problems after smartphone use sent out significantly more number of messages on whatsapp over a period of 7 days ($p = 0.046$).

Table 1: Smartphone usage patterns in both the groups

Parameter	Undergraduate students (n=89)	Postgraduate students (n=56)	Statistics
Number of phones (Median)	2	2	U = -1.233 ^{NS}
Monthly expenditure on Internet services in Rupees (Median)	200	199.5	U = -1.310 ^{NS}
Perceived use of smartphone in hours (Median)	3.00	4.00	U = -1.226 ^{NS}
Keeping net pack online during the night (%)	39	47	X ² = 0.985 ^{NS}
Constantly checking the phone for missed conversations (%)	76	60	X ² = 3.908 ^{NS}
Checking mobile phone immediately on waking up (%)	70	74	X ² = 0.348 ^{NS}
Tried to cut down use but failed (%)	65	40	X ² = 9.495 ^{NS}

* significant (p < 0.05), NS – not significant
X² = Chi Square test and U = Mann Whitney U test

Table 2: Whatsapp Usage Statistics (WUS) in the entire sample

Parameters	Males (n=72)	Females (n=73)	Statistical analysis (Z Score)	Unmarried (n=117)	Married (n=28)	Statistical analysis (Z score)
	N = 145			N = 145		
Median number of messages sent (MS)	157	277	- 1.572 ^{NS}	212	200	- 1.856 ^{NS}
Median number of messages received (MR)	895	948	- 0.148 ^{NS}	1003	667	- 2.454* (p=0.1417)
Median size of the media sent (Med S) in MB	0.544	0.461	- 0.002 ^{NS}	0.461	0.562	- 0.040 ^{NS}
Median size of the media received (Med R) in MB	12.65	10.10	- 1.222 ^{NS}	10.50	19.00	- 0.959 ^{NS}
Total time spent using Whatsapp (TW) ^a	177	180	- 0.601 ^{NS}	180	167.5	- 0.105 ^{NS}
Total time spent using Facebook (TF) ^a	23	17	- 1.381 ^{NS}	19	18.5	- 0.030 ^{NS}
Total time spent playing Games (TG) ^a	17.5	42	- 1.387 ^{NS}	34	13.5	- 1.982* (p=0.0474)
Total time spent using the web browser (TB) ^a	20	23	- 1.017 ^{NS}	20	27.5	- 1.084 ^{NS}
Total time spent using Youtube (TY) ^a	9	15	- 0.953 ^{NS}	19	7.5	- 1.838 ^{NS}

^adata in minutes, NS – not significant, * significant (p < 0.05)

Table 3: Whatsapp usage statistics in the study groups

Parameter	Undergraduate students (N = 89)	Post graduate (N = 56)	Statistical analysis	
			Z score	p value
Median number of messages sent (MS)	230	159	- 2.070	0.0385*
Median number of messages received (MR)	1312.5	667	- 3.519	0.0004*
Median size of the media sent (Med S) in MB	0.490	0.558	- 0.282	NS
Median size of the media received (Med R) in MB	9.70	16.40	- 1.328	NS
Total time spent using Whatsapp (TW) ^a	180	177	- 0.0110	NS
Total time spent using Facebook (TF) ^a	19	20	- 0.255	NS
Total time spent playing Games (TG) ^a	34.5	20	- 1.470	NS
Total time using web browser (TB) ^a	14.5	23	- 1.854	NS
Total time spent using Youtube (TY) ^a	19.5	9	- 2.071	0.0383*

^adata in minutes, NS – not significant, * significant (p < 0.05)

Table 4: Perceived consequences of smartphone usage in the study sample across designations

Perceived effect of smartphone use	Total N = 145 UG (N = 89) PG (N = 56)		Odds ratio (95% CI)
	Group	N (%)	
Affected family time	UG	26 (29.0)	2.076 (0.890 – 4.845) ^{NS}
	PG	9 (16.0)	
Affected work	UG	23 (24.0)	2.803 (1.052 – 7.403) *
	PG	6 (11.0)	
Affected social commitments	UG	9 (10.0)	0.907 (0.304 – 2.705) ^{NS}
	PG	6 (11.0)	
Affected communication and relationships	UG	21 (23.33)	1.370 (0.590 – 3.177) ^{NS}
	PG	10 (18.0)	
Affected recreational interests and activities	UG	20 (22.22)	2.322 (0.873 – 6.234) ^{NS}
	PG	6 (11.0)	
Addictive	UG	43 (48.0)	0.686 (0.229 – 2.057) ^{NS}
	PG	22 (23.33)	
Light headedness	UG	30(33.3)	1.219 (0.588 – 2.525) *
	PG	16(28.8)	
Wrist-pain	UG	34(38.0)	2.176 (1.009 – 4.693) *
	PG	12 (22)	
Tiredness	UG	45 (50.0)	2.438 (1.194 – 4.976) *
	PG	16 (28.8)	
Blurred/strained vision	UG	20 (22.22)	1.024 (0.455 – 2.302) *
	PG	12 (22.00)	
Headache	UG	16 (18.0)	0.865 (0.368 – 2.301) ^{NS}
	PG	11 (20.0)	
Disturbed/altered sleep	UG	43 (48.0)	2.230 (1.092 – 4.554) *
	PG	16 (28.8)	

*significant ($p < 0.05$), NS – not significant. Odds ratios are calculated by converting perceived effects and designations in dichotomous variables and cross-tabulations.

Significantly more number of undergraduate students reported perceiving light headedness, blurring of vision, wrist pain, tiredness and sleep disturbances after repeated smartphone use. 62% of the participants reported negative impact of smartphone use on one or more domains of socio-occupational function. Participants who reported socio-occupational consequences after smartphone use had received significantly more number of messages on whatsapp over a period of 7 days ($p = 0.033$). 44% participants believed smartphone to be addictive, however the presence of this belief did not affect the duration of use of multiple apps on smartphone or message/media exchange on whatsapp.

DISCUSSION

The study findings in the present research is in keeping with the literature on patterns of smartphone use in terms of time spent on Whatsapp and Facebook as well as the daily usage of smartphone in hours.¹⁰ Patterns and preferences of smartphone usage did not differ across professional status as well as gender in this study. Whatsapp, due to its easy and consumer friendly interface was the most used app in this study sample, a finding in other studies as well.¹⁰ The key finding in the study was regarding the perceived and actual time spent and messages exchanged on smartphone and social networking apps. We observed that

the UG and PG groups were comparable in their usage of Whatsapp, Facebook, Games and YouTube on their smartphones. The UG group did exchange significantly more messages on whatsapp than PG's. With this exception, Whatsapp usage statistics (WUS) did not differ across age, gender, marital status, professional status and designation. It did not differ despite the presence of physical problems and the detrimental effect on work and family time or perceived addictive nature of smartphone use. It was observed that time spent on whatsapp did not correlate significantly with the message and media exchanged on whatsapp. It can be concluded that, users spent time on whatsapp even when they are not involved in an active conversation. This could be attributed to the no logout option on whatsapp and the lack of a notification system on whatsapp which informs the users about a newly joined member, or newly changed profile picture or status.¹¹ Users who were aware about this and had tried to curb their smartphone use spent significantly less time on whatsapp, but exchanged comparable (non-significantly different) amount of messages and media on Whatsapp. Time spent on whatsapp correlated positively with time spent on web browsers. This could happen as Whatsapp brings a large number of information and media on to your smartphone, in forms of jokes, trivia information, puzzles and forwarded messages. Thus, it is natural for a user to open his browser and find an appropriate media to reply the incoming message.

Physical problems with smartphone use have been attributed to the radiation from phones to change in posture to type and read, to the glare coming from a bright screen, and to constant wear and tear of wrist musculature.¹¹ Participants in the study reported various physical complaints noticed after smartphone use. Users, who reported physical problems, had sent significantly more messages on whatsapp during study duration. It was expected since, sending a message requires more attention, dexterity, movements of wrist and thumb than just receiving and reading a message. This result is consistent with the observations in another study on physical consequences of smartphone use.¹²

Smartphone use was also found to affect socio-occupational domains of life. Participants who had received more number of messages on whatsapp reported this effect. This study supports the past research in reporting that excessive use of smartphone and social media services to affect work and academic performance detrimentally.¹³⁻¹⁴ Recently, studies have explored the addictive nature of smartphone and other social networking apps.¹⁵ We explored three such compulsive behaviour patterns frequently seen with social networking viz. keeping the phone online throughout the night, frequently checking the smartphone for missed conversations, likes or messages and checking the smartphone and social network immediately after waking up. These behaviours were observed in the study sample, and were found to be associated with a higher reporting of physical consequences after smartphone use. Literature has demonstrated such addictive and compulsive behaviours in context to smartphone use.¹⁶ A new, conceptual model for smartphone addiction has been developed recently.¹⁷ Such behavioural addictions have been linked to shyness, mood swings, loneliness and stress.¹⁸ It is fair to assume that smartphone use needs to be further explored for its possible addictive potential. This needs to be monitored in medical students as well due to the high smartphone usage.

The strength of the current study is that it objectively measures the pattern of smartphone usage and the attitude towards smartphones in general. The limitations of the study were that it was conducted in a circumscribed group and the findings cannot be generalized. Many psychiatric and medical illnesses such as stress, depression, thyroid illnesses, and migraine can present with some of the symptoms reported by the participants. Effect of these confounding variables was not considered in this study. We therefore selected a study population with similar academic demands, work schedules and lifestyle to counter this limitation. Due to non-compatibility of the app with the I-Phone, users of that phone could not be included in the study. Future research should seek to identify personality and other neuro-behavioural predictors of problematic smartphone use. Objectives measures in the form of apps such as AUT and WUS have a vital role to play in exploring the dynamic interaction between social networks, smartphones and human behaviour.

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Nil

CONFLICT OF INTEREST

Nil

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