

## Relationship between Smartphone Addiction Severity and Depression among College Students

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### ABSTRACT

**Background:** The main of this study was to determine the smartphone usage pattern and the relationship between smartphone addiction severity and depression. **Methods:** This descriptive cross-sectional study was carried out in the college campus of Amar Jyoti Rehabilitation Center, Delhi over a duration of six months. Data collection was done using a self-administered questionnaire containing PHQ-9 Scale and SAS-SV Scale which was analyzed using IBM SPSS Version 25. **Results:** Among 300 study participants the majority of them 53.3% were from urban locality. Mean time spent on the smartphone was found to be 3.20 hours with a standard deviation of 1.76 hours. Smartphone usage was highest during midnight hours. Social networking 53.3% was the most common cause for smartphone use. The major depressive disorder was present in the study population. The Pearson correlation between the Smartphone addiction severity, depression and gender was found to be strong and significant. **Conclusion:** In conclusion, the smartphone addiction has not been studied well in India and its impact is underestimated as compared to other addiction's. Hence, more focus should be put on research and prevention strategies related to smartphone addiction.

**Keywords:** *Smartphone Addiction, Mobile Phone Addiction, Problematic Smartphone Use, Depression, Smartphone Usage Pattern*

According to Telecom Regulatory Authority of India (TRAI), there are 1,186.84 Million total wireless subscribers in India (TRIA, 2014). Smartphones have not only replaced cell-phones but to a certain extent, they have also replaced personal computers and a multitude of other devices. Their large screen size and inherent mobility allow for a plethora of functions to be accessed anytime and anywhere. The hardware and software of smartphones are dramatically improving and various applications are being developed and available to suit our lifestyle. This change is beyond our imagination. With a smartphone, a person can make calls, send e-mails, watch and share photos and videos, play video games and music, keep track of appointments and contacts, surf the Internet, use voice search, check news and weather, use chat applications for voice calls and texting (e.g., Whatsapp) and interact on social networks (e.g., Facebook) (Samaha & Hawi, 2016). The key differences between smartphones and previous mobile phones are full-featured Internet access and easy

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installation of new applications through modern OS platforms and app store as a result, many people in this modern society are extremely interested in acquiring a smartphone. Hence, smartphones are now considered handheld computers rather than traditional phones (Zheng & Ni, 2006). Smartphones are becoming an integral part of the lives of all ages worldwide. People feel inseparable from their smartphones (Lepp, Li, Barkley, & Salehi-Esfahani, 2015). Problematic mobile phone use (PMPU) is a phenomenon related to maladaptive mobile phone use, which could present a pattern of dependency involving negative consequences (e.g., using the mobile phone excessively during daily activities ignoring consequences or harm, being unable to maintain concentration in a task or in an interpersonal relationship due to the need to check mobile phone notifications constantly) (Ahn, Wijaya, & Esmero, 2014; Bian & Leung, 2015; Chiu, 2014; Rozgonjuk, Rosenvald, Janno, & Täht, 2016). Problematic smartphone use could be included in the behavior addiction category when the following components of addiction are taken into consideration: 1) the individual is preoccupied with a specific behavior (smartphone use); 2) the behavior is used in order to escape reality or create a feeling of euphoria; 3) as the behavior is continued, tolerance develops; 4) when the behavior is abstained or interfered with, withdrawal symptoms occur (feeling anxious, depressed, or irritable); 5) as a consequence of the continuous behavior, interpersonal problems occur; and 6) individual experiences relapse against one's will (Choi et al., 2014). Smartphone addiction can be defined as a state of being locked up to smartphone and its facility (Yildiz, 2017). Other publications have defined smartphone addiction as the uncontrollable and excessive use of a smartphone, the presence of withdrawal symptoms when control is attempted, and continuous use of a smartphone despite awareness of the consequences (Mok et al., 2014; Wu, Cheung, Ku, & Hung, 2013).

Fortunately, the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) addressed this behavior when it introduced a non-substance addiction (Internet gaming disorder) as a psychiatric diagnosis (American Psychiatric Association: Diagnostic and statistical manual of mental disorders (5th ed.), 2013; Pontes & Griffiths, 2015). This addition to the DSM-5 gives hope to researchers who have been conducting studies on non-substance addiction, an area that is expanding to encompass not only Internet gaming disorder but all types of digital addictions. One of the reasons for this unexpected popularity of smartphones is that it makes people's lives more convenient. However, this may also pose many risks for such dependence over a gadget. According to the study related to the development of smartphone addiction scale, smartphones also caused symptoms of addiction similar to the effects of the internet including craving, withdrawal, tolerance, daily-life disturbance, and preference of cyberspace-oriented relationship, which were confirmed through the diagnosis (Kwon, Kim, Cho, & Yang, 2013). An epidemiological study revealed that people who use mobile phones excessively were more likely to experience health problems (e.g. headache, fatigue, impaired concentration, insomnia, and hearing problems). It was also reported that some dimensions of personality such as low self-esteem, extraversion, higher approval motivation, and higher self-monitoring were more frequently seen in people who suffer from mobile phone addiction (Bianchi & Phillips, 2005). Nevertheless, studies so far have shown that compulsive use of smartphone may lead to psychological disorders (Samaha & Hawi, 2016). Adverse results caused by the overuse of smartphones can be easily seen in today's society. For example, pedestrians viewing smartphone videos when crossing the street, without checking the traffic signal, are in danger of getting hit by cars; fumbling with one's smartphone while driving may cause car accidents; and elementary-school-aged children are highly likely to be addicted to smartphone games as well as to Internet video games (Infocomm Development Authority, 2015). There is also a strong evidence on the adverse effect of smartphone addiction on academic performance. A survey conducted among university students found

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out that undergraduate students who were at a high risk of smartphone addiction were less likely to achieve cumulative GPAs of distinction or higher (Hawi & Samaha, 2016). According to a meta-analysis on assessment of Smartphone Addiction in Indian Adolescents and concluded that Smartphone addiction among Indian teens cannot only damage interpersonal skills but also it can lead to significant negative health risks and harmful psychological effects on Indian adolescents (Davey & Davey, 2014). This 'smartphone addiction' recently has become an important issue in our society. However, research investigating smartphone use and how it is affecting people's lives is still at a very early stage. So only a few studies have been conducted in India related to smartphone addiction, the other studies are focused on the Problematic internet use (PIU) hence limited data is available in case of Indian scenario which the current study aimed to generate.

### *Objectives of this study were*

1. To find out the correlation between the smartphone addiction and gender.
2. To find out the correlation between the smartphone addiction and individuals with depression.
3. To find out the smartphone usage pattern among the study participants.

## **METHODOLOGY**

This Descriptive cross-sectional study was carried out on the college campus of Amar Jyoti Rehabilitation Center, Delhi over duration of six months from October 2017 to March 2018 with the main aim to assess smartphone usage pattern and the relationship between smartphone addiction severity and depression among college students. A total 300 study participants were enrolled in this study who agreed to participate after explaining about the study to them and taking their written consent. Those whose age was below than 18 years were excluded and those who were not willing to participate and didn't use smartphone from the past three months were excluded from the study. Data collection was done using a self-administered questionnaire containing PHQ-9 Scale and SAS-SV Scale which was analyzed using IBM SPSS (Version 25.0. Armonk, NY: IBM Corp).

### *Ethical considerations*

The author adhered to all the ethical guidelines including the Indian Council of Medical Research ethical guidelines for research on human participants (Mathur, 2017).

## **RESULTS**

The reliability (Cronbach's Alpha) of smartphone addiction scale-short version (SAS-SV) was found to be 0.859. In this study equal quantity of both genders were enrolled that is 150 to ensure the normal distribution of study population. On studying the age distribution of study population the mean age of the study participants was found to be 24 and the maximum number of study participants up to 53.3 % falls under the age group of 23-26. Only 6.7% of study participants were found to be in the age group of 31-35. The majority of the study participants were from urban locality up to 53.3% and 46.7% were from the rural locality. Details of socio-demographic characteristics of the study population are shown in Table 1.

**Table 1: Socio-demographic characteristics of the study population**

Variables	Frequency (n=300)	Percentage (%)
<b>Gender</b>		
Male	150	50.0
Female	150	50.0

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Variables	Frequency (n=300)	Percentage (%)
<b>Age (In years)</b>		
18-22	70	23.3
23-26	160	53.3
27-30	50	16.7
31-35	20	6.7
<b>Locality</b>		
Rural	140	46.7
Urban	160	53.3

The cross-tabulation between the gender and smartphone addiction severity shown that the females were more addicted to the smartphone in terms of severity as compared to their male counterparts which is shown in Table 2.

**Table 2: Smartphone addiction severity and Gender cross-tabulation**

Count	Gender		Total	
	Male	Female		
Smartphone Addiction Severity	1-20 (Mild Addiction)	80	40	120
	21-40 (Moderate Addiction)	30	50	80
	41-60 (Severe Addiction)	40	60	100
<b>Total</b>	<b>150</b>	<b>150</b>	<b>300</b>	

On studying the response regarding daily exercise a majority of study participants up to 70% didn't exercise on a daily basis. Only 30% of them agreed that they exercise on a daily basis. There was no history of depression among the majority of study participants, only 20% of the study population had a history of depression. Details are shown in Table 3 below.

**Table 3: Depression history and Exercise response of study population**

Variables	Frequency (n=300)	Percentage (%)
<b>Exercise Response</b>		
Yes	90	30
No	210	70
<b>Depression History</b>		
Yes	60	20
No	240	80

On studying the smartphone usage pattern of study population it was found that the majority of the study population up to 26.7 % spent at least 3 hours on the smartphone daily. Mean of time spent on smartphone was found to be 3.20 hours with the standard deviation of 1.76 hours. The maximum time which is 6 hours and more than 7 hours on the smartphone was spent by only handful of study participants was 6.7 % respectively. On analyzing the when did the study participants most often used their smartphones it was found that most of them 56.7 % used smartphone during night hours followed by 43% in day hours. The purpose of using the smartphone by the majority of study participants was found to be social networking which was up to 53.3% followed by gaming 26.7%, browsing 13.3% and other purposes 6.7 %. Details of smartphone usage pattern among study population are shown in Table 4 below.

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**Table 4: Smartphone usage pattern**

Variables	Frequency (n=300)	Percentage (%)
<b>Time ( In hours)</b>		
1 hour	50	16.7
2 hours	70	23.3
3 hours	80	26.7
4 hours	30	10.0
5 hours	30	10.0
6 hours	20	6.7
More than 7 hours	20	6.7
<b>Smartphone usage duration pattern</b>		
In day hours	130	43.3
In night hours	170	56.7
<b>Purpose of using smartphone</b>		
Gaming	80	26.7
Social Networking	160	53.3
Browsing	40	13.3
Others	20	6.7

On analyzing the smartphone addiction severity among the study population by using smartphone addiction scale-short version (SAS-SV) it was found that the smartphone addiction among the majority of study population 40% was mild followed by severe addiction in 33.3% and moderate in 26.7% among the study participants. Details of Smartphone Addiction Severity among study population are shown in Table 5 below.

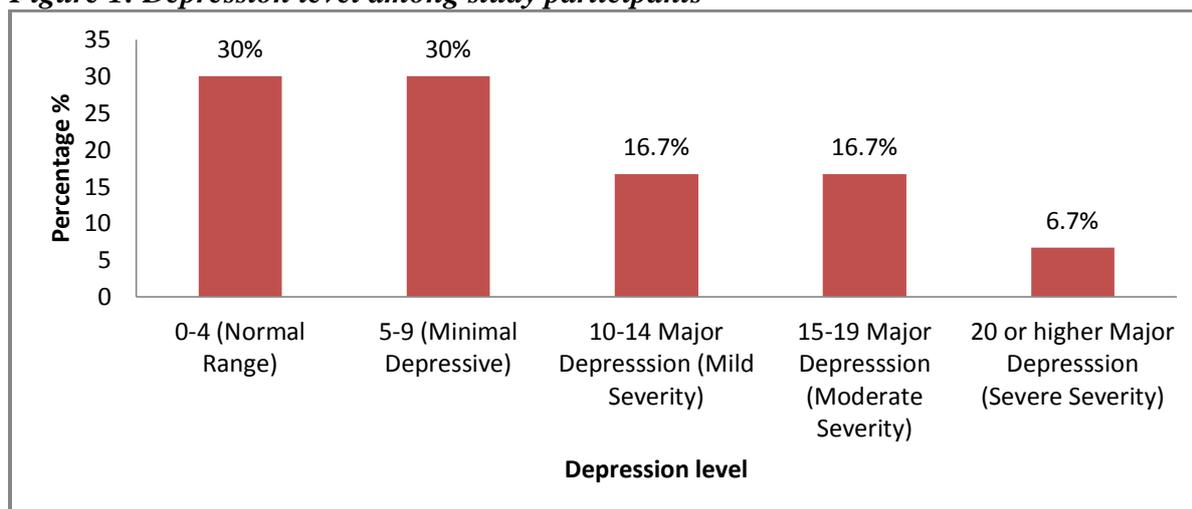
**Table 5: Smartphone Addiction Severity among study population**

Smartphone Addiction Severity among study population	Frequency	Percentage (%)
1-20 (Mild Addiction)	120	40.0
21-40 (Moderate Addiction)	80	26.7
41-60 (Severe Addiction)	100	33.3
<b>Total</b>	<b>30</b>	<b>100.0</b>

The depression level among the study participants analyzed using Patient Health Questionnaire-9 (PHQ-9). The Depression level among the majority of individuals was found to be within normal range and minimal depression i.e. up to 30% respectively in both cases. Details of depression level among study population are shown in Figure 1 below.

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**Figure 1: Depression level among study participants**



The Pearson correlation between the Smartphone addiction severity and Depression was found to be strong  $r = 0.834$  at 95% Confidence Interval and significant ( $p < 0.01$ ) and it was also found to be strong between Smartphone addiction severity and Gender  $r = 0.234$  at 95% Confidence Interval and significant ( $p < 0.01$ ). Paired samples t-test between them was also found significant. Details are shown in Table 6.

**Table 6: Paired samples t-test**

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
<b>Pair 1</b>	Depression - Smartphone Addiction Severity	.46667	.71922	.04152	.38495	.54838	11.238	299	.000
<b>Pair 2</b>	Gender - Smartphone Addiction Severity	-.43333	.88402	.05104	-.53377	-.33289	-8.490	299	.000

## DISCUSSION

The Smartphone addiction scale (SAS) was developed by (Kwon, Kim, et al., 2013). The SAS has a six-factor structure, and each item is scored on a six-point Likert-type scale. The internal consistency value (Cronbach's alpha) of the scale is 0.96, and no cut-off scores were indicated in the original scale. Its shorter version is known as smartphone addiction scale-short version (SAS-SV) which was developed and validated by (Kwon, Kim, et al., 2013). The scale covers the following six addictive symptoms based on substance dependence and pathological gambling disorders proposed in DSM-IV (Association, 1994) these are a loss of control, disruption of family or schooling, disregard for consequences, withdrawal, preoccupation, and tolerance. Each item is associated with an addictive symptom, except four item clusters: items 1 and 8 (both assessing "loss of control"), items 2 and 10 ("disruptions"), items 3 and 7 ("disregard for consequences") and items 4 and 5 ("withdrawal"). The reliability was reported to be 0.911, while in our study reliability (Cronbach's Alpha) was

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found to be 0.859 which is closely related and proves its reliability as well as its validity which was also previously validated in other studies (Lopez-Fernandez, 2017).

The majority of study participants 53.3 % were found to be 23-26 years age group which is quite different as reported in other studies (Choi et al., 2015; Lopez-Fernandez, 2017) as they found the majority of study population belonged to 19-20 years. The cross-tabulation between the gender and smartphone addiction severity shown that the females were more addicted to smartphone in terms of severity as compared to their male counterparts while is similar to other studies (Akin, Altundağ, Turan, & Akin, 2014; Chen et al., 2017; Demirci, Orhan, Demirdas, Akpınar, & Sert, 2014; Im, 2013; D. Kim, Lee, Lee, Nam, & Chung, 2014; Kwon, Lee, et al., 2013; Kwon, Kim, et al., 2013; Lopez-Fernandez, 2017). A large number of study participants were from urban locality 53.3% however 46.7% were from rural locality the major reason behind this close gap can be the easy accessibility to smartphones at cheaper price as compared to price at least 10 years ago because of technological advanced and high demand and young age can also be a factor here. On studying the response regarding daily exercise a majority of study participants up to 70% didn't exercise on daily basis similar findings were reported in a conducted in South Korea. Participants with smartphone addiction were less likely to walk for each day (S.-E. Kim, Kim, & Jee, 2015).

A large number of the study population that is up to 26.7 % spent at least 3 hours on smartphone daily followed by 2 hours (23.3 %). Mean of time spent on smartphone was found to be 3.20 with standard deviation of 1.76. A study conducted in South Korea reported similar result (Im, 2013). The purpose of using the smartphone by majority of study participants was found to be social networking which is up to 53.3% followed by gaming 26.7%, browsing 13.3% similar findings were reported in other studies (Ahn et al., 2014; Choi et al., 2014, 2015; Haug et al., 2015; Herrero, Urueña, Torres, & Hidalgo, 2017; Im, 2013; Lee, Ahn, Choi, & Choi, 2014; Lopez-Fernandez, 2017).

On analyzing the when did the study participants most often used their smartphones it was found that majority of study population up to 56.7 % uses smart phone in night hours followed by 43% in day hours. (Ahn et al., 2014) conducted a study on usage pattern analysis and concluded that the social networking, gaming, browsing are the most used by the smartphone addicts and midnight hours use of the smartphone was higher as compared to other hours during the day. The smartphone addiction severity among study population using of smartphone addiction scale-short version (SAS-SV) was found to be mild in majority 40% of the study population followed by severe addiction in 33.3% and moderate in 26.7% among the study participants this show that the smartphone addiction cannot be underestimated as compared other addiction should be taken more seriously because it can affect not just the academic performances but also family relationships (Hawi & Samaha, 2016; Herrero et al., 2017).

There was no history of depression among the majority of study participants that is up to 80% and only 20% of the study population had the history of depression. Depression level among the majority of individuals was found to be within normal range and minimal depression that is up to 30% respectively in both cases. Followed by major depression with mild 16.7, moderate 16.7 and severe severity 6.7 among the study participants. The depression level among the study participants was analyzed using Patient Health Questionnaire-9 (PHQ-9). On analyzing the Pearson correlation between the Smartphone addiction severity and Depression was found to be strong 0.834 at 95% Confidence Interval and significant ( $p < 0.01$ ) similar results regarding correlation among smartphone addiction and depression were

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reported in various studies (Bian & Leung, 2015; Demirci, Akgönül, & Akpınar, 2015; Enez Darcin et al., 2016; Herrero et al., 2017; S. M. Kim, Huh, Cho, Kwon, & Choi, 2014).

### *Limitations of study*

1. The study might be vulnerable to confounding factors because of very complex nature and interdependence between other variables.
2. There might be the presence of social acceptability bias which can be affecting accurate response results of this study.

## CONCLUSION

The smartphone addiction was more prevalent in males, however based on addiction severity it was more prevalent in females. The mean age of the study was found to be 24 years. Addiction was more in urban participants. Mean time spent on the smartphone was found to be 3.20 hours with standard deviation of 1.76 hours with 2-3 hours were spent on the smartphone by a majority of the population. Smartphone usage was highest during midnight hours. Social networking was the most common cause for smartphone use. There was no depression history in the majority of the study population. Smartphone addiction severity was found to be mild in the majority of the population. The major depressive disorder was present in the study population. There was a strong and significant correlation between smartphone addiction severity, depression, and gender. In conclusion, the smartphone addiction has not been studied well in India and its impact is underestimated as compared to other addiction's. Hence, more focus should be put on research and prevention strategies related to smartphone addiction.

**Direction for future research:** The future studies should focus on following points:

1. Conducting the multi-centric study on a large sample size focusing on the assessment of smartphone use and indicators of smartphone addiction.
2. Including clinical interviews and subsequent analyses of the diagnostic ability of the German version of the SAS- SV to correctly detect smartphone addiction symptoms.
3. Assess a comprehensive set of personality, health- and substance use-related characteristics.
4. Include objectively recorded data on smartphone use (e.g. obtained via a smartphone application).
5. Assess the effect of smartphone addiction on family relationships.

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***Conflict of Interest***

The authors carefully declare this paper to bear not conflict of interests

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