

## Development and validation of the smartphone use scale

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### ABSTRACT

The aim of this study was to develop a self-administering scale that could measure smartphone use. In addition, the reliability and validity of the Smartphone Use Scale (SUS) was demonstrated. A set of 30 questions pertaining to smartphone use were developed with the help of experts. A total of 372 participants were selected to accomplish a set of questionnaires – Smartphone Use Scale (SUS) and Smartphone Addiction Scale (SAS) (Kwon, Lee, Won, Park, & Min, 2013). The sample comprised 182 males and 190 females, with ages ranging from 16 to 22. Internal-consistency test and correlation analysis were conducted to verify the reliability and validity of SUS. Reliability and concurrent validity of the test were computed. Cronbach's alpha was found to be 0.712. Concurrent validity using the SAS was found to be 0.76. The study shows that 13.72% males and 14.28% females fall under the “high smartphone use” category, 63.72% males and 63.47% females were found to be under the “average smartphone use category, and 22.54% males and 21.73% females were found to be under the “low smartphone use” category.

**Keywords:** *Smartphone use scale*

A smartphone (or smart phone) is a mobile phone which combines the features of a personal computer with a mobile phone, typically having internet access through with third-party mobile applications may be downloaded. The operating software of a smartphone is advance and can be updated from time to time. The downloadable third-party “apps” makes a smartphone a multi-purpose gadget as compared to a feature phone. Through smartphones one can use social networking sites, read and send emails, use messenger services, take notes, pay bills, make reservations, and perform a host of other activities. These facilities provided by a smartphone have led to a surge in the popularity of the gadget. According to Llamas (2015) “the worldwide smartphone market will reach a total of 1.5 billion units shipped in 2015, up 11.9% from the 1.3 billion smartphone units shipped in 2014... By 2019, total smartphone shipment volumes will reach 2.0 billion smartphone units...”. India is catching up to this worldwide trend. According to Cisco's Visual Networking Index (VNI) global mobile data traffic forecast for 2014 to 2019 "In India, the number of smartphones grew 54% during 2014, reaching 140 million in number and the number of smartphones will grow 4.7-fold between 2014 and 2019, reaching 651 million in number." Smartphones are available in many price ranges, but are definitely more

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expensive than feature phones. However, according to a survey by Nielsen India, 50% of those 40 million smartphones are with people under the age of 25. Regarding the usage of smartphones, a study by Nielsen Informat Mobile Insights (Smartphone Incidence Study, 2013), found that on an average, Indian smartphone users spend 2 hours and 30 minutes with smartphones and 72% of that time goes into gaming, entertainment, and Internet. Traditional voice calls and text messaging take a mere 28% of the time. Younger Indians prefer to spend most of their time browsing the internet on their smartphones with little time spent for SMS. Casual browsing of the phone like searching for contacts and setting alarms take 30 minutes of the time for 15-24 year olds.

The smartphone has many functions that are viewed as essential in today's world. In such a setting, it is very difficult to distinguish between smartphone use and smartphone over-use. Smartphone over-use, or problematic smartphone use can thus be determined using the same yardsticks that are used to measure abuse of other addictive objects or substances. When smartphone use reaches a level where it starts interfering and hampering personal and occupational functioning, it may be categorised as over-use.

The criteria for substance abuse as per DSM-IV-TR (APA 2000):

1. recurrent use leading to failure to fulfil major obligations
2. recurrent use which is physically hazardous
3. recurrent legal problems related to use
4. continued use despite social or interpersonal problems
5. The symptoms have never met the criteria for dependence

The criteria for Other (or unknown) Substance Use Disorder as per DSM-5 (APA 2013):

1. The substance is often taken in larger amounts or over a longer period than was intended.
2. There is a persistent desire or unsuccessful efforts to cut down or control use of the substance.
3. A great deal of time is spent in activities necessary to obtain the substance, use the substance, or recover from its effects.
4. Craving. Or a strong desire or urge to use the substance.
5. Recurrent use of the substance resulting in a failure to fulfill major role obligations at work, school, or home.
6. Continued use of the substance despite having persistent or recurrent social or interpersonal problems caused or exacerbated by the effects of its use.
7. Important social, occupational, or recreational activities are given up or reduced because of use of the substance.
8. Recurrent use of the substance in situations in which it is physically hazardous.
9. Use of the substance is continued despite knowledge of having a persistent or recurrent physical or psychological problem that is likely to have been caused or exacerbated by the substance.

The people who have problematic smartphone use have many signs in common with the criteria for Substance Use Disorder (Brewer, Elwafi, & Davis, 2013):

1. Texting while driving
2. Facing problems at work or in relationships due to excessive phone usage
3. Extreme anxiety when separated from their smartphones
4. Using the smartphone for a longer duration than intended
5. Having a strong desire to use the smartphone when it is not supposed to be used.
6. Feeling phantom vibrations - the feeling that the phone is vibrating, when it is not.

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Indians are catching up with their western counterparts in terms of smartphone ownership and use, warranting research about the patterns and effects of smartphone use among them to predict and prevent addiction and overuse.

### *Sample*

182 males and 190 females (age= 16-22 years), from Kolkata, belonging to the High Income Group families (income above Rs. 40,000 p.m.) served as samples for the present study. Participants of the study belonged to nuclear families, had internet connection at their own residence, and minimum duration of smartphone ownership was 6 months. Students from broken homes and those staying away from home were excluded from the study.

### *Tools*

- 1. Information schedule:** An information schedule seeking personal, familial, and smartphone usage information was used for data collection.
- 2. Smartphone use scale:** The scale comprises 30 statements and follows a 5-point Likert format (ranging from 1-5), measuring smartphone use along the dimensions of (a) smartphone use and interpersonal relationships, (b) smartphone as a precious possession, (c) smartphone as a companion, (d) smartphone as a tool for evasion, (e) smartphone as an instrument of multiple utility. : The scale is self-administering in nature with the instructions printed on the data sheet. There is no time limit for completion. The respondents' scores have a possible range of 30-150.
- 3. Smartphone addiction scale:** This scale was developed in 2013 by Kwon M, Lee J-Y, Won W-Y, Park J-W, Min J-A. The SAS consists of 48 questions and is grouped into six subscales, all weighted equally on a 6-point scale. The six subscales' scores are summed up to yield a total SAS score with a 48–288 range, where a higher score indicates more serious smartphone addiction. It has a reliability of 0.976 (Cronbach's Alpha).

### *Procedure*

The aim of the present study is to develop a scale to measure smartphone use, and to test the reliability and validity of the scale. This scale was prepared by developing statements related to various aspects of smartphone use, such as duration of use per day, reaction upon not having the smartphone in possession, circumstances under which the smartphone is used most, etc. 40 statements were shortlisted for relevance rating by experts, following which a final list comprising 30 statements were chosen for the data sheet to be filled by participants of the study. The scale follows a 5-point Likert format (ranging from 1-5). The statements were divided along five dimensions - smartphone use and interpersonal relationships, smartphone as a precious possession, smartphone as a companion, smartphone as a tool for evasion, smartphone as an instrument of multiple utility.

Data was collected from 200 males and 200 females of the age group 16-22. After rejecting incomplete data sheets and those that did not meet the inclusion criteria, a final 372 (182 males and 190 females) data were selected. Reliability was measured by computing Cronbach's Alpha. For validity of the scale, the Smartphone Addiction Scale (Kwon M, Lee J-Y, Won W-Y, Park J-W, Min J-A., 2013) was administered to the same participants, and their scores on the SAS and SUS were correlated.

**RESULTS AND DISCUSSION***Table 1 Mean and Standard Deviation of scores obtained by males and females on the Smartphone Use Scale*

Mean	S. D
92.69	92.46
14.43	14.56

*Table 2 Value of Cronbach's Alpha for the Smartphone Use Scale*

Cronbach's Alpha	Number of Items
0.712	30

*Table 3 Mean and Standard Deviation of scores obtained on the Smartphone Use Scale (SUS) and the Smartphone Addiction Scale (SAS)*

	Mean	S. D	N
SUS	92.5668	14.46472	372
SAS	100.8157	12.15041	372

*Table 4 Correlation value between scores obtained on the Smartphone Use Scale (SUS) and the Smartphone Addiction Scale (SAS)*

		SUS	SAS
SUS	Pearson Correlation	1	.763**
	Sig. (2-tailed)		.000
SAS	Pearson Correlation	.763**	1
	Sig. (2-tailed)	.000	
	N	372	372
8	Attachment to peers	100.8827	11.76816

The present study found that, 13.72% males, and 14.78% females fall under the category of High Smartphone Use. The mean score for males was found to be 92.69, and the mean score for females was found to be 92.46. Both these mean scores lie above the median score, which is 90. Overall mean of the Smartphone Use Scale was found to be 92.56, which is also above the median score. Overall standard deviation was found to be 14.46. On the basis of mean scores for males and females, norms of the Smartphone Use Scale are:

- Males: mean= 92.7; standard deviation= 14.4
- 108-150= high smartphone use
- 78-107= average smartphone use
- 77-30= low smartphone use
- Females: mean= 92.4; standard deviation= 14.6
- 108-150= high smartphone use
- 78-107= average smartphone use
- 77-30= low smartphone use

Internal consistency of the Smartphone Use Scale was measured using Cronbach's Alpha which was found to be 0.712, which indicates reasonably good reliability. Correlation between the Smartphone Addiction Scale and the Smartphone Use Scale was found to be 0.763, which indicated reasonably good validity of the SUS.

**CONCLUSION**

The aim of the present study was to develop a scale to measure smartphone use among residents of Kolkata aged 16-22 years. The Smartphone Use Scale was found to have a

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reliability of 0.712 and a validity of 0.763. This scale is self-administering and may be used to identify teenagers and young adults with problematic smartphone use, so that they may be prevented from becoming addicted or may be helped detach themselves from the device. With growing use of the smartphone among high school and college students, this scale may be beneficial for parents, school and college counsellors, and students themselves, who feel their smartphone use is problematic.

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### **Conflict of Interest**

The author declared no conflict of interest.

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### SUS

NAME:

AGE:

EDUCATION:

SMARTPHONE MODEL USED:

INSTRUCTIONS: THE QUESTIONNAIRE CONSISTS OF 30 QUESTIONS WITH 5 ALTERNATIVE ANSWERS – “ALWAYS”, “FREQUENTLY”, “SOMETIMES”, “RARELY”, “NEVER”. PLEASE RESPOND TO THE QUESTIONS ACCORDING TO HOW TRUE THEY ARE FOR YOU. EACH POSSIBLE RESPONSE IS ASSIGNED A NUMBER. PLEASE FILL IN THE APPLICABLE NUMBER NEXT TO THE RESPECTIVE STATEMENT, WITHOUT LEAVING OUT ANY. YOUR RESPONSES WILL BE KEPT CONFIDENTIAL.

ALWAYS- 5

FREQUENTLY- 4

SOMETIMES- 3

RARELY- 2

NEVER- 1

	STATEMENTS	RESPONSE				
		1	2	3	4	5
1.	I fiddle with my smartphone without realising.					
2.	I do not try to use my smartphone in places where it is prohibited.					
3.	My fingers often feel sore due to texting.					
4.	I use my smartphone for more than 10 hours each day.					
5.	My friends and family have commented on my excessive phone usage.					
6.	I feel nervous when my smartphone is not with me.					
7.	I keep my smartphone with me when I study.					
8.	I take my smartphone with me to the toilet.					
9.	My ideal gift to receive would be a higher model of a smartphone.					
10.	I sleep with my smartphone switched on next to me.					
11.	I avoid going to places where I can't use my smartphone.					
12.	I put my phone on silent or vibration mode when I am supposed to switch it off.					
13.	My smartphone is my constant companion.					
14.	I have had accidents while using my smartphone.					
15.	I use my smartphone to avoid people I am uncomfortable around.					
16.	I am completely dependent on my smartphone.					
17.	I do not use my smartphone when I am with friends or family.					
18.	My smartphone is my most important possession.					
19.	I don't feel lonely when my smartphone is with me.					
20.	I feel more comfortable talking over the phone than face to face.					
21.	I reach for my phone first thing in the morning.					
22.	I use the internet from my smartphone even when I have access to a computer.					
23.	I spend a major part of my pocket-money on my smartphone every month.					
24.	I can concentrate better when my smartphone is not with me.					
25.	I go through old messages and photos on my smartphone when I am bored.					
26.	I keep checking my phone for notifications.					
27.	I find my phone cumbersome to carry around.					
28.	I use my smartphone as an escape from my problems.					
29.	I feel more comfortable talking face to face than texting.					
30.	It is difficult to imagine everyday life without my smartphone.					