

**How to Cite:**

Husaini, F., & Imtiaz, N. (2022). Psychometric properties of smart-phone addiction scale. *International Journal of Health Sciences*, 6(S4), 11820–11827.  
<https://doi.org/10.53730/ijhs.v6nS4.11407>

## Psychometric properties of smart-phone addiction scale

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**Abstract**---The study was conducted in order to standardise the smart-phone addiction scale on Indian population. The work was conducted on N = 258 undergraduate students to examine the psychometric properties i.e., reliability and validity of the scale for measuring smart-phone addiction among generation Z. Cronbach's alpha of the scale was computed and was found to be 0.89 and the construct validity was obtained highly satisfying. Exploratory factor analysis was carried out and four (4) factors emerged in the analysis. In summing up, all factors explained 60.594% of the total variance which confirms the good construct validity. Further. Inter-factorial correlations among sub dimensions of smart-phone addiction were found highly significant. It can be concluded that the present work state good reliability and validity of smart-phone addiction scale. After required statistical analysis the scale is found to be highly standardised.

**Keywords**---smart-phone addiction, reliability, validity.

**Introduction**

Technology was built to make people's life easy but all inventions will only remain good until it is not being used excessively as excess of everything is bad. Smart-phone helped people in many ways but somehow use of smart-phone is now crossing the boundary of optimum use and entering into an area where this would damage life and society and become one of the major reasons for many illnesses in adolescents. Research has proved that 43% of the young adults are obese because they use smart-phone while they eat their food and 66% of the population use smart-phone as a status symbol (Milijic, 2019). Journal of Cognitive psychology stated that the constant and excessive use of smart-phone

diminishes the ability of person to understand and interpret the deeper meaning of information and 2 out of 3 people are experiencing the nomophobia that is, fear of losing or being without their smart-phones resulting in addiction. Smart-phone addiction is just like other behavioural or drug addiction, such as cocaine, marijuana, alcohol or gambling, it impairs person's cognitive ability, manipulates thoughts and actions, and makes them want or develop cravings for the substance, hence, the person feel the compulsion to use substance or to act. Similarly, a smart-phone addict will refuse to leave the smart-phone, use it all the time, remain in virtual world, and inflict various unhealthy behaviours. People using smart-phones are not always addicted to it but there are various factors which contribute to the unnerving condition. It is found that there are certain types of personality factors which are more vulnerable to addiction than others and not just the person themselves but other external and internal factors such as quality of life and adjustment also fills up the puzzle of addiction.

The most affected population is the young adults of the world from the age of 18 to 29, which makes it more important for us to get deeper in the respective concern. This is the age where almost everyone tries to identify their capabilities at work and at personal level and with the impaired understanding and interpretations, generation Z is going downhill. Increased cases of depression, suicide, narcissism, severe stalking, school dropouts, declining academic performance and poor adjustment has taken toll on society. According to statistics the people around the world invest \$28.25 billion on their smart-phones irrespective of their financial conditions and cries (Milijic, 2019). The excessive use is the reason behind the virtual identities, low self-esteem, cyber crimes and other problems. Venkataraghavan (2015) conducted a study on mobile phone use and cyber bullying and stated that mobile phone is the most used medium for cyber bullying and the most prevalent form of bullying was abusive language, hurtful mean messages and scandalizing images. People prefer to be engaged with their online acquaintances than real people around them and believe on affirmations or likes or being followed online than feeling comfortable around people. The recent studies shows that people do not feel comfortable anymore to initiate or participate in face to face conversations (Casey, 2012), also cyber crime have increased over time with the increased use of various apps available online and people have started living an insta or virtual life than the real one and doesn't feel loved, which is alarming.

In today's time there are 5 billion people who own smart-phone and this number is increasing rapidly. According to the statistics, 4.39 billion that is 72% of the population use smart-phone solely for the purpose of searching web instead of laptop or desktop and the number is expected to reach 7.33 billion by 2023 (Milijic, 2019). Technology is great but it is advancing too fast and is taking over the lives of people. It is portable, user friendly, full of options, comfortable and almost everything is just a click away. So it is basically a solutions for most of the problem at one side but on the other side it is also responsible for various other issues in human lives and cause many ill effects and damage many things. The smart-phone has become the most integral and intimate part of our lives, so much that 51% of the population divine in their smart-phone every few minutes resulting in 150 times a day on average, 87% of the population check their smart-phones before going to bed and 69% of them use it within the five minutes of

waking up. This smart device has not affected the life of one particular age group but has taken control over all, especially the generation Z. According to UN's International Telecommunications Union (ITU) there are more smart-phones than people on earth, because many of the individuals own more than one. On an average, 56% of children between the ages of 8-12 get their first smart-phone and the population falling under the age group of 18-29 has 100% ownership of smart-phone and 79% of them can't be without their devices for more than an hour.

Deshpande (2015) reviewed the empirical research available on impact of mobile phone addiction on physical and mental health among youth. The researcher discussed findings of studies stating the problems associated with mobile addiction, like financial issues, poor social skills, relationship issues, car accidents, job loss, academic difficulties, low self-esteem, physical health issues like nervous system disorder and adverse proactive effects, and mental health issues like sadness, restlessness, insomnia, and anxiety. Thus, highlighting the ill effects of smart-phone addiction among youth (Lavanya and Rajandran, 2017).

The research findings of a study conducted by kim and kang (2016) entitled as "The Effects of Young Children's Smartphone Use Experience on their Parents' Perceptions and Needs and their Self-Regulation" concluded that the minimum age of children to use smart-phone starts from 2 years old, especially when both parents are working. Parents encourage children to use smart-phone and expect them to self-regulate their emotions but results on hand shows vice-versa, children at this age are too young and using smart-phone further hamper the development of emotional and cognitive ability of children. The researchers used survey method to collect data, to analyse the general characteristics of the data independent t-test and one way ANOVA was used, whereas to evaluate the effects multiple regression was used with the help of SPSS. The findings of the study suggest 11.2% explanatory power for demerits of use of smart-phone and for emotional control the findings shows 4% variance. The smart-phone addiction scale was developed by Kwon M, Kim DJ, Cho H, Yang S (2013) on the Korean population. Therefore, the researcher felt the need to develop the scale which can be suitable for the Indian population.

## **Method**

### **Sample**

The sample of the study comprises of N=258 undergraduate students from various departments of the Aligarh Muslim University, Aligarh (U.P.), India. The age of the respondents ranged from 20 to 25 years with the mean age of 21.58 years.

### **Development of the Scale**

At first, the objectives and the relevance of developing the scale for smart-phone addiction were explained to the experts from the field of psychology. In the initial phase a pool of 30 items were formulated with 5 point Likert responses viz., strongly agree, agree, neutral, disagree, and strongly disagree. The scale was

administered on sample and the data was collected. The analysis was started with inter-correlation matrix which was applied to examine multi-collinearity and singularity of items of the scale, 'Determinant' of R-matrix was estimated and was found to be greater than 0.00001. Sample adequacy was assured through Kaiser-Meyer-Olkin (KMO) test i.e., .920 which is greater than 0.50. On the basis of the analysis 14 items were eliminated and the final scale comprises of remaining 16 items and four dimensions extracted through Exploratory Factor Analysis along with Principle Component Analysis extraction and Varimax rotation methods.

### Operational Definition

**Smart-Phone Addiction:** The lack of control to use the smart-phone despite adverse effects including financial, psychological, physical, and social harmful consequences on users (Moattari, 2017).

**Overuse:** Use of smart-phone for nearly everything despite of the harmful symptoms and facts.

**Disturbance:** Use of smart-phone results in disturbances in daily life and routine. For example, late night use of smart-phone leading to disturbed sleep, delayed work, and physical health problem like headache, neck pain and texting claws.

**Cyber-Orientation:** Preferring online friends, information, and communication instead of offline people, facts, and conversations.

**Anticipation:** Anticipating text, calls, and updates might result in mood swings, sadness, irritation, and frustration.

**Dimensions:** The distribution of the items under each dimension is given in the table 1.

Table1: Dimensions of smart-phone addiction and the items number comprised in each dimension

No	Dimensions	Items	Total No. of items
1	Overuse	1,2,3,11	4
2	Disturbance	4,5,6,12,15,16	6
3	Cyber-orientation	7,8,9	3
4	Anticipation	10,13,14	3
		Total No. of items	16

### Scoring system

The score of the scale was calculated as per the scoring system in table. The responses of the items were added to generate dimension-wise scores and summing all 16 items to generate overall smart-phone addiction score. Thus, the minimum possible score is 16 and maximum happens to be 80. The higher score indicates no addiction and the low scores points at addiction and its severity.

Table2: Scoring System

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	2	3	4	5

Instructions for Administration: Instructions for the scale highlighted few of the important ethics of the psychology i.e.,

- a. The responses will be kept confidential.
- b. There are no right and wrong answers.
- c. All the items are mandatory to respond.
- d. There is no time limit but individual must complete it in feasible time.
- e. Item must be responded genuinely for better results.
- f. The scale can be administered on individuals as well as groups of students.

### Reliability

The essential element of the standardisation is reliability and validity which determine the quality of tool or scale. Professionals and practitioners put forward the concern of how important it is for a scale to be reliable over time and is within the given context. For establishing the internal consistency reliability, Cronbach's Alpha was estimated and is highlighted in Table 3A and 3B.

Table 3A

Descriptive statistics for items					Descriptive statistics for Scale			
Item No	Range	Mean	Std. Deviation	Variance	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SAS1	4	2.42	.986	.971	44.96	122.998	.342	.890
SAS2	4	2.53	1.099	1.207	44.85	116.760	.568	.883
SAS3	4	2.87	1.146	1.312	44.51	114.561	.635	.880
SAS4	4	2.68	1.145	1.312	44.69	116.065	.570	.883
SAS5	4	2.95	1.182	1.397	44.42	114.431	.617	.881
SAS6	4	3.29	1.285	1.651	44.09	114.832	.543	.884
SAS7	4	2.40	1.064	1.131	44.97	118.552	.508	.885
SAS8	4	2.70	1.173	1.376	44.67	119.000	.432	.888
SAS9	4	3.01	1.137	1.292	44.37	115.190	.613	.881
SAS10	4	3.17	1.247	1.556	44.21	115.927	.520	.885
SAS11	4	2.25	1.008	1.016	45.13	120.058	.470	.886
SAS12	4	3.63	1.240	1.539	43.74	114.259	.590	.882
SAS13	4	3.21	1.315	1.728	44.17	115.521	.502	.886
SAS14	4	3.39	1.221	1.491	43.99	115.895	.535	.884
SAS15	4	3.24	1.151	1.324	44.14	115.174	.605	.881
SAS16	4	3.64	1.209	1.461	43.74	112.786	.670	.879

Table 3B  
Descriptive Statistics of Scale and Reliability (Cronbach's Alpha)

Mean	Variance	Std. Deviation	Cronbach's Alpha	N of Items
47.38	131.446	11.465	.890	16

## Validity

There are various methods to establish construct validity of the tool. Hence, quite a few of them are having limitations as role of time and existence of subjectivity in subject's responses. To overcome these limitations, Exploratory Factor Analysis with Varimax rotation was used to establish the construct/factorial validity of the tool. After using the Exploratory Factor Analysis, four factors emerged. The percent of variance accounted by factors varies from 22.52% to 11.04%. In total, all four factors explained 60.59% of the total variance. The construct/factorial validity of the scale is highly satisfactory.

Table 4: Shows descriptive statistics and inter-correlations among dimensions of the scale

Dimensions	Descriptive Statistics				A	Inter-correlation				
	Range	Mean	Std. Deviation	Variance		X1	X2	X3	X4	X5
Overall SAS (X1)	34	40.34	7.678	58.951	.890	1				
Over use (x2)	10	8.64	2.344	5.492	.720	.750	1			
Disturbance (x3)	21	16.45	4.121	16.980	.827	.906	.552	1		
Cyber-orientation (x4)	9	6.90	2.044	4.180	.672	.717	.360	.603	1	
Anticipation (X5)	12	8.36	2.572	6.613	.708	.612	.366	.394	.251	1

Table 5  
Shows Construct/Factorial Validity along with factor loadings, percent of variance and cumulative percent of variance for each dimension

Items	Factors			
	1	2	3	4
1	.778 } .633 } .564 } .598 } Overuse			
2				
3				
11				
4		.712 } .678 } .532 } .620 } .624 } .670 } Disturbance		
5				
6				
12				
15				
16				
7			.647 } .743 } .500 } Cyber - Orientation	
8				
9				
10				.727 } .715 } .684 } Anticipation
13				
14				
PCT of variance	22.520	14.689	12.342	11.043

Cum. Variance	22.520	37.209	49.551	60.594
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## Conclusion

Smart-phone Addiction Scale provides measure of four empirically derived dimensions. Reliability, validity, and stability of the data were based on responses from 258 undergraduate students of Aligarh Muslim University, Aligarh (U.P.), India. The analysis of the data shows that smart-phone addiction scale has quite satisfactory psychometric characteristics. Inter-factorial correlations indicate that all the factors are significantly correlated with each other and measure the respective construct which confirms inter-factorial validity of the scale. Thus, the results of the study shows that the smart-phone addition scale can be used for assessment and research work on paper or through google forms.

## Implications

The study presents sufficient background to measure the smart-phone addiction of students at undergraduate and post-graduate level in Indian culture, although it can be used freely on other cultures as well. After studying the above construct, it can be suggested that four factors proposed cover the smart-phone addiction satisfactorily.

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