

# A Cross-Sectional Study on Smart-Phone Addiction among Late Adolescents and Young Adults (Aged 15 to 24 Years) of Ahmedabad City, Gujarat, India

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## ABSTRACT

### BACKGROUND

Smartphone use has gone tremendously up throughout the world during the past decade and addiction potential is well documented among the users. Smartphone addiction among adolescents and young adults should be seen with caution as they lay the foundations not only for their healthy lives but also of the country's future and its economy, they live in.

### METHODS

Both school and college students aged between 15 - 24 years were enrolled in this cross sectional study, using systematic random sampling technique to determine smartphone addiction potential through Smartphone Addiction Scale (SAS). The possible factors contributing to SAS scores were also determined through statistical tests (Chi-square test, Kruskal-Wallis H test and Mann Whitney U test).

### RESULTS

Among a total of 239 respondents of age 15 to 24 years (mean age  $18.5 \pm 2.35$  years), there were 124 (51.9 %) females and 231 (96.7 %) belonged to the urban area. Most of the participants were studying in high school (40.6 %) followed by medical field (40.2 %). A total of 110 (46 %), students had used their smartphone commonly for social media purpose, followed by entertainment purpose (29.3 %), education (36 %), web surfing (20 %). The median daily usage of smartphone was found to be 4 hours among participants. The mean score of SAS was found to be  $103.59 \pm 25.08$ . There was statistically significant difference in SAS score according to age group, according to their smartphone usage per day, according to common purpose of usage of smartphone and also according to their streams, and monthly expenses the student spends to recharge their smartphone.

### CONCLUSIONS

Smartphone addiction potential was determined according to various social and demographic characteristics. Factors causing smartphone addiction should be tackled by multiple stakeholders to reduce the chances of addiction due to smartphone and to protect them from future health consequences.

### KEYWORDS

Adolescent, Smartphone Addiction, Smartphone Addiction Scale, Young Adults

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## BACKGROUND

Smart-phones have and will eventually become an integral part of one's life, starting from late childhood to old age as it offers variety of applications not only for communication purposes but also for information, education and entertainment at their fingertips.<sup>1</sup> Not only smartphone usage which has gone up tremendously around the globe, but also the lower age limit has also gone significantly down. For example, the prevalence of smartphone usage shoots up from 53 % at the age of 11 to 80 % by the age 14 in the United States.<sup>2</sup> India is no exception in terms of increasing smartphone usage over the years. There were at least 142.3 million new smartphones shipped in the year 2018, a healthy 18 million units more than in the year 2017.<sup>3</sup> Studies conducted in India have recognised addictive behaviours due to smartphone usage among young adults of the country.<sup>4,5</sup>

Overuse of smart-phone leads to many physical (neck pain, accidents) as well as mental (sleep disturbance, depression) health issues among their users.<sup>6,7</sup> Apart from physical-mental health problems, overuse of smartphone has also led to poor academic performance, reduced social interactions as well as diminished interpersonal relationships.<sup>8,9</sup> This in particular applies to school going adolescents as well as college going young adults, as they are in their crucial phase of lives from physical, mental, social as well as intellectual point of views. Symptoms like anxiety and discomfort in absence of smartphone are shaping up rapidly depending upon the onset and duration of smartphone usage among Indian adolescents and young adults.<sup>10</sup> The potential advantages through the use of smartphone like online classes, e-books, tutorials and knowledge sharing are often overshadowed by their misuse-overuse and their related social and health consequences by and large due to lack of maturity to control over the usage.

The term "addiction" is used to describe more of behavioural addiction when it comes to smartphone use.<sup>11</sup> Addiction to smartphone usually leads to cognitive and behavioural symptoms which include progressive loss of controlling tolerance and withdrawal symptoms, which are quite similar to substance-related addiction.<sup>12</sup> According to the Diagnostic and Statistical Manual of Mental Disorders fifth edition criteria, symptoms related to smart phone addiction are mostly related as "Internet Gaming Disorder". Additionally, the research of behavioural symptoms associated with smartphone addiction is often overlapped by terms like Internet addiction or gambling disorders, which per se are different entities.<sup>11</sup>

In India, the studies have mainly been focused on the patterns of smartphone usage, rather than the addictive potential and psychological impacts among college students in particular.<sup>13</sup> Furthermore, they may depict only one aspect among many (e.g., social networking, shopping, gambling); each of which may require individual assessment. There is need to analyse smartphone usage patterns to justify smartphone addiction as a separate heading. Knowledge about risk factors as well as protective factors is very much needed to understand the concept of smartphone addiction.<sup>14</sup> The patterns, risk factors and behaviours related

to smartphone, if not identified and considered now, would emerge as huge public health problem in India as well around the globe.<sup>15,16,17</sup> This study aims to find smartphone addiction potential along the lines of currently defined strategies, using a modified version of the Smartphone Addiction Scale (SAS).<sup>18</sup> The objective of the study was to recognise and compare potential factors through smartphone addiction scores of the respondents.

## METHODS

A cross sectional study was conducted among participants aged between 15 to 24 years of school and college students of both urban and rural backgrounds. The only exclusion criteria were the students who were suffering from behavioural disorders or mental diseases. As the previous research have shown a prevalence of smart-phone addiction of ranges from 8 % to 48 % the average prevalence was taken as 28 % (P),<sup>13,18,19</sup> and considering that a population size (finite = N) of about 1000, confidence limit of 5 % (95 % CI) and design effect (DEFF) of 1, the sample size calculated as per Epi Info software, the sample size (n) comes out to be 239 using the formula  $n = [DEFF * Np(1 - p)] / [(d^2 / Z^2_{1-\alpha/2} * (N - 1) + p * (1 - p)]$ .<sup>20</sup> The field practice area of the medical institute formed the sampling frame for schools / colleges. The samples were drawn from the selected schools and colleges according to probability proportional to size. The samples (students) within each stream were selected on the bases of systematic random sampling technique.

A self-administered questionnaire – Smartphone Addiction Scale (SAS)<sup>18</sup> was used to investigate the presence of symptoms akin to addiction. The questionnaire was translated in local language and then was back translated to maintain the content validity of the questions. Institutional ethical approval was obtained before the start of the survey. This questionnaire was administered as pen and paper-based method for school and college students as well as online forms for other participants. The data collection was supervised by the investigators as well the staff from the respective school / college during September to November 2019. The selected student participants were informed about the purpose and the likely questions beforehand, with assurance that no personally identifiable information would be collected or used. A pre-test was carried out to know the feasibility of the questionnaire. If more than 20 % of the data were missing from a reply, then the assessment was discarded.

The data was entered either manually or automatically using online forms depending on the form of data collection. Collected data were analysed and patterns identified to link smart-phone usage and addiction. For each item, participants expressed their opinion on a 6-point scale ranging from 1 (strongly disagree) to 6 (strongly agree).

## Statistical Analysis

For analysis, methods like descriptive analysis, proportions and statistical tests of significance like chi-square test,

Kruskal-Wallis H test, Mann Whitney U test were used to derive at the prevalence as well as factors of smart-phone addiction among the respondents.

**RESULTS**

There were 239 students enrolled in this study of age 15 years to 24 years. Mean age of participants was 18.5 (± 2.35) years. Total of 124 (51.9 %) females and 115 (48.1 %) males participated in the study. Majority (96.7 %) of them belonged to the urban area. Most of the participants were studying in medical field (40.2 %) or high school (40.6 %) followed by in engineering stream, architecture, commerce, arts etc. Majority, 228 students (95 %) have both parents and only 1 student did not have any parent. (Table 1)

As depicted in Table 2, the smartphone used by majority of students (82.4 %) was that of their own. A total of 110 (46 %) students had used their smartphone commonly for "social media". "Entertainment" was found as 2<sup>nd</sup> most common purpose for using smartphone (N = 70, 29.3 %) followed by different purposes like "education" (15.1 %), "web surfing" (8.4 %) etc. The mean years of starting smartphone usage was 3.99 ± 2.94 years. More than half (67.4 %) of the students started using smartphone between 2 to 5 years from the survey. There were 5.9 % of students who started using smartphone for more than 10 years at the time of survey. The median daily usage of smartphone was 4 hours among the participants. One third (N = 73, 25.1 %) of the students had been using smartphone for less than 2 hours in a day. The median expense of recharge was found Rs. 199 (one hundred ninety-nine rupees) in the study. More than two third (N = 158, 66.1 %) of the students spent less than 200 rupees for monthly recharge of smart phones.

The mean score of SAS was found to be (mean) 103.59 ± (SD) 25.08 (median = 103, range = 5 2.84 - 153.16). Maximum score was found to be 171 and 32 was found as minimum SAS score among students. In Table 3, "Mann Whitney U" statistical tests indicated that the SAS score difference between boys (median = 124.1) and girls (median = 116.2) was not found statistically different (P > 0.05). The SAS score difference was also not found statistically significant according to their residential areas (P > 0.05).

As shown in Table 4, There was a statistically significant [Type I error Type I error (α) was set at 0.05] difference found in SAS score between students from different age groups (the Kruskal-Wallis H test, H2 = 998, P value = 0.019). The median SAS score was increasing as age of students was increasing. There was no statistical difference found among students who have both or single or no parent. The SAS scores between students of different streams were found statistically significant at P value of 0.01. Statistically significant difference was also found in the SAS scores among students who either have their own smartphone or have to share their smartphone with parent and siblings (H2 = 22.8, P value < 0.001). There was statistically significant difference between SAS scores among students and their smartphone usage per day (H2 = 28.16, P value < 0.001)

as well as to their commonest purpose for using smartphone (H2 = 14.88, P value = 0.005). However, there was no statistical significance between SAS scores and the duration of smartphone usage among the respondents. The SAS score difference was found statistically significant among students on monthly expenses. (H2 = 11.99, P value = 0.007).

The Table 5 shows the median scores achieved by the cumulative responses of the enrolled students of the study for questions got 4 plus scores, whereas the Likert scale defines 1 as never to 6 as always. It can be seen that most of the students agreed that they used their smart phones more than intended. However, they did not agree to the sentence that their lives would be empty without smart phones.

	Variable	Frequency	Percentages
Age	15 - 16 Years	62	25.9
	17 - 18 Years	51	21.3
	19 - 20 Years	59	24.7
	≥ 21 Years	67	28.0
Gender	Male	115	48.1
	Female	124	51.9
	Residence		
	Urban	231	96.7
	Rural	8	3.3
Field of study	School	97	40.6
	Medicine	96	40.2
	Engineering	32	13.4
	Commerce	6	2.5
	Others	8	3.3
Type of parenting (current)	Both parents	228	95.4
	Single parent	10	4.2
	No-parents	1	0.4

**Table 1. Distribution of Demographic Characteristics among Study Participants (N = 239)**

	Variable	Frequency	Percentages
Whose smartphone was used	Own	197	82.4
	Shared with parents	38	15.9
	Shared with siblings	4	1.7
Most common purpose of using smartphone	Social media	110	46
	Entertainment	70	29.3
	Education	36	15.1
	Web surfing	20	8.4
	Other	3	1.3
Duration of use of smartphone (mean 3.99 ± 2.94), median = 3.33 (range = 0.39 - 6.27)	≤1 year	28	11.7
	2 - 5 years	161	67.4
	5 - 9 years	36	15.1
	≥10 years	14	5.9
Daily smartphone usage (mean 4.14 ± 2.95 hours), median = 4 (range = 1.05 - 6.95)	< 1 hour	13	5.4
	1 - 2 hours	60	25.1
	3 - 4 hours	86	36.0
	5 - 6 Hours	45	18.8
	> 6 hours	35	14.6
Monthly expenditure on smartphone recharges in INR- Indian National Rupees (mean 239 ± 206.14), median = 199 (range = 32.68 - 445.14)	≤ 100	45	18.8
	110 - 200	113	47.3
	210 - 499	54	22.6
	≥ 500	27	11.3

**Table 2. Distribution of Smartphone Related Variables among Study Participants (N = 239)**

Independent Variable	Subgroups (N = 239)	Mean Rank	U Value	P Value
Gender	Boys	124.1	6659	0.378
	Girls	116.2		
Residence	Urban	119.2	754	0.378
	Rural	141.1		

**Table 3. Differences between Two Subgroups According to the Variables and Their SAS Scores**

Independent Variable	Subgroups (N = 239)	Mean Rank	H Statistics	P Value
Age	15 - 16 Years	100.4	9.98	0.019
	17 - 18 Years	112.5		
	19 - 20 Years	135.7		
	≥ 21 Years	129.9		
Family	Both Parents	118.8	5.39	0.067
	Single Parent	157.4		
	No Parent	13		
Field of study	Medicine	124.5	13.26	0.010
	Engineering	121.1		
	Commerce	156.2		
	School	107.2		
	Others	188.5		
Whose smartphone was used	Own	128.1	22.85	< 0.001
	Shared with family	72.5		
Duration of smartphone usage	Shared with siblings	171.5	1.62	0.654
	≤ 1 year	120.4		
	2 - 5 years	117.8		
	5 - 9 years	132.7		
Daily smartphone usage	≥ 10 years	110.9	28.16	< 0.001
	< 1 hour	57.7		
	1 - 2 hours	107.4		
	3 - 4 hours	111.1		
	5 - 6 Hours	149.8		
Commonest purpose of using smartphone	> 6 hours	148.1	14.88	0.005
	Social media	134.40		
	Web surfing	116.95		
	Entertainment	117.04		
Monthly expenditure on smartphone recharges (in rupees)	Education	88.83	11.99	0.007
	Other	55.33		
	≤ 100	95.1		
	110 - 200	116.6		
	210 - 499	136.4		
	≥ 500	142.4		

**Table 4. Differences between Different Multiple Subgroups According to the Variables and Their SAS Scores**

Sl. No.	Questions	Median Score (± 2 SD)
01	Missing planned work due to smartphone use.	4 (1.02 - 6.98)
02	Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use.	4 (0.72 - 7.28)
09	Being able to get rid of stress with a smartphone	4 (1.2 - 6.8)
12	Feeling most liberal while using a smartphone	4 (1.22 - 6.78)
16	Getting irritated when bothered while using my smartphone	4 (1.26 - 6.74)
18	Feeling great meeting more people via smartphone use	4 (0.94-7.06)
23	Checking SNS (Social Networking Service) sites like Twitter, Facebook, Instagram, WhatsApp or Snapchat right after waking up	4 (0.46 - 7.54)
25	Preferring searching from my smartphone to asking other people	4 (0.84 - 7.16)
26	My fully charged battery does not last for one whole day.	4 (0.5 - 7.5)
27	Using my smartphone longer than I had intended	5 (1.14 - 6.86)
28	Feeling the urge to use my smartphone again right after i stopped using it	4 (0.9 - 7.1)
29	Always thinking that I should shorten my smartphone use time	5 (1.3 - 6.7)
30	Having tried repeatedly to shorten my smartphone use time but failing every time.	4 (1.06 - 6.94)
31	The people around me tell me that I use my smartphone too much.	4 (0.66 - 7.37)

**Table 5. Item Question Wise Median Scores among the Respondents Where the Scale Gave 4 Plus Median Scores (N = 239)**

**DISCUSSION**

In the present study, 48.1 % were male and 51.9 % were female participants for the study of smart-phone addiction. Similar proportions of males (47.2 %) and females (52.8 %)

were also found in previous research on smartphone addiction recently in other countries as well.<sup>21</sup> The proportion of male and female students were 41.3 % and 58.7 % respectively in a study done among 150 medical students of South India<sup>22</sup> which could be due to difference in the rates of admission as well as of sample size. In the present study, the mean SAS score was found to be 103.59 ± 25.08, which was found to be 108 in a study done by Bhatt S. et al. among Indian dental students<sup>13</sup> and it was around 110 among adults of South Korea in a study done by Kwon M et al.<sup>18</sup> No cut-offs were applied to determine smartphone addiction in the scale used for the present study and rather mean SAS scores were compared.

In this study, the commonest purpose for using smartphone was "social media" (46 %) followed by "entertainment" (29.3 %), "education" (15.1 %) and "web surfing" (8.4 %). Social networking and gaming (entertainment) were also found to be the two most common purposes for using smartphone in studies by Karki et al. (social networking 42 %, gaming 33 %); Jilisha G et al. (social networking 36.1 %, entertainment 31 %); Chen et al. (social networking 33 %, entertainment 20 %) and by Kwon M et al. (social networking 55.6 %, entertainment 21.1 %) had the similar findings as far as the commonest two reasons are concerned.<sup>10,18,23,24</sup>

In the current study, the mean age of starting smartphone use was 14.51 years among the participants while it was 15.09 ± 2.12 years in a study done by Boumosleh et al. among 688 undergraduate university students of Lebanon.<sup>25</sup> The difference, however mild, could be due to the difference in social-cultural characteristics between the two nations or due to the difference in sample size. In this study, findings show that average daily usage of smartphone among the respondents was 4.14 ± 2.95 hours, which was found to be similar in a study by Haug et al. (Switzerland) and Süt et al. (Turkey).<sup>26,27</sup> On the other hands, some higher daily usage were found in the studies done by Celikkalp, U et al. which showed average 5 hours / day of usage as well as from by Erdem et al. which showed average 6.43 hours of usage per day; which might be due to difference of sample size as well as the type of the students from the present study.<sup>19,28</sup>

In the present study, smartphone addiction was reflected through the SAS scores of the respondents. It was found that there was no significant difference between male and females in the present study, which is similar to previous research.<sup>29</sup> However, the findings were different from a very recent study among newly admitted undergraduate medical students of Nepal. The female students were more likely to accept addiction in that study which is most likely to be due to difference of social norms between the countries.<sup>23</sup> In the present study, there was no statistically significant difference between SAS score for gender, type of residence (urban / rural), type of parenting and duration of smartphone usage among the respondents. On the other hands, significant statistical association (P < 0.05) were found for SAS score with regards to the streams of study, weather they have their own smartphone or not, usage per day, common purpose of using smartphone and the monthly expenses. Similar results were found in a study done

recently by Celikkalp, U et al. among medical and nursing students in Turkey, where significant statistical differences for SAS scores were found with regards to gender, daily smartphone use duration, department, academic performance, participation in sports and preferred mode of communication.<sup>19</sup> The significant SAS scores between genders might be due to larger sample size in the later as well as the difference of the composition of the respondents. It is also to be noted here that the mean SAS scores were significantly different for different age groups in the present study and the means of SAS scores tend to rise with increasing age, indicating higher smartphone addiction with advancing age.

## CONCLUSIONS

Smartphone addiction scores were obtained and compared for various social and demographic characteristics. Majority of the respondents belonged to high school followed by medical college. "Social media" and "entertainment" were the two most common purposes for using smartphone by the youth. On comparing the scores (SAS), significant statistical associations were found among age-groups, streams of study, daily usage, purpose of usage, and range of expenses. However, the study could not find statistically significant difference between mean scores of gender, rural / urban, parenting style and cumulative length of smartphone usage in years. Smartphone etiquettes and addiction potential should be given due emphasis among parents and students through multiple stakeholders like teachers, mentors, institutes as well the government for this frequently used gadget of modern era.

Data sharing statement provided by the authors is available with the full text of this article at jebmh.com.

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