

## Has Smartphone Become an Addiction Amongst Adolescents?

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### Abstract:

**Introduction:** Smartphones have become a part and parcel of everyone's life, from rich to poor it has made its home in everyone's pocket, school going adolescents are no exception. However, due to unchecked availability of its services it has the potential to cause behavioral addiction. There is paucity of data regarding the extent of smartphone addiction among adolescents of different age groups.

**Objective:** To study the smart phone addiction among school going adolescent. To evaluate effect of smart phone addiction among adolescents

**Study design:** A cross sectional questionnaire-based survey was done among 2100 school going adolescents of age groups 10 to 19 years satisfying the inclusion criteria. Smart Phone addiction scale was used. Additional data regarding their socio-demographic profile were also collected.

**Results:** Overall 20% were found to be addicted and 53.4% were prone to getting addicted to smartphones, with 17 to 19 years of age contributing 52% of addicted children. It was observed that the most common health problem associated with smart phone is dry eyes (27%), followed by pain in neck, wrist and back (16%), and followed by chronic tiredness (11%), although study revealed that 38% had no health problem.

**Conclusion:** Addiction was more in 17-19 years of age group and in those children whose parents had higher education, living in small family, having <2 children, upper socio economic. The most common health problem associated with addiction was dry eye followed by pain in neck, wrist and back.

**Keywords:** Addiction, Smartphone, Adolescent.

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### Introduction

Smartphones are the advanced devices with integrated computer-related functions and a variety of tasks based on number of applications [2]. Based on the Internet, smartphones have a wide range of functions. It can also be used to play games, use messenger systems, chat with friends, access web services, and search for information in addition to making phone calls. [3] In recent years, the percentage of smartphone owners and users has increased worldwide. The smartphone usage around the world has increased significantly from 1.57 billion in 2014 to 2.53 billion on 2018. It is estimated that over 36% of the world's population are using smartphone by 2018, which has increased by 10% compared to 2011. In India about 4 million people use a smartphone as of 2018 [4]. Instead of benefits of smartphones in daily life, excessive usage was informed to cause health hazards such as decrease in academic success and social participation in real life, headaches, neck pain, fatigue, sleep disturbances, memory loss, hearing

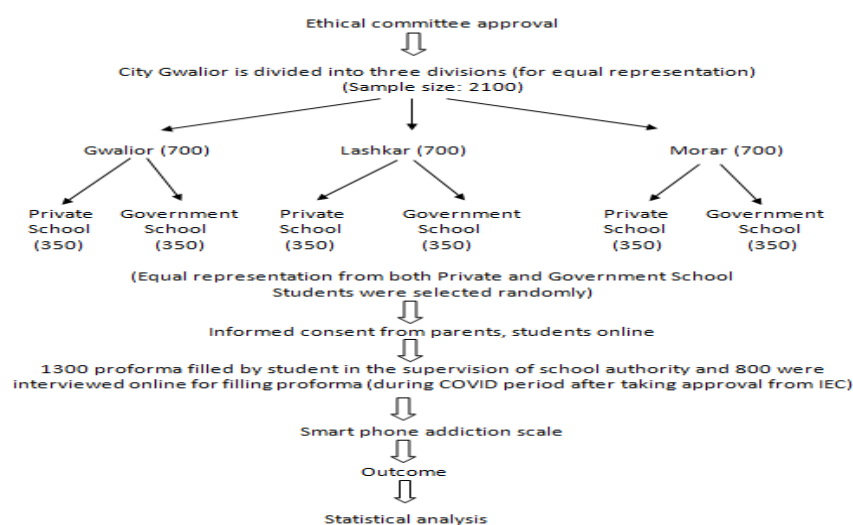
loss and decrease in concentration. [5] Repetitive behaviours of individuals create need for evaluating the situation in terms of addiction in case they influence functionality in daily life and social relations. [6] WHO (WHO Expert Committee - 1964) considers addiction as dependence, as the continuous use of something for the sake of relief, comfort, or stimulation, which often causes cravings when it is absent. [7] The two major categories of addiction involve either substance addiction, e.g., "drugs or alcohol addiction" or "behavioural addiction such as smart phone addiction. [8] Excessive use of a smartphone and the expression of an uncontrollable desire to use it when it is out of one's sight or reach characterize smartphone addiction. [9] Smartphone addiction generally has four main components: compulsive behaviours, tolerance, withdrawal, and functional impairment. [10] Mobile phone addiction is significantly related to internet addiction, although it has a distinct user profile. Risk factors included

gaming, fear of missing out (FOMO), depression and parental addiction and lack of parental monitoring, phubbing, low self-esteem, depression and experiential avoidance. [11] The main prevention in reducing smartphone addiction in adolescents is by increasing self-control. [12] From Gray's reinforcement sensitivity theory (RST), the Behavioral Inhibition System/Behavioral Activation System (BIS/BAS) scales were developed to assess personality dimension. These are two basic brain systems that control human behaviour. The BIS is activated by conditioned stimuli associated with termination of reward or punishment, the BAS is activated by stimuli associated with reward or termination of punishment. Therefore BIS/BAS personality characteristics may be associated with addiction. [13] Recent times have been challenging due to COVID 19 pandemic specially to adolescents and school going children making them to sit in front of laptops/smartphones for online education. School closure has begun the concept of digital remote learning, which is being promoted extensively, with due credit to the digital technology. However, it is now being fathomed that online learning is causing a lot of stress to the children and families. To deal with these challenges Indian Academy of Pediatrics (IAP) formed a task force of paediatricians, educationists and technological experts who connected through various video and social platforms to address the issues being faced. There are not many studies conducted on the issue and therefore this is an attempt to understand the gravity and risk factors of smartphone addiction.

#### Aims and Objectives

- To study the smart phone addiction among school going adolescent.
- To evaluate effect of smart phone addiction among adolescents.

#### Materials and Methods



This study "A Cross Sectional Study Of Smart Phone Addiction And Its Impact On School Going Adolescent" was conducted at government and private schools in Gwalior District, Madhya Pradesh State, during 2019-2020. The management of the high school was approached for permission to conduct the study. Written informed consent from the parents studying in the school was obtained.

**Setting:** Private Schools, Government Schools of Gwalior district.

**Study Design:** Cross sectional observational study.

**Sample Size:** 2100 adolescents

**Duration:** Two years

#### Inclusion Criteria:

- School going adolescent in the age group of 10-19 years.
- Students selected from private and government schools.

#### Exclusion Criteria:

- Students in the age group <10 years and >19 years.
- Who do not give consent

#### Material

- Written questionnaire proforma in Hindi and English
- Smartphone addiction scale [1] was adopted and modified to prepare questions according to Indian adolescent. The scale is validated [14].
- The scale used was a 4-point Likert scale, with 10 questions. Participants with score equal to or more than 21 were classified as addict and those between 15 to 20 as prone to addiction.

#### Methodology

### Statistical analysis

All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and cross tabulation was used to prepare the tables. Microsoft office and PRISM software used to prepare the graphs. All the qualitative data was expressed as number and percentage. Chi Square test was used to compare the numbers and percentage. P value of <0.05 was considered as significant.

A total 2100 school going children were enrolled and data analysis was performed. Out of 2100 sample size, 36.8% were of 17 – 19 years of age, 35.1% and 28.1% were of age group 14 – 16 years, 10 – 13 years respectively. Gender distribution of this study has male predominance and accounted for 64.9%, while female was accounted for 35.1%. Majority of the adolescents were in 9th-12th class (70.8%) as compared to in 5th-8th class (29.2%). In this study 39.6% were using personal smart phone whereas 35.2% were using others smart phone.

### Results

**Table 1: Demographic Variables of the Study Group**

Parameters		Frequency (n=2100)	Percentage (%)
Age Group (in years)	10-13	591	28.1
	14-16	737	35.1
	17-19	772	36.8
Gender	Male	1346	64.9
	Female	745	35.1
Class	5th-8th	614	29.2
	9th-12th	1486	70.8
Smartphone distribution	Personal	831	39.6
	Parents	530	25.2
	Other	739	35.2

**Table 2: Smartphone addiction scale**

S.no.	Parameters		Frequency (n=2100)	Percentage (%)
1.	Missing planned work due to smartphone use	Strongly disagree	1913	91.1
		Disagree	145	6.9
		Agree	21	1
		Strongly Agree	21	1
2.	Having a hard time concentrating in class, while doing assignments, or while working due to smartphone use	Strongly disagree	415	19.8
		Disagree	1483	70.6
		Agree	174	8.3
		Strongly Agree	28	1.3
3.	Feeling pain in the wrists or at the back of the neck while using a smartphone	Strongly disagree	849	40.4
		Disagree	714	34
		Agree	244	11.6
		Strongly Agree	293	14
4.	Won't be able to stand not having a smartphone	Strongly disagree	264	12.6
		Disagree	593	28.2
		Agree	1017	48.4
		Strongly Agree	226	10.8
5.	Feeling impatient and fretful when I am not holding my smartphone	Strongly disagree	308	14.7
		Disagree	617	29.4
		Agree	745	35.5
		Strongly Agree	430	20.5
6.	Having my smartphone in my mind even when I am not using it	Strongly disagree	227	10.8
		Disagree	828	39.4
		Agree	786	37.4
		Strongly Agree	259	12.3
7.	I will never give up using my smartphone even when my daily life is already greatly affected by it.	Strongly disagree	442	21
		Disagree	843	40.1
		Agree	766	36.5
		Strongly Agree	49	2.3
8.	Constantly checking my smartphone so as not to miss conversations between other	Strongly disagree	384	18.29
		Disagree	723	34.43

	people on Twitter or Facebook	Agree	836	39.81
		Strongly Agree	157	7.48
9.	Using my smartphone longer than I had intended	Strongly disagree	265	12.62
		Disagree	809	38.52
		Agree	947	45.10
		Strongly Agree	79	3.76
10.	The people around me tell me that I use my smartphone too much.	Strongly disagree	394	18.8
		Disagree	609	29
		Agree	625	29.8
		Strongly Agree	472	22.5

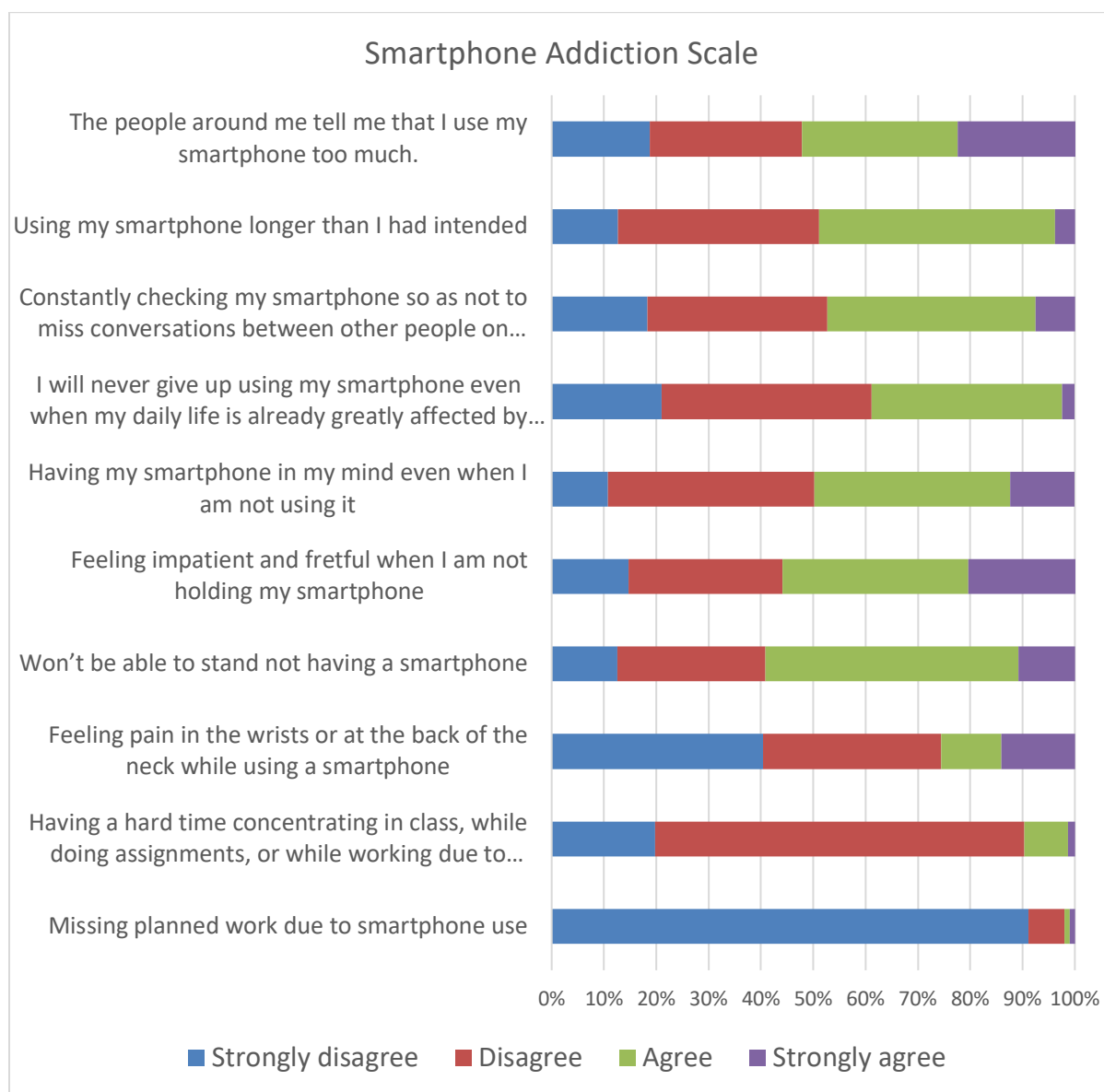


Figure 1: Smartphone addiction scale

Table 3: Addiction and proneness characteristics

Parameters		Status				P Value
		Not Addicted	Prone To Addict	Addict	Total	
Age Group (in years)	10-13	143	348	100	591	0.228
	14-16	260	370	106	737	
	17-19	145	404	224	772	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	
Gender	Male	249	540	214	1003	0.552

	<b>Female</b>	299	582	216	1097	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	
<b>Class</b>	<b>5-8</b>	168	345	87	600	0.001
	<b>9-12</b>	380	777	343	1500	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	
<b>Socioeconomic Status</b>	<b>Upper</b>	212	460	167	839	0.032
	<b>Upper middle</b>	121	245	127	493	
	<b>Lower middle</b>	89	178	56	323	
	<b>Upper lower</b>	78	128	46	252	
	<b>Lower</b>	48	111	34	193	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	
<b>Daily Smartphone Use (in hours)</b>	<b>&lt;2</b>	248	334	138	720	0.002
	<b>2 to 5</b>	291	752	244	1287	
	<b>&gt;5</b>	9	36	48	93	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	
<b>Last Grade in Exams</b>	<b>A+</b>	169	98	77	344	0.003
	<b>A</b>	207	373	90	670	
	<b>B</b>	83	359	148	590	
	<b>C</b>	89	292	115	496	
	<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	

Addiction was more in 17-19 years of age. However, p value is 0.228 which highlights that smart phone addiction can occur in any age. No significant difference was obtained between the addiction level between the genders as revealed by the insignificant p value of 0.552. Addiction was more common in those studying in class 9-12 as revealed by the highly significant p value of 0.001. Smart phone addiction was common in upper class

subjects followed by upper middle class as revealed by the significant p value of 0.032. Excessive use of smart phone can significantly affect the exam grades of school going children as revealed by the significant p value of 0.003. Majority of adolescents using smartphone for <2 hours are not addicted; 2-5 hours are prone to addict and >5 hours are addicted as revealed by the highly significant p value of 0.002.

**Table 4: Association of smart phone addiction with associated discomfort**

<b>Health Problem</b>	<b>Not Addicted</b>	<b>Prone to Addict</b>	<b>Addict</b>	<b>Frequency</b>	<b>Percent</b>	<b>P value</b>
Dry eye	97	329	148	574	27%	0.001
Sleep disturbance	51	66	52	169	8%	
Pain in neck, wrist and back	58	198	84	340	16%	
Chronic tiredness / lethargy	23	138	62	223	11%	
No health problem increase number in this group	319	391	84	794	38%	
<b>Total</b>	<b>548</b>	<b>1122</b>	<b>430</b>	<b>2100</b>	<b>100%</b>	

Those who were addicted had more risk of dry eyes, pain in neck, wrist and back and chronic tiredness / lethargy.

#### **Discussion/Conclusion**

Smartphone love has swept the world. Smartphone technology is advancing at a rapid rate. However, the evolution of the technology is not what is distressing, but rather people's misuse and excessive engagement with their devices. So, most of adolescents are exposed to the media applications and instant internet access involved with the advancement of smartphone.

What would be beneficial now, in light of the negative effects associated with excessive smartphone use, would be the development of a

strategy for encouraging more responsible use of personal devices [15,16].

#### **Demographic Variables of the Study Group:**

The present studies found that majority of the subjects were of age group of 17-19 years accounted for 36.8%. These subjects are more prone to addiction for smartphone. However, p value is 0.228 which highlight that smart phone addiction can occur in any age. Sex distribution showed male dominance and accounted for 64.9%, while female was accounted for 35.1%.

No significant difference was obtained between the addiction level between the genders as revealed by the insignificant p value of 0.552. Similarly, Bansal S et al showed the same results and male was 61.5%, while female was 38.5% [17]. Addiction

was more common in those studying in class 9-12 as revealed by the highly significant p value of 0.001.

**Smartphone Addiction Scale –Short Version (SAV-SV) 1:** Smartphone Addiction Scale –Short Version (SAV-SV) developed by Kwon et.al (2013) have been validated and used in many communities in the western nations, including Italy, Spain, Belgium, Turkey. Content validity was used to select the 10 final questions. The concurrent validity and internal consistency of SAS were verified with a Cronbach's alpha of 0.911. The SAS-SV was significantly correlated with the Smartphone Addiction Scale (SAS), Smartphone Addiction and Proneness Scale (SAPS) and Korean self-reporting internet addiction scale short-form scale (KS-scale).

**Addiction and proneness characteristics:** The duration of smartphone usage was another important parameter studied and it was found that majority of adolescents were using smart phone for 2-5 hours daily accounting for 61.29% followed by <2 hours daily (34.29%). Rai S et al showed that 32.67% students use smartphone less than 2 hours, 40% students use smartphone 2-4 hours, 23.33% students use smartphone 4-6 hours and only 4% students use smartphone >6 hours [18]. Similar study done in September 2014 at Baylor University, Texas, found that average usage of smartphone was 8 hours [19]. Jain P et al noted that majority of the addicted persons were using smart phone for the 3-4 hours (52.78%) followed by 1-2 hours (22.22%).[20]

**Smartphone related health problem:** This research work revealed that health problems are associated with smartphone use. The most common health problem was dry eye (27%) followed by pain in neck, wrist and back (16%). Chronic tiredness and sleep disturbance were also noted in our study. 38% of adolescents who used mobile devices did not have any health-related complications. In a study conducted by Department of community medicine, Bhaskar medical college, Moinabad, Hyderabad on some of the common health effects of cell-phones amongst student revealed that headache was found to be the commonest symptom (51.47%) followed by irritability/anger (50.79%).

Other common mental health symptoms included lack of concentration and poor academic performance, insomnia, anxiety etc. Among physical symptoms body-aches (32.19%), eye strain (36.51%), digital thumb (13.8%) was found to be frequent [21]. The study executed by Khan suggested that frequently encountered health problems related with smartphone using were memory disturbance, sleeplessness and hearing problems [22]. Since the study is cross sectional,

there are limitations in explaining cause and result relations.

**Implication:** In current situation smart phone has become the integral part of education system, but being a double-edged sword if used for longer duration of time it can be derogatory for the user. This study recommends that

- Parents and School authorities can utilize smartphone addiction scale to screen out children who are falling under smart phones addiction category or early identification of children getting prone for addiction and take immediate steps with strict counseling to prevent the child getting addicted to smartphones.
- Parents to fix the screen time slot and duration to be spent by the school going children on smart phone to avoid the smart phone addiction.
- Parents to share some of their quality time with their children for leisure activity to create an alternative positive stimulus like outdoor/indoor play.
- IAP guidelines recommend that the age-specific norms for duration of use of digital/screen-based media should be followed meticulously.

#### Statements

**Statement of Ethics:** Published research complies with the guidelines for human studies and was conducted ethically in accordance with the World Medical Association Declaration of Helsinki. Subjects have given their written informed consent and the study protocol was approved by the institute's ethical committee.

**Study approval statement:** This study protocol was reviewed and approved by Institutional ethics committee (IEC), Gajra Raja Medical College, Gwalior, M.P., India with the approval number-65/IEC-GRMC/2018

**Consent to participate statement:** Written informed consent was obtained from parents/legal guardian to participate in the study.

**Data Availability Statement:** The datasets generated during and/or analyzed during the current study are not publicly available due to patient confidentiality of individual cases, the datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

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