



Smartphone Addiction and Contributing Factors among School Level Adolescents in a District of South Kerala

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Abstract Objectives: Though technological advancements contributed many electronic devices, cellphones are the inevitable part of everyone's daily life. Due to experimentation, exploration and risk-taking behaviour, adolescents are at risk to develop addictive usage pattern of smart phone that may lead to physical and mental health problems. Present study was conducted to assess the magnitude of smartphone addiction and to point out its determinants among adolescents. **Methodology:** Study was conducted among 804 high school students of 13-16 years of age and studying in different high schools of Thiruvananthapuram District of Kerala, state of South India. Descriptive analytical design was used and sampling technique was multi stage cluster sampling. Socio personal information were collected through structured questionnaire and smartphone addiction was assessed by Smartphone Addiction Scale- Shortened Version (SAS-SV), using a self-report technique. Data were analysed by descriptive statistics, Chi square test and logistic regression. **Results:** Smartphone addiction among the school going adolescents in this study was 20.4 %, with more prevalence among boys (27.0%), than girls (13.7%). Adolescents whose mothers had only primary or lower education (OR = 3.93; 95% CI: 1.809-8.552; p = 0.001), participants from nuclear families (OR = 2.146; 95% CI: 1.325-3.475; p = 0.002), those with substance use in the family (OR = 1.68; 95% CI: 1.088-2.599; p = 0.019) and adolescents with duration of smartphones use as 3-6 hours or more per day (OR = 3.348; 95% CI: 2.191-5.116; p<0.001) were the significant contributing factors of addiction. **Conclusion:** The study findings point out that even after the re-opening of schools and online classes after COVID 19, smart phone addiction among the school level adolescents are not much reduced. Factors associated with this problem reveals family related matters and demand the need for family education or parents focused interventions.

Key Words Smartphone Addiction, School Adolescents, Contributing Factors

INTRODUCTION

Adolescence is the developmental stage associated with experimentation, risk taking behaviour with less self-control and impulsivity [1]. Today's adolescents represent the 'digital native' generation, being grown with mobile technology [2]. Though smartphone gives immense opportunity for learning, entertainment and networking, the excess use of smartphone has been linked to physical inactivity, academic problems, family relationship problems and sleep disturbance. Studies show that adolescents are more susceptible for smartphone addiction and subsequent physical and mental health symptoms [3]. A meta-analysis shows the global estimate of smartphone addiction as 26.99% [4].

The WHO Regional Office for Europe reported a notable scale up in harmful social media use among

adolescents, rising from 7% in 2018 to 11% in 2022. About 11% demonstrate social media overuse, marked by poor control and negative consequences, with higher figures among girls (13%) than boys (9%). More than 33% remain in continuous digital contact with peers, distinctly 15-year-old girls (44%). Furthermore, 34% of adolescents engage in habitual digital game play and among them, 22% spend four or more hours gaming on active days. Overall, 12% are at risk of problematic gaming, a pattern more commonly observed in boys (16%) than girls (7%). This report also states that responsible social media use can positively support adolescents by improving peer support and strengthening social connections through shared interests [5].

"Smartphone addiction is defined as a problem that affects users' daily lives, with clinical symptoms including

decreased concentration, tolerance and control; mood problems; and withdrawal symptoms” [6]. Adolescents make up nearly one-fifth of India’s total population, with about 22% living in urban settings [7]. A systematic review of 45 global studies identified 6 Indian studies for meta-analysis, including 1,304 participants. The pooled findings indicated that a notable fraction of Indian teenagers exhibit overuse of smartphone, with prevalence estimates ranging from approximately 39-44%, highlighting a growing public health concern that may lead to notable physical and psychological health. Factors such as poor relationships with teachers, sleep disturbances, adverse effects on academic performance and limited social support were associated with increased risk of excess smartphone use [8].

A cross-sectional study of 184 rural secondary school students in Pune (post-COVID) found that 83.2% had excessive screen time and nearly all (98.9%) used mobile phones [9]. A study among rural adolescents (10-19 years) in Bengaluru found that smartphones were the most commonly used devices (63%), with 17% reporting excessive screen time. Key factors associated with higher screen use included hostel residence and a family history of mental illness [10]. Excessive smartphone use can negatively impact a person’s physical health, mental well-being and social relationships, while also interfering with their performance in school and work [11]. Smartphone overuse and addiction can lead to several problems, including fatigue, stress, headaches, poor concentration, low mood, loneliness, strained relationships, lack of sleep and reduced academic performance [12].

School based research among adolescents of 15-19 years in Gujrat used mixed method approach, in 2023. Among the participants, 89.8% were using smartphones and 64% met the criteria for addiction. Smartphone use was significantly associated with urban residence, hands-free device use, lower parental education and previous addiction history [13]. An observational cross-sectional study that involved 496 students between the age of 16-19; in Vallabh Vidyanagar, educational township of Gujarat found that 83.9% used smartphones and 37% showed signs of smartphone dependency and it was significantly associated with their residential area, age, type of educational institution, duration and daily use of smartphones, awareness of health effects and parental education and income [14]. Shimla based cross-sectional survey among the undergraduate medical students; aged between 20-22 years revealed that daily screen engagement was more than four hours among 70.2% of the participants and majority (70.7%) had moderate nomophobia and 19% had severe nomophobia [15].

In the light of the aforementioned studies, magnitude of smart phone overuse and related difficulties among students in the adolescence and young adulthood are major concerns to be addressed. Hence the current study was intended to find out smart phone addiction among school level adolescents and to identify the contributing factors, that can contribute for planning the specific control measures in the earlier stages itself.

METHODS

The present study followed an analytical design and was conducted among school-going adolescents aged 13–16 years from urban and rural areas of Thiruvananthapuram, the capital of Kerala, a South Indian state. Study was conducted between November 2022 and February 2023, on re-opening of schools after COVID 19, as the initial phase of an intervention study that had been aimed the emotional-behavioural problems among adolescents [16].

Sample and Sampling Procedure

Since this study was conducted as a part of the first phase (screening phase of an intervention study on emotional and behavioural problems of adolescents measured using Strengths and Difficulties Questionnaire (SDQ11), the sample size for the present study was measured using a previously reported proportion of emotional-behavioural problems (24.5%) among school-attending adolescents of Kollam district, Kerala [17] applying the formula $4pq/d^2$. Stratified multi stage cluster sampling was used and considering the design effect, the minimum sample size needed was estimated as 680. Thiruvananthapuram district, which comprises three educational districts served as the study area, from which two districts were randomly selected. Using cluster sampling, final participants of 804 adolescents were chosen from government, government-aided and unaided schools, ensuring proportional representation from each type of institution. Two schools from each category were selected and participants aged 13-16 years and studying in standards 8, 9 and 10 were included by randomly selecting one or two divisions from these classes [16]. Only the adolescents who provided assent along with parental informed consent were included. Those with intellectual disability, physical impairments, or those currently receiving medication or psychological interventions for mental health issues were deemed ineligible. Based on these criteria, 804 adolescents were eligible as the participants.

Data Collection Method and Tools

For data collection of this study, two tools were used- socio demographic data sheet and Smartphone Addiction Scale-Shortened Version (SAS-SV) and data were collected using self-report method. SAS-SV is a standardized instrument developed by Kwon *et al.* [18] and was used to assess smartphone addiction among adolescents. The cut-off scores were set at 31 for boys and 33 for girls. A pilot study was carried out with 10 students, to examine the clarity of the questionnaire and the time required for completion, which was found to be approximately 15-20 minutes.

Ethical Considerations

The research proposal received approval from the Institutional Review Board and the Government-recognized Institutional Ethics Committee (Approval No. 005/05/2022/IEC/SMCH dated 05/01/2022) [16]. Permission to conduct the study was obtained from the Deputy Director of Education, Thiruvananthapuram District and from the respective school authorities. Written informed

consent was secured from parents and assent was obtained from the students prior to data collection. Participants were informed about the objectives of the study and ensured confidentiality of the personal information provided. Following these procedures, all the 804 students were screened for smart phone addiction, by using SAS-SV

Statistical Analysis

Data were coded and entered into the Statistical Package for the Social Sciences (SPSS) version 20 for analysis. Descriptive statistical methods were applied to determine the prevalence of smartphone addiction among adolescents. Factors associated with smart phone addiction were examined using univariate analysis followed by logistic regression analysis. The socio-personal variables assessed included gender, residential area, family structure, parent's education, family income, parents' marital status, substance use within the family, psychoactive substance use history among adolescents, participation in hobbies, availability of social support and emotional support, physical activity, duration of smartphone use and the type of school. Statistical significance was considered at a p-value of ≤ 0.05 .

RESULTS

Table 1 shows that the participants had a mean age of 14.0 ± 1.2 years. The proportion of boys and girls was nearly equal. Majority of adolescents were from nuclear families (68.3%) and resided in rural areas (54.4%). More than half of the mothers (55.2%) had collegiate-level education. Majority of the participants reported as having social support (83.5%), emotional support (69.9%), participation in extracurricular activities (85%) and spending 0-2 hours daily on mobile phones (71.1%). Around half (49.6%) of the adolescents were from government schools [16].

Prevalence of Smartphone Addiction among Adolescents

Out of the 804 adolescents, 164 adolescents (20.4%) were found to have smartphone addiction, whereas the majority, 640 adolescents (79.6%), did not show addiction. The findings indicate that nearly one-fifth of the adolescents have smartphone addiction.

Table 2 presents the univariate analysis to find out the association between socio-personal variables of adolescents and smartphone addiction. Odds Ratios along with 95% confidence intervals were computed to determine the magnitude and direction of these associations.

Table 1: Socio-Demographic Characteristics of Adolescents (n = 804)

Variable	Category of variable	Frequency	Percentage
Age in years	13.0	228	28.4
	14.0	344	42.8
	15.0	200	24.8
	16.0	32	4.0
Gender	Male	403	50.1
	Female	401	49.9
Residential area	Urban	367	45.6
	Rural	437	54.4
Family structure	Nuclear	549	68.3
	Joint	255	31.7
Educational status of father	School	470	58.5
	College	334	41.5
Educational status of mother	School	360	44.8
	College	444	55.2
Family income (Rupees/month)	< 25000	627	78.0
	25001-40000	98	12.2
	> 40000	79	9.8
Parental marital status	Married staying together	649	80.7
	Single parent	155	19.3
Substance use within the Family	Present	230	28.6
	Absent	574	71.4
Psychoactive substance use history in participants	Present	44	5.5
	Absent	760	94.5
Participation in hobbies	Present	553	68.8
	Absent	251	31.2
Availability of social support	Present	671	83.5
	Absent	133	16.5
Availability of emotional support	Present	562	69.9
	Absent	242	30.1
Regular physical activity	Yes	229	28.5
	No	575	71.5
Participation in extracurricular activities	Present	684	85.0
	Absent	120	15.0
Duration of mobile phone use	0-2 hrs	572	71.1
	3-5 hrs	140	17.4
	6 hrs or more	92	11.5
Type of schools	Government	399	49.6
	Govt-aided	325	40.4
	Unaided	80	10.0

Table 2: Univariate Analysis of Socio-Personal Factors Associated with Smartphone Addiction among Adolescents

Socio- personal Variables	Category	Smartphone Addiction				Total No.	χ^2 Value	P	OR	95%CI
		Addiction		No addiction						
		No	%	No	%					
Gender	Male	109	27.0	294	73.0	403	22	0.001	2.3	1.6-3.3
	Female	55	13.7	346	86.3	401				
Maternal education	Primary	28	62.2	17	37.8	45	51.4	0.001	7.5	4-14.2
	High school and above	136	17.9	623	82.1	759				
Family structure	Nuclear	133	24.2	416	75.8	549	15.6	0.001	2.3	1.5-3.5
	Joint/extended	31	12.2	224	87.8	255				
Substance within the family	Present	68	29.6	162	70.4	230	16.7	0.001	2.1	1.5-2.9
	Absent	96	16.7	478	83.3	574				
Hobbies	Absent	65	25.9	186	74.1	251	6.8	0.009	1.6	1.1-2.2
	Present	99	17.9	454	82.1	553				
Social support	Absent	45	33.8	88	66.2	133	17.7	0.001	2.4	1.6-3.6
	Present	119	17.7	552	82.3	671				
Emotional support	Absent	74	30.6	168	69.4	242	22.1	0.001	2.3	1.6-3.3
	Present	90	16.0	472	84.0	562				
Regular Physical activity	Absent	124	21.6	451	78.4	575	1.7	0.193	1.3	.9-1.9
	Present	40	17.5	189	82.5	229				
Extracurricular activities	Absent	36	30.0	84	70.0	120	8	0.05	1.9	1.2-2.9
	Present	128	18.7	556	81.3	684				
Duration of on mobile phone use for non-academic purpose.	Long period (3-6 hrs and more)	90	38.8	142	61.2	232	67.9	0.001	4.3	2.9-6.1
	Mild or no use (0-2hours)	74	12.9	498	87.1	572				
Total		164	20.4	640	79.6	804				

Table 3: Contributing Factors of Smartphone Addiction among School Going Adolescents

Socio-personal variables	B	S.E.	Wald	Df	P	OR/ Exp(B)	95% C.I. for EXP(B)	
							Lower	Upper
Gender	0.526	0.218	5.812	1	0.016	1.691	1.103	2.593
Maternal Education	1.370	0.396	11.948	1	<0.001	3.934	1.809	8.552
Family structure	0.764	0.246	9.637	1	0.002	2.146	1.325	3.475
Substance use within the family	0.520	0.222	5.481	1	0.019	1.682	1.088	2.599
Hobbies	0.334	0.219	2.326	1	0.127	1.396	0.909	2.143
Social Support	0.321	0.280	1.306	1	0.253	1.378	0.795	2.388
Emotional Support	0.408	0.240	2.882	1	0.090	1.503	0.939	2.407
Extracurricular Activities	0.107	0.272	0.155	1	0.694	1.113	0.653	1.896
Time spent on mobile	1.208	0.216	31.215	1	<0.001	3.348	2.191	5.116
Prosocial	1.818	0.233	61.116	1	<0.001	6.161	3.906	9.720
Constant	-3.632	0.530	46.955	1	<0.001	0.026		

Male adolescents showed a higher prevalence of smartphone addiction, as compared with females (27 Vs 13.7%). The likelihood of smartphone addiction was significantly greater among males (OR = 2.3). Adolescents whose mothers had only primary-level education exhibited a significantly increased risk of smartphone addiction in comparison with mothers of higher educational qualifications (OR = 7.5). Adolescents belonging to nuclear families had statistically significant risk of smartphone addiction while compared to those from extended and joint families (OR = 2.3). A significantly increased likelihood of smartphone addiction was observed among adolescents from families with substance use, in comparison to those from families without substance use (OR = 2.1). Participants who were not involved in hobbies have showed more chance to experience smartphone addiction than adolescents engaged in hobbies (OR = 1.6). Adolescents without social support showed higher odds to have smart phone addiction than those who receive social support (OR = 2.4). Likewise, adolescents who lacked emotional support reported a significantly greater risk of smartphone addiction, compared to those who had. (OR = 2.3). Adolescents who were not involved in

extracurricular activities had significantly elevated odds of smartphone addiction, compared to those participating in such activities (OR = 1.9). Participants using smartphones for 3–6 hours or longer per day were significantly more prone to exhibit smartphone addiction than those with mild or minimal smartphone use (OR = 4.3).

Binary logistic regression analysis was performed to identify the independent risk factors of smartphone addiction among adolescents. The socio-personal variables that showed statistical significance in the univariate analysis were included.

Table 3 Participants whose mothers had only primary-level education were at a significantly elevated risk of smartphone addiction. These adolescents had nearly four times greater odds of developing smartphone addiction while relating to those whose mothers had higher educational status (OR = 3.93). Participants from nuclear families had two times higher odds of smartphone addiction, when compared to others (OR = 2.146). Being a member of family with substance use make the adolescents more predisposed to smartphone addiction than those without such family issues (OR = 1.68). Duration of smartphone use emerged as another significant predictor; since adolescents with daily use of mobile phones

for 3-6 hours and above have shown more than three times higher odds of smartphone addiction when compared to those with lower duration of use (OR = 3.348).

DISCUSSION

In the present study, 20.4% of adolescents showed SAS SA-scores that indicated smartphone addiction; and was more (27%) among males and only 13.7% among females; univariate analysis also predicted significantly higher chance of mobile phone addiction among males (OR = 2.3).

Univariate analysis also showed primary or lower level of maternal education, nuclear family, presence of substance use in the family, no involvement in hobbies, absence of social and emotional supports, absence of extra-curricular activities and long duration of smart phone use (3-6 hours and more per day) are significantly associated with smartphone addiction among adolescents. Binary logistic regression pointed out; primary or low maternal educational status, nuclear type family, substance use in the family and long duration use of 3-6 hours or more in a day as the significant contributing factors of smartphone addiction.

A study among Korean middle school students shows the prevalence of smart phone addiction tendency as 17.9% which is approximately same as that of the current study [19].

Nepal based cross-sectional study in the private schools of Kathmandu district estimated internet addiction among 376 school students as 51.10%, which is higher when compared to the present study. Both the studies point out the duration of hours spent on a day as a significant factor [20]. A prevalence study among high school and college students of Brazil, using Internet Addiction Test revealed that 52.3%, which is much higher than this study findings [21].

Gujarat based study among students found smartphone addiction in 37% of participants, which is higher than the current study. In both the studies, factors that are significantly associated with smart phone addiction were duration of time spent on smartphone per day, parental education [14].

A school based cross-sectional study in Visakhapatnam district shows the prevalence of addiction as 40.9% and is very high while comparing the present study [22]. A descriptive study in selected high schools in Bangalore, Karnataka shows that 27.75% were addicted to smartphone and there was significant association between gender and duration of smartphone use and is to this study findings [23]. A cross-sectional study among school-going Indian adolescents assessed the prevalence of smartphone addiction and depression; which revealed them as 23 and 45% respectively and significant association was found with duration of phone use [24].

A cross-sectional study among participants of 10-19 years and from low-income urban areas of Delhi showed the mobile phone dependency among them as 33.0% and the addiction was reported higher among males (33.6%) than in females (32.3%). There was no significant gender difference in mobile phone use and smartphone addiction was higher among adolescents from nuclear families. Though the prevalence rate is higher in Delhi based study, both the

studies show that duration of time spent on mobile phones were significantly associated with addiction [25]. The results of a cross-sectional study in Ahmedabad city, involving adolescents revealed smart phone addiction as 67% and gender-based prevalence rates among girls and boys were 57 and 43% respectively and all these values are higher than the Kerala based study findings [26].

A systematic review on predictors of smartphone addiction, included total 22 papers and shows the factors like social rejection and family dysfunction are significant ones and these are congruent with present study findings [27].

A study on smartphone addiction among adolescents from government and private schools in Jammu and Kathua shows that smartphone addiction was significantly higher among females. But the current study showed that addiction was more among males, when compared to females [28]. The study among adolescents of Dehradun city reveals smartphone addiction as 20.5% which is similar to the present study [29].

Merits of the Study

Equal participation of both boys and girls; included adolescents from urban and rural areas and proportionate representation of all the three sectors-Government, Aided and Un aided schools were ensured in this study.

Limitations

Self-report technique in the class room settings may show a tendency to respond in the socially acceptable manner.

Recommendations for Future Research

As the previous studies show correlation between smartphone addiction and other problems like emotional-behavioural issues, academic backwardness and addictive behaviours, such studies can be conducted in different study settings. Intervention studies may be conducted to find out the effectiveness of educational and other structured measures.

Nursing Implications

Since this study findings point out the factors associated with smartphone addiction as nuclear family, lower maternal educational status, family issues like substance use within the family, lack of social and emotional supports, lack of hobbies and duration of time spent on mobile use; these results are useful for the nurses to plan educational interventions for parents and teachers. Parents focused interventions on these aspects and the negative consequences of smart phone use (physical and mental health consequences) should be integrated in the care of adolescents. Nurses should emphasize the importance of sleep hygiene, to reduce the duration of smart phone use.

CONCLUSION

Present study results point out the significant factors associated with smartphone addiction as family related factors, primary level education of mothers, lack of social and emotional support, absence of hobbies and longer duration of phone use; hence it recommends parents focused interventions-both at the community and school levels.

Limitations

Self-report technique in the class room settings may show a tendency to respond in the socially acceptable manner.

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Conflicts of Interest

There are no conflicts of interest between the authors.

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