Smartphone Use and Its Addiction among Adolescents in the Age Group of 16–19 Years

Dinesh J. Bhanderi, Yogita P. Pandya, Deepak B. Sharma
Department of Community Medicine, Pramukhswami Medical College, Karamsad, Gujarat, India

Abstract

Background: Smartphone use is escalating among adolescents, thereby increasing the risk of its addiction among them. Objective: The objective of this study was to estimate the prevalence of smartphone use and its addiction among adolescents in 16–19 years of age group. Materials and Methods: An observational cross-sectional study was conducted among 496 students in the age group of 16–19 years. Relevant information was collected using a self-administered questionnaire and the Smartphone Addiction (SA) Scale. Chi-square test and logistic regression were applied to study the association between independent and dependent variables. Results: Smartphone use was found to be 83.9%. It was associated with age, area of residence, discipline, use of hands-free kit, and parents’ education and income. The smartphone addiction rate was reported to be 37%. It was found to be associated with age, area of residence, place of education, duration of smartphone use, daily hours of use, perception that cellphone use is harmful to health, and parents’ education and income. Conclusion: A high rate of SA among adolescents warrants effective strategies at local, state, and national level to address this growing health problem in this population.

Keywords: Addiction, adolescents, smartphone

Introduction

Smartphones are the new generation of mobile phones that provide integrated communication and entertainment services. With a rapid rise in its use, a new kind of health disorder called “smartphone addiction (SA)/abuse/misuse” has now emerged as a challenging public health problem among adolescents. Research shows that abnormal users of smartphone in the adolescent age group are more at risk of severe psychopathological disorders such as problematic behaviors, somatic symptoms, attention deficits, depression, and aggression. In addition, adolescents with SA are more likely to access cyber-sexual content, to get involved in cyber-verbal violence, and to suffer from cyber-sexual delinquency. Easy availability and affordability of smartphone have not spared adolescents from its effects even from lower socioeconomic class worldwide. Moreover, there is a paucity of research regarding smartphone use and its adverse consequences in adolescents belonging to developing countries. Considering the increasing smartphone engagement among Indian adolescents, it is important to measure and understand their addictive behavior. Hence, the present study was conducted with the objectives to estimate the prevalence of smartphone use among adolescents of age 16–19 years and to assess the extent of SA and the associated factors in this group.

Materials and Methods

Approval of the Institutional Ethics Committee was sought before the commencement of the present study. This observational cross-sectional study was conducted among the students in the age group of 16–19 years attending higher secondary schools and colleges located in Vallabhb Vidyanganagar. The sample size was calculated using the formula $N = \frac{Z_{\alpha/2}^2pq}{L^2}$, considering the prevalence of SA among Indian teenagers from a previous study as 44%, and allowable error as 10% of $p$. The calculated $N$ of 489 was rounded to 496.

Address for correspondence: Dr. Dinesh J. Bhanderi, Department of Community Medicine, Pramukhswami Medical College, Karamsad - 388 325, Gujarat, India. E-mail: bhanderi1963@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: WKHLRPMedknow_reprints@wolterskluwer.com

How to cite this article: Bhanderi DJ, Pandya YP, Sharma DB. Smartphone use and its addiction among adolescents in the age group of 16–19 years. Indian J Community Med 2021;46:88-92.

Received: 22-04-20, Accepted: 22-12-20, Published: 01-03-21
The participants were selected using a two-stage sampling procedure. First, stratified sampling was done to decide upon number of students from higher secondary schools and students from colleges of discipline of commerce, arts, science, and engineering. Second, after seeking permission from heads of the institutes, lists of students studying in 11th standard, 12th standard, 1st-year graduation, and 2nd-year graduation were obtained. A required number of students were selected randomly from the provided list. After taking written informed consent from selected students more than 18 years old and written informed assent from students up to 18 years old along with signature of teacher/principal, relevant information was collected from participants using a pretested self-administered questionnaire and the SA Scale-Short version (SAS-SV), which has been developed and validated for its use among adolescents.[4]

Operationally, smartphone was defined as a mobile phone that has features of personal computer operating system, typically having a touchscreen interface, Internet access, and an operating system capable of running downloaded apps. Smartphone use was considered when the participant is currently using it for any duration. SA was considered when SAS-SV score was higher than 31 in boys and 33 in girls. Both smartphone use and SA were examined against a set of relevant independent variables (individual, household, and community characteristics) in order to determine the factors associated with these two variables.

Data analysis was performed using Stata-14.2 (StataCorp, LLC, Texas, USA) software. Chi-squared test was used to assess the significance of associations, considering \( P \leq 0.05 \) as statistically significant. Logistic regression was conducted

| Table 1: Distribution of respondents according to smartphone use (\( n=496 \)) |
|-----------------------------|----------------|----------------|-----|
| Variable                  | Smartphone use, \( n \) (%) | Total, \( n \) (%) | \( P^* \) |
| Age (completed years)     |                |                |     |
| 16                        | 57 (77.0)      | 74 (14.9)      | 0.200 |
| 17                        | 120 (84.5)     | 142 (28.6)     |      |
| 18                        | 102 (82.3)     | 124 (25.0)     |      |
| 19                        | 137 (87.8)     | 156 (31.5)     |      |
| Gender                    |                |                |     |
| Male                      | 238 (86.2)     | 276 (55.6)     | 0.109 |
| Female                    | 178 (80.9)     | 220 (44.4)     |      |
| Area of residence         |                |                |     |
| Urban                     | 269 (92.8)     | 290 (58.5)     | 0.000 |
| Rural                     | 147 (71.4)     | 206 (41.5)     |      |
| Discipline                |                |                |     |
| Arts/commerce/general     | 194 (78.2)     | 248 (50.0)     | 0.001 |
| Science/engineering       | 222 (89.5)     | 248 (50.0)     |      |
| Use of hands-free kit     |                |                |     |
| Yes                       | 161 (94.2)     | 171 (34.5)     | 0.000 |
| No                        | 267 (82.2)     | 325 (65.5)     |      |
| Father’s education        |                |                |     |
| Illiterate                | 14 (41.2)      | 34 (6.9)       | 0.000 |
| Just literate             | 12 (54.5)      | 22 (4.4)       |      |
| Primary                   | 18 (60.0)      | 30 (6.0)       |      |
| Secondary                 | 58 (82.9)      | 70 (14.1)      |      |
| Higher secondary          | 97 (87.4)      | 111 (22.4)     |      |
| Graduate and above        | 217 (94.8)     | 229 (46.2)     |      |
| Mother’s education        |                |                |     |
| Illiterate                | 19 (35.8)      | 53 (10.7)      | 0.000 |
| Just literate             | 14 (70.0)      | 20 (4.0)       |      |
| Primary                   | 33 (60.0)      | 55 (11.1)      |      |
| Secondary                 | 86 (93.5)      | 92 (18.5)      |      |
| Higher secondary          | 114 (95.0)     | 120 (24.2)     |      |
| Graduate and above        | 150 (96.2)     | 156 (31.5)     |      |
| Parents’ monthly income   |                |                |     |
| (in Indian rupees)        |                |                |     |
| 0-10000                   | 10 (29.4)      | 34 (6.9)       | 0.000 |
| 10,000-20,000             | 40 (58.8)      | 68 (13.7)      |      |
| 20,000-30,000             | 100 (86.2)     | 116 (23.4)     |      |
| 30,000-40,000             | 158 (96.3)     | 164 (33.1)     |      |
| >40,000                   | 108 (94.7)     | 114 (23.0)     |      |

*Chi-square test
in order to determine the factors significantly associated with the rates of smartphone use as well as its addiction.

RESULTS

A total of 496 adolescent students in the age group of 16–19 years participated in our study, having a mean age of 17.8 years ± 1.1. All were found to be using some kind of cellphone. Almost 56% were male, and 59% were living in an urban area [Table 1]. Out of 496 participants, 416 (83.9%) were using smartphone. As depicted in Table 1, smartphone use was significantly associated with area of residence (P = 0.000), discipline (P = 0.001), use of hands-free kit (P = 0.000), father's education (P = 0.000), mother's education (P = 0.000), and parents' income (P = 0.000). Multivariate analysis [Table 2] demonstrated that age (adjusted odds ratio [AOR] = 2.76, 95% confidence interval [CI]: 1.28–5.94), area of residence (AOR = 0.22, 95% CI: 0.09–0.56), place of education (AOR = 5.0, 95% CI: 1.07–23.42), father's education (AOR = 1.48, 95% CI: 1.01–2.15), perception that cellphone use is harmful to health (AOR = 4.89, 95% CI: 1.68–14.27), and use of hands-free kit (AOR = 0.08, 95% CI: 0.02–0.31) were independently associated with smartphone use. However, on multivariate analysis, gender, discipline, mother’s education, and use of cellphone while driving a vehicle were not found to be associated with cellphone use.

In our study, SA rate was reported to be 37%. It was found to be associated with age (P = 0.004), area of residence (P = 0.027), place of education (P = 0.003), duration of smartphone use (P = 0.000), daily hours of use (P = 0.000), father’s education (P = 0.000), mother’s education (P = 0.000), and parents’ income (P = 0.000), as shown in Tables 3 and 4. On multivariate analysis [Table 5], area of residence (AOR = 3.03, 95% CI: 1.37–6.69), discipline (AOR = 0.16, 95% CI: 0.06–0.42), parents’ income (AOR = 0.4, 95% CI: 0.23–0.7), duration of smartphone use (AOR = 0.22, 95% CI: 0.12–0.39), daily hours of use (AOR = 0.13, 95% CI: 0.08–0.21), and perception that cellphone use is harmful to health (AOR = 0.4, 95% CI: 0.17–0.95) were found to be independently associated with SA. While, age, gender, place of education, parents’ education, use of cellphone while driving, and use of hands-free kit were not found to be associated with SA on multivariate analysis.

DISCUSSION

In our study, about 84% of respondents were found to be using smartphone. The top three reasons for smartphone use were as follows: (1) for calling parents and friends (96%), (2) to use the Internet particularly for social networking (91%), and (3) to use it for studies (78%). The top three reasons for not using smartphone were as follows: (1) it is expensive, (2) one does not need it, and (3) parents do not allow to keep it. Our study detected a higher prevalence of SA among adolescents in the age group of 16–19 years than that reported among medical students of Central India[5] and among Polish[6] as well as British and Spanish adolescents.[7] However, SA prevalence in our study is similar to that reported among Korean adolescents by Lee and Lee[8] and lower than the rates reported among college students by Sethuraman et al. in their study done in Andaman and Nicobar islands,[9] Basu et al. in their Delhi-based study,[10] and Aljomaa et al. in their study done in Saudi Arabia.[11] A mixed-method study done by Davey and Davey using a systematic review and meta-analysis approach reported SA in the range of 39% to 44% among Indian adolescents.[12] A Turkish study found SA in 50.6% of adolescents who were referred to psychiatry clinics.[12]

Table 2: Factors associated with smartphone use - multivariate logistic regression analysis (n=496)

| Variable                        | Adjusted OR | 95% CI       | P     |
|---------------------------------|-------------|--------------|-------|
| Age                             | 2.76        | 1.28–5.94    | 0.01  |
| Area of residence               | 0.22        | 0.09–0.56    | 0.001 |
| Place of education              | 5.00        | 1.07–23.42   | 0.041 |
| Father’s education              | 1.48        | 1.01–2.15    | 0.042 |
| Perception that cellphone use is harmful to health | 4.89 | 1.68–14.27 | 0.004 |
| Use of hands-free kit           | 0.08        | 0.02–0.31    | 0.000 |

Table 3: Distribution of smartphone users according to background characteristics (n=496)

| Variable                        | Smartphone addiction, n (%) | Total, n (%) | P*     |
|---------------------------------|----------------------------|--------------|--------|
| Age (completed years)           |                           |              |        |
| 16                              | 18 (31.6)                 | 57 (13.7)    | 0.004  |
| 17                              | 34 (28.3)                 | 120 (28.8)   |        |
| 18                              | 52 (51.0)                 | 102 (24.5)   |        |
| 19                              | 50 (36.5)                 | 137 (32.9)   |        |
| Gender                          |                           |              |        |
| Male                            | 85 (35.7)                 | 238 (57.2)   | 0.524  |
| Female                          | 69 (38.8)                 | 178 (42.8)   |        |
| Area of residence               |                           |              |        |
| Urban                           | 110 (40.9)                | 269 (64.7)   | 0.027  |
| Rural                           | 44 (29.9)                 | 147 (35.3)   |        |
| Place of education (school vs. college) |         |              |        |
| School                          | 60 (29.7)                 | 202 (48.6)   | 0.003  |
| College                         | 94 (43.9)                 | 214 (51.4)   |        |
| Duration of smartphone use (months) |                       |              |        |
| <3                              | 3 (4.3)                   | 70 (16.8)    | 0.000  |
| 3-6                             | 3 (6.7)                   | 45 (10.8)    |        |
| 6-12                            | 11 (11.7)                 | 94 (22.6)    |        |
| >12                             | 137 (66.2)                | 207 (49.8)   |        |
| Daily use of smartphone (h/day) |                           |              |        |
| <1/2                            | 6 (4.4)                   | 135 (32.5)   | 0.000  |
| 1/2-1                           | 25 (20.2)                 | 124 (29.8)   |        |
| 1-2                             | 49 (67.1)                 | 73 (17.5)    |        |
| >2                              | 74 (88.1)                 | 84 (20.2)    |        |

*Chi-square test
In our study, Chi-square analysis showed a higher SA in older adolescents compared to younger ones. This finding is in congruence with the finding from studies done among South Korean,[13] Turkish,[12] and Spanish and British adolescents.[14] However, it is in contrast to the finding from a study conducted among Spanish adolescents.[17] Although, in our study, discipline was not related to SA, place of education, whether school or college, was significantly associated with SA, college students being more likely to get smartphone addicted. We suppose that restriction on the use of mobile phones in schools may be the reason for less SA among school students. A Lebanese study, as well, did not demonstrate association between type of discipline and SA score.[18]

Our study revealed that longer the duration and higher the number of daily hours of smartphone use, more is the likelihood of SA. It can be a vicious cycle of SA and more time spent on smartphone, one perpetuating the other. Duration[19] and daily use[3,5,11,15] of smartphone were reported to be predictors of SA by some studies conducted in Central India and other parts of the world.

A strong association between parents’ education and SA reported in our study corroborates the finding obtained in the study by Lopez-Fernández et al.[14] However, Cha and Seo[19] did not find the effect of parents’ education level on SA, while Firat and Gül[12] found only maternal education as a predictor of SA. Similarly, finding in our study that adolescents from higher economic class are more likely to be addicted to smartphone replicates the finding from the Spanish study by Sánchez-Martínez and Otero[17] but not that reported by other researchers.[11,12,19]

In our study, multivariate logistic regression analysis showed that significantly less proportion of adolescents addicted to smartphone perceived that excessive cellphone use is harmful to health. However, the practice of using cellphone while driving and using hands-free kit was similar in the two groups: those who have SA and those who have not. In addition, arts, commerce, and general stream students were more likely to have SA compared to science and engineering students. Less academic burden and more leisure time for former group may be the reason for this difference.
Our study has few limitations. As it has used a cross-sectional design, causality cannot be inferred. Further longitudinal or experimental studies need to be conducted for establishing causal associations. Moreover, there is possibility of reporting bias as the questionnaire used was self-administered. In addition, the results of our study may have limited external validity as we have not included adolescents who are not enrolled in an educational institute and other age groups who are at risk of SA.

**Conclusion**

The present study detected a high rate of SA among adolescents in the age group of 16–19 years. It was found to be significantly higher in urban college students belonging to well-educated and affluent families. Consequently, effective strategies at local, state, and national level should aim at addressing this growing health problem in adolescent population.

**Financial support and sponsorship**

Nil.

**Conflicts of interest**

There are no conflicts of interest.

**References**

1. Brauser D. Smartphone “Addiction” may affect adolescent development. Medscape Medical News 2013. Available from: http://www.medscape.com/viewarticle/804666. [Last accessed on 2020 Apr 21].

2. Choi J, Choi OJ, Kim JH. Effects of adolescent smartphone addiction on cybersexual delinquency. Social Behavior and Personality: An International Journal 2017;45:819-32.

3. Davey S, Davey A. Assessment of smartphone addiction in Indian adolescents: A Mixed method study by systematic-review and meta-analysis approach. Int J Prev Med 2014;5:1500-11.

4. Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. PLoS One 2013. 8:e83558.

5. Jain P, Gedam SR, Patil PS. Study of smartphone addiction: prevalence, pattern of use, and personality dimensions among medical students from rural region of central India. Open J Psychiatry Allied Sci 2019;10:132-8.

6. Warzecha K, Pawlak A. Pathological use of mobile phones by secondary school students. Arch Psychiatry Psychother 2017;19:27-36.

7. Lopez-Fernandez O. Problem mobile phone use in Spanish and British adolescents: First steps towards across-cultural research in Europe. In: Riva G, Wiederhold BK, Cipresso P, editors. Identity and Relationships in Online Communities. The Psychology of Social Networking. Vol. 2. Warsaw: De Gruyter; 2015. p. 186-201.

8. Lee C, Lee SJ. Prevalence and predictors of smartphone addiction proneness among Korean adolescents. Child Youth Serv Rev 2017;77:10-7.

9. Sethuraman AR, Rao S, Charlette L, Thatkar PV, Vincent V. Smartphone addiction among medical college students in the Andaman and Nicobar Islands. Int J Community Med Public Health 2018;5:4273-7.

10. Basu S, Garg S, Singh MM, Kohli C. Addiction-like behavior associated with mobile phone usage among medical students in Delhi. Indian J Psychol Med 2018;40:446-51.

11. Alijomaa SS, Qudah MFF, Albursan IS, Bakhiet SF, Abduljabbar AS. Smartphone addiction among university students in the light of some variables. Computers in Human Behavior 2016;61:155-64.

12. Firat S, Gül H, Sertçelik M, Gül A, Gürel Y, Köç BS. The relationship between problematic smart-phone use and psychiatric symptoms among adolescents who applied to psychiatry clinics. Psychiatry Res 2018;270:97-103.

13. Lee EJ, Ogbolu Y. Does parental control work with smartphone addiction?: A Cross-sectional study of children in South Korea. J Addict Nurs 2018;29:128-38.

14. Lopez-Fernández O, Losada-López JL, Honrubia-Ser-rano ML. Predictors of problematic Internet and mobile phone usage in adolescents. Aloma 2015;33:49-58.

15. Haug S, Castro RP, Kwon M, Filler A, Kovatsch T, Schaub MP, et al. Smartphone use and smartphone addiction among young people in Switzerland. J Behav Addict 2015;4:299-307.

16. Mok JY, Choi SW, Kim DJ, Choi JS, Lee J, Ahn H, et al. Latent class analysis on internet and smartphone addiction in college students. Neuropsychiatr Dis Treat 2014;10:817-28.

17. Sánchez-Martínez M, Otero A. Factors associated with cell phone use in adolescents in the community of Madrid (Spain). Cyberpsychol Behav 2009;12:131-7.

18. Matar Boumosleh J, Jaa1ouk D. Depression, anxiety, and smartphone addiction in university students- A cross sectional study. PLoS One 2017;12:e0182239.

19. Cha SS, Seo BK. Smartphone use and smartphone addiction in middle school students in Korea: Prevalence, social networking service, and game use. Health Psychol Open 2018;5:2055102918755046.