



ISSN: 2230-9926

Available online at <http://www.journalijdr.com>

IJDR

International Journal of Development Research
Vol. 14, Issue, 11, pp. 67005-67008, November, 2024
<https://doi.org/10.37118/ijdr.28946.11.2024>



RESEARCH ARTICLE

OPEN ACCESS

PREVALENCE OF SMARTPHONE ADDICTION AND ITS ASSOCIATION AMONG ADOLESCENT STUDENTS OF WEST BENGAL

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ARTICLE INFO

Article History:

Received 17th August, 2024

Received in revised form

19th September, 2024

Accepted 06th October, 2024

Published online 30th November, 2024

Key Words:

Smartphone addiction,
Adolescent students.

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ABSTRACT

Background: The rising craze of smartphone use and its addiction was noticeable and it was increased further during COVID pandemic period. Seventy percent Indian adolescent found Smartphone user and its addiction was range from 39% to 85.4%. Changing prevalence of Smartphone addiction and its association was observed in different part of country. Therefore, it is important to understand the situation after COVID pandemic. The study aimed in estimating the prevalence of smartphone addiction among adolescent student and associated factors. **Method:** The cross-sectional study involves 420 adolescent smartphone user who were the students of standard nine and ten. Stratified random sampling technique used to select sample from five secondary school of a subdivision in West Bengal. Smartphone addiction was measured by a standardized tool Smartphone addiction scale short version. **Result:** The overall prevalence of Smartphone addiction was 32.9%; adolescent students age, standard of education, duration of smartphone uses and common reason of smartphone use was significantly associated with smartphone addiction at 0.05 level of significance. Smartphone addiction was significantly associated with frequency of smartphone use and participant's personality traits at 0.001 level of significance. **Conclusion:** To minimize smartphone addiction and its health effects awareness program are essential and parent can play their role as role model to their children.

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Citation: Mamtaz Begum and Dr. Blessy Peter, 2024. "Prevalence of smartphone addiction and its association among adolescent students of West Bengal". International Journal of Development Research, 14, (11), 67005-67008.

INTRODUCTION

The growing digitalized world exposing people with newer technological device like smartphone that has more advanced computing ability and connectivity than a normal cell phone. The newer features of smartphone attract the user. Worldwide number of smartphone user increased from 2.5 billion to 3.8 billion during 2016 to 2021.¹ In 2022, India was in the second position after China on the basis of number of smartphone user.² The craze of smartphone use is very high among Indian adolescent; 70% high school students use Smartphone.³ In Mumbai, a metropolitan city of India, 33% teen age usage mobile phone during crossing the road.⁴ In UK (2019), 50% school children was owner of smartphone.⁵ The ownership of mobile phone also early in US population; by the age of 11 years 48% owned mobile phone and 85% owned by 14 years.⁶ In south India 90% adolescent students have the accessibility to smart phone and 42% use smartphone for 4 to 6 hours per day.⁷ Among Indian school going adolescent 81% possessed a smart phone; on average they spent 101 minutes per day; 34.8% slept late at night due to mobile phone usage and phone dependency was observed in 67.2%.⁸ During 2014 to 2020, varying degree of smartphone addiction prevalence was noticed in different country of the world. The highest prevalence (51%, 89%) was noticed in Turkey and India was in the second position where the prevalence of smartphone addiction was ranged 6-49%.

The prevalence of smartphone addiction was noticed 10% at Great Britten, 2% at Barcelona, 17% at Switzerland, 26% at Rome, 14-31% at South Korea and 23% at Japan.⁹ According to the report of a leading newspaper, 'Hindustan Times' across 30 Indian cities 65% of the children became addicted to electronic devices including smartphone.¹⁰ In a systematic review and meta-analysis (1995 to 2014) identified the magnitude of smart phone addiction that ranges from 39% to 45% in fixed effects models ($P < 0.0001$).¹¹ An Indian study involves eight major city including Delhi, Mumbai, Bangalore, Kolkata, Chennai and Hyderabad to observe the pattern of smartphone use and its effect. Total duration of smartphone usage hour increased from 4.5 hours to 7 hours between pre and post Covid period; the compulsion of smartphone use increased from 52% to 88% and school children were found irritable and isolated without their smartphone.¹² The association of smartphone addiction with personal characteristics, habit and mental status was observed in a study of China where undergraduate medical students age, playing of Smartphone games, Smartphone media applications, poor sleep quality, depression, and anxiety were associated with Smartphone addiction.¹³ In Korea Smartphone addiction behaviour was not different between male and female elementary school students (11 to 13 years).¹⁴ Among adolescent of China higher degrees of Smartphone dependence and Smartphone influence was present in females students compared to males.¹⁵ Smartphone addiction behaviour was also associated with adolescents level of self-control

and friendship quality.¹⁶The quality of self-esteem more specifically high self-esteem was a protective factor against Smartphone addiction.¹⁷ Among middle school students of Korea, the level of smartphone addiction was higher in girls and it also increases with higher stress, more serious interpersonal problems, less use of the smartphone for study, more time spent enjoying music and videos, and more use of social media.¹⁸In a systematic review of literature it was observed that problematic use of mobile phone was more common in children who have a feeling of insecurity; impaired parent-child relationship; impaired school relationships; compulsive buying habit; pathological gambling, low mood, tension and anxiety, leisure boredom etc.¹⁹ Among middle school students of Korea smartphone addiction is influenced by gender ($\beta = 3.14, P < 0.01$), stress ($\beta = 2.99, P < 0.01$), and interpersonal problems ($\beta = 3.81, P < 0.001$).²⁰ Subjective economic level, academic stress, parental support, and bullying victimization is associated with smartphone addiction tendency as reported by Kim (2021). Smart phone addiction behavior is not only associated with personal and social character of user but it also associated with number of health problems including sleep problems, reduced physical fitness, unhealthy eating habits, pain and migraines, reduced cognitive control and changes in the brain's gray matter volume, shyness and low self-esteem (Wacks *et al.*, 2023). Adolescent with higher risk of smartphone addiction also had the poor self-reported health and greater level of anxiety (Kim *et al.*, 2021).

According to the report of National Youth Policy Institute of Korea, mobile phone addiction increases the risk of poor sleep quality. Mobile phone is the main source of digital media and excessive screen time was associated with poor sleep, impaired vision and reduced bone density. It also increases the risk of high blood pressure, obesity, low HDL cholesterol, poor stress regulation and Insulin Resistance. Addictive screen time decreases social coping and involves craving behaviour (Lissak, 2018). Excessive use of new age technologies in terms of cell phones, internet, television, and video games can affects in adolescent health in terms of quality of sleep, body composition, mental well-being, and also leads to risky sexual behaviours (Bilgrami) Other than physical problems psychological and emotional problems also observed among addictive and problematic user of smartphone. Problematic smartphone use was associated with depression, anxiety, perceived stress, and poorer sleep quality (Sohn *et al.*, 2019). Depression and neuromuscular disorder were identified as health effects of smartphone addiction in a meta-analysis (Ratan *et al.*, 2021). Addicted user of smartphone was lonelier (Sönmez *et al.*, 2021). Along with physical problems, Lone liness and depression, mood disorder also significantly higher among the high user of cellphone in young adult of Pakistan (Daniyal *et al.*). The effect of smartphone addiction on social health of user also observed in number of studies. Social engagement is decreases with increasing addiction to Smartphone among children aged 9 to 17 years in Korea (Ihm *et al.*, 2018). Long term Smartphone usage can result in decreased face-to-face communication; decreased interaction between family members (>2 hours) and increased interaction with friends and people outside the home (Tariq *et al.*, 2018). Addictive screen time decreases social coping (Lissak, 2018). Children with problematic smartphone use show lower quality of life, more behavioral difficulties, and poorer school performance (Kliesener *et al.*, 2022). Adolescence is a vulnerable period of life in which risk-taking behaviors are more common due to lack of self-regulatory competence. The rising level of addiction and its health effects is a concern of health care provider. Today's adolescents are tomorrow's adult therefore recognition of smartphone addiction and its associated factors in the post Covid pandemic period is important for health care provider.

METHODOLOGY

The cross-sectional observation study was conducted in a subdivision of West Bengal, India. Out of 1008 students of five secondary and Higher secondary school, 420 adolescents were selected by stratified random sampling technique. Smartphone addiction was assessed by a

standardized tool Smartphone addiction scale short version. The association of smartphone addiction was observed with participants age, standard of education, Common reason of smartphone use, Age of starting smartphone, Duration of smartphone use, Restriction of smartphone use, Common time of smartphone use, Frequency of smartphone use, Temptation of smartphone use, Personality traits and Academic performance.

RESULTS

Demographic and habit of smartphone use: Total 420 adolescent students were participated in the study, among them 81.0% were in the age group of 15-16 years, 55% were female and 56% were from standard nine. Majority of adolescent students (81.2%) started to use smartphone after 11 years, 15.2% started to use within 6 to 10 years of age; only 3.6% started to use at 5 years or earlier. More number of students (48.3%) said that they use smartphone 1-2 hours daily; 14% uses 3 to 4 hours; 3.8% uses 5 hours or more. Among the participants 48.3% participant use smartphone 1-2 hours daily and 3.8% use 5 hours or more. Majority (64%) of the participants were warned verbally for their excessive smartphone use and 13.3% experienced no restriction. Preferable time of smartphone use was night as mentioned by 55% of the participant. The ability to control the temptation of smartphone use was reported sometimes, most of the time and not at all by 48.6%, 29.5% and 7.1% of participant. The perceived personality traits as deep thinker, very active and impulsive was reported by 45.7%, 31.7% and 10.5% of participants. The academic performance in terms of percentage of marks obtained in last term examination are $\leq 50\%$, 51-60%, 61-70%, 71-80%, 81-90% and $>90\%$ by 24%, 20%, 11.4%, 20.7%, 14.8% and 9% of participants.

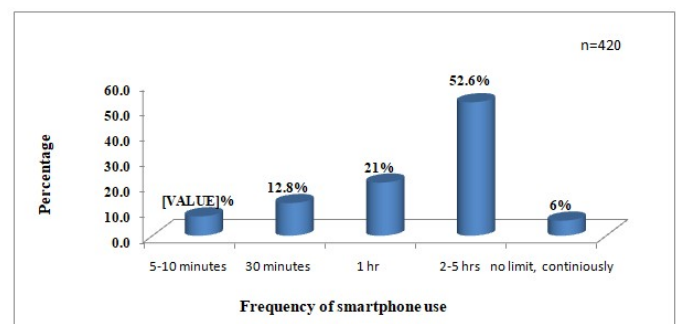


Fig. 1. Frequency of smartphone use by adolescent student

Among 420 students more than half of the students 221(52.6%) use smartphone in every 2 to 5 hours interval; 21% use in every 1-hour interval; 12.8% use every 30 minutes interval; very few numbers of student 32(7.6%) use 5 to 10 minutes interval and 6% students use continuously without any limit.

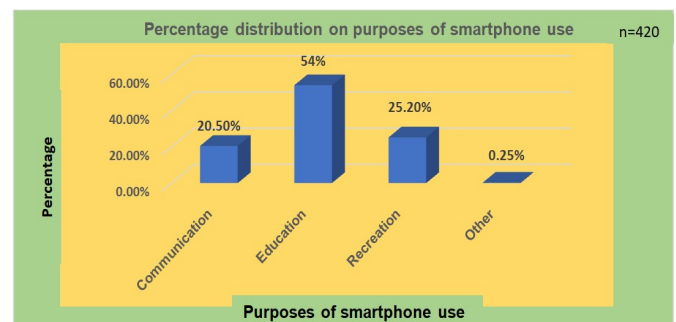


Fig. 2. Purposes of smartphone use among adolescent student

Figure-2 depicts that more than half of the adolescent student (54%) use smartphone mainly for education; one fourth of participants (25.2%) use for recreation; 20.5% use for communication; and only 1% of them not mentioned any particular reason of smartphone use.

Prevalence of smartphone addiction in adolescent students

Table 1. Prevalence of smartphone addiction in adolescent student n=420

Variable	Prevalence		One sample Binomial Test			Confidence interval summary CI(95%)		
	f	%	Standard Error	Standardized test statistic	Sig (2 sided test)	Estimate	Lower	Upper
Not addicted to smartphone	282	67.1	10.247	-6.978	<.001	0.329	0.284	0.376
Addicted to smartphone	138	32.9						

Out of 420 adolescent student 67.1% was found not addicted to smartphone whereas 32.9% were addicted to smartphone. The prevalence of smartphone addiction was 32.9% with a confidence interval of 0.28 to 0.38; $p < 0.001$.

Association of smartphone addiction and socio-demographic variables: According to the result of chi square test, adolescent students age, standard of education, duration of smartphone use and common reason of smartphone use was significantly associated with smartphone addiction ($\Phi(\phi) = 7.361, df(2), p = .023$; $\chi^2 = 7.94, df(1), p = .005$; $\chi^2 = 15.943, df(3), p = .001$; $\Phi(\phi) = 6.994, df(3), p = .051$) at 0.05 level of significance. The test results also revealed that smartphone addiction was significantly associated with frequency of smartphone use and participant's personality traits ($\chi^2 = 20.713, df(4), p < 0.001$; $\chi^2 = 17.461, df(3), p < 0.001$) at 0.001 level of significance. Smartphone addiction was not associated with gender, and age of starting smartphone use, restriction of smartphone use, common time of smartphone use, temptation of controlling smartphone use and Academic performance.

DISCUSSION

Prevalence of smartphone addiction among adolescent students: In the present study prevalence of smartphone addiction was 32.9% with a confidence interval of 0.28 to 0.38; $p < 0.001$. The prevalence of smartphone addiction in adolescent school students of Jeevanagar community area at Karaikal, India was much higher (67%) as reported by MP Venkatesan, K Kamala (2021). The similar findings also observed in a community-based, cross-sectional study (N. Gangadharan -2022) of Delhi where the prevalence of mobile phone addiction was 33.0% (95% CI: 27.2-38.6). The prevalence of smartphone addiction was 57% among adolescent (<19 yrs) in a University of Mangalore, India (R Kundapur *et al*, 2020) and it is 24.1% higher than adolescent students of west Bengal.

Association between Smartphone addiction and selected socio-demographic variables: Adolescent students age, standard of education, duration of smartphone use, common reason of smartphone use, frequency of smartphone use and participant's personality traits was significantly associated with smartphone addiction ($\Phi(\phi) = 7.361, df(2), p = .023$; $\chi^2 = 7.94, df(1), p = .005$; $\chi^2 = 15.943, df(3), p = .001$; $\Phi(\phi) = 6.994, df(3), p = .051$; $\chi^2 = 20.713, df(4), p < 0.001$; $\chi^2 = 17.461, df(3), p < 0.001$) at 0.05 level of significance. Another North Indian study (J.-Y. Yoon, 2021) found significant association between smartphone addiction and standard of education which is consistent with the present study. A cross-sectional survey (P. Jain *et al*-2019) of central India revealed that smartphone addiction had significant association ($p < 0.05$) with Smartphone use duration on a typical day, frequency of use, personality dimensions and emotional instability which was consistent with this finding. Smartphone addiction was independent to gender in children and adolescent of Korea (Son HG *et al*). This finding is consistent to the present study where no significant association found between Smartphone addiction and gender. Another study (A. Tangmunkongvorakul *et al*, 2020) of two Asian country Japan and Thailand, where Smartphone addiction was significantly associated with Gender.

Implication of study

In the present study smartphone addiction was associated with adolescent age, standard of education, reason of smartphone use, frequency and duration of smartphone use and personality traits.

Therefore, health care provider may plan an awareness program keeping in mind about the association of demographic and behavioral factors. Nurses can conduct counseling for adolescent and parent on prevention of smartphone addiction and its associated factors. Nurse administrator can set policy for the hospital about the restriction of mobile phone use among nursing students, health personnel, patient and their family members. Present study findings may be the foundation of future researcher to carry out longitudinal study and investigate the detailed relationship between smartphone addiction and different adverse outcomes. Based on the present study findings some interventional research can be conducted on prevention and control of smartphone addiction.

Limitations

This study provides new insights into the smartphone usage pattern and addiction among adolescent students in West Bengal and it also has some limitations-

- This survey was conducted using self-reporting methods. Therefore, social desirability may influence the adolescents' responses.
- The study was conducted in selected secondary and higher secondary school of a subdivision therefore it limits the generalization of findings.

Recommendations

Considering the limitations of the present study and to improve the generalization, the recommendations are-

- A descriptive study can be conducted to estimate the prevalence of smartphone addiction and associated factors as reported by adolescent students and their parents.
- Comparative study can be conducted to investigate the differences of smartphone usage pattern, and level of addiction through technological records of smartphone use in adolescent students.
- Cross-Sectional study can be conducted to find the changes of prevalence of Smart-Phone Addiction among Children, Adolescents and Young Adults.

CONCLUSION

During COVID-19 pandemic period the prevalence of smartphone addiction was rising all over India. The present study provides insight into the prevalence of smartphone addiction among adolescent students in post Pandemic period that was 32.9%. There were no gender differences in Smartphone addiction. Smartphone addiction was associated with participant's age, standard of education, duration of use, reason of smartphone use, frequency of smartphone uses and participant's personality traits. Smartphone addiction is preventable when it will be accepted by all segment of people. Being role model, restricting on smartphone use parents can play important role in prevention of smartphone addiction among children. Continuous community level awareness may bring some changes in the use of smartphone as well as addiction.

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