NDC E-BIOS (Online) Volume 4, pp 64-72 (2024) ISSN: 2583-6447
DOI: https://doi.org/10.5281/zenodo.15800518

ORIGINAL ARTICLE

SMARTPHONE ADDICTION AND SLEEP QUALITY AMONG UNDERGRADUATE STUDENTS – A PILOT STUDY IN A DEGREE COLLEGE OF KOLKATA, WEST BENGAL, INDIA

Tanima Paul Das

Department of Food and Nutrition, Prasanta Chandra Mahalanobis Mahavidyalaya, 111/3, B.T. Road, Kolkata 700108. Email: tanima.fnta1@gmail.com

Abstract: *Smartphone has evolved exponentially from a simple talking device to an indispensable technological virtual companion. Smartphone addiction is a behavioural addiction as per DSM-5 which has been very common in student community. Very few studies have focussed on smartphone addiction among college students of Kolkata. The objective of the study was to identify smartphone addiction and sleep quality among undergraduate students in a degree college of Kolkata, West Bengal, India. It was an Institutional based, observational, cross-sectional questionnaire-based study done in April and May 2024on undergraduate degree college students of Prasanta Chandra Mahalanobis Mahavidyalaya affiliated to West Bengal State University. Simple random sampling method was used to collect data. Questionnaires consisted of assessment of sociodemographic variables, usage pattern of smartphone and assessment of addiction by Smartphone Addiction Scale-Short Version (SAS-SV) and assessment of sleep quality by Pittsburgh Sleep Quality Index (PQSI) scores. Students were informed in detail by providing Participant Information Sheet and those who voluntarily participated in this study were included after signing consent form. Data was tabulated in MS-Excel 2007 and analysed using SPSS Version 20.0. Out of 50 participants, 40% students were found to use smartphone more than 5 hrs /day, most of them (52%) used smartphone in night hours. The prevalence of smartphone addiction was found out to be 47.2% in females and 78.6% in males, median score being significantly higher ($p < 0.05$) among male students. It was also found in the study that 58.0% students were poor sleepers as assessed by their PQSI scores. Significant association was found between SAS-SV scores and PQSI scores ($r = 0.363$, $p=0.010$*). Smartphone addiction has been demonstrated to have a detrimental effect on sleep quality of majority of college students of Kolkata. Identification of smart phone addicted students, awareness and intervention strategies can be adopted.*

Keywords: Smartphone addiction, sleep quality, Smartphone Addiction Scale Short Version (SAS-SV), Pittsburgh Sleep Quality Index (PQSI), college students.

Communicated: 22.12.2024 Revised: 27.12.2024 Accepted: 28.12.2024

1. INTRODUCTION

Smartphones and other android devices are being integrated in our everyday life of all sectors of the population worldwide. The rampant usage of these gadgets has enslaved us from being a luxurious talking tool a few years back to a common tool nowadays which readily connects us to the virtual world and social networking sites. Social media is being increasingly used to connect with friends, family, create business opportunities and collaboration, for product marketing, creating and monitoring brands, products or services and sharing media. India witnessed a mobile phone revolution since its inception in late nineties and now it is an indispensable device for everybody, irrespective of economic status and literacy levels [1, 2].The number of smart phone users in India is expected to reach to 887.4 million by 2030 [3].The sudden technological spurt with explosion of easily affordable smartphones and exposure to multiple applications, though being a boon, for better communication are making the people more vulnerable to short term and long-term health problems [4] like addiction, nomophobia, stress, anxiety, depression and even sleep disorders [5-9].Young adults attending college consist of a vast major portion of consumers of being excessively dependent on smart phone causing addiction [6]. Further studies also reveal that smart phone addiction has vehemently revolutionized the lives of the young adults enrolled in colleges and they spend nearly nine hours/day using smart phone [10]. This latest technological addiction has been classified as behavioral addiction according to the latest version of the Diagnostic and statistical manual of mental disorders (DSM-5) by American Psychiatric Association, 2013 [11]. The constant pervasive use of smart phones has morphed the helpful technological device to an over reliant habitual companion causing negative impacts on sleep [12,13]. Sleep disorders are crucial complications of internet addiction and which is linked to headache, learning disability, memory loss, aggressive behaviour, mental disorder, increased risk of cardiovascular disorders and even type 2 diabetes mellitus [12,14]. The menace of smart phone over use has also been related to stress and anxiety among college students in several earlier studies [15,16].

The present study is aimed to find out the socio demographic characteristics of the prevalence of smart phone addiction among the study subjects, to assess the sleep quality among study subjects and to establish any association, if any, between smartphone addiction and sleep quality of the studied sample taken from an undergraduate degree college, Kolkata, India.

2. MATERIALS AND METHODS

The cross-sectional pilot study was institution-based observational, cross-sectional, questionnaire-based study. It was conducted in April-May 2024 at Prasanta Chandra Mahalanobis Mahavidyalaya affiliated to West Bengal State University (WBSU), West Bengal. This is a government aided college, which enrols 500 undergraduate degree college students every year. Respondents consisted of both genders of final year B.Sc. /B.A. students i.e.6^{th} Semester having own smart phone. Data were collected from students available on days of data collection and those who consented by signing Informed Consent Sheet (ICF) to voluntarily participate after going through Participant Information Sheet (PIS). Unwilling, unavailable students were excluded from the study. Simple random sampling method was used to collect data.

A semi structured questionnaire was used to collect socio- demographic data such as age, type of family, number of family members, Per Capita Monthly Income (PCMI). Furthermore, according to B. G. Prasad's scale (year 2022) per capita per month family income data were used in classifying PCMI as follows (a) Upper class Rs. $\geq$ 8480 and above per capita per month, (b) Upper middle class: Rs. 3127 to Rs. 6253(c) Middle: Rs. 1876 to 3126(d) Lower middle: Rs. 938 to 1875(e) Lower class: less than Rs. 938 [17]. Mobile phone usage patterns were assessed

using a self-administered questionnaire consisting of questionnaires such as duration of using smartphone, number of phone calls per day, preference of usage of phone at day or night time etc. Addiction to smart phone and the level of risk were estimated using Smartphone Addiction Scale Short Version (SAS-SV). It consists of 10 compulsory questions with a six-point Likert scale with values ranging from 1= Strongly disagree to 6 = Strongly Agree, the total score spans from 6 to 60. The cut-off score for males is ≥31, whereas that of females is ≥33 [18]. Pittsburgh Sleep Quality Index (PSQI), a self-reported questionnaire was used to assess sleep quality of students [19]. It consists of 19 questions summing up to 7 components producing one PQSI score. The PQSI score ranges from 0 to 21, the cut off score for good sleepers are≤5 [20, 21]. The higher score indicates more sleep disturbances. It took approximately 30 minutes in administering the questionnaires per student.

Collected data was tabulated in Microsoft Excel spreadsheet and analysis was done using SPSS Version 20.0. Pearson's Chi square tests were applied to study the association between categorical variables. Mann–Whitney U test was done to find whether significant differences exist between the median values of two independent clusters. Scatterplot was used to show linear correlation between two numerical variables. The 'p' values equal to or less than 0.05 was considered to be statistically significant.

3. RESULTS

Table 1. Socio demographic variables of undergraduate students in a degree college of Kolkata (n=50)

Variables	Groups	Number (Percentage)
Age (yrs.)	<20	21 (42)
	≥ 20	29 (58)
Gender	Male	14 (28)
	Female	36 (72)
Major	Science	33 (66)
	Arts	17 (34)
Type of family	Joint	9 (18)
	Nuclear	41 (82)
Family members	<4	18 (36)
	≥4	32 (64)
Per capita monthly Income (INR/month)	Lower class	10 (20)
	Lower middle class	5 (10)
	Middle class	10 (20)
	Upper middle class	9 (18)
	Upper class	9 (18)

Table 1 shows that out of 50 study subjects, majority of participants (58%) were in the age group ≥ 20 years. The sample constituted majority of female respondents (72%) while only 28% were male. Out of the total students, 66% studied science and 34% students studied arts. Most of the respondents (82%) belonged to nuclear families, and

64% subjects had ≥4 family members. The highest numbers of respondents (20%) were in lower (income) class and middle (income) class as per modified B.G. Prasad socioeconomic status scale. Compared to the percentage of respondents in other categories, the lower and middle-class respondents are higher and the value is 20% in both the categories according to the B.G. Prasad Scale (2022).

Table 2. Smartphone usage details of undergraduate students in a degree college of Kolkata (n=50)

Variables	Groups	Number (Percentage)
Duration of owning a smart phone (in years)	<1year	7 (14)
	1 to 5 years	31 (62)
	>5 years	12 (24)
Daily smart phone using duration (in hours)	> 2 hours to 3 hours	9 (18)
	> 3 hours to 4 hours	9 (18)
	>4 hours to 5 hours	12 (24)
	>5 hours	20 (40)
Total number of calls made with smart phone/day	<3	19 (38)
	> 3 to 5	20 (40)
	> 5	11 (22)
Time of daily smart phone use	Day	24 (48)
	Night	26 (52)

The results depicted in Table 2 shows that, all the selected respondents had their own smart phone. Majority (62%) of the students were found to own a smart phone for 1 to 5 years.

It was also found 40% of the students used phone for >5 hours / day. In addition, it was observed that, 40% students made 3 to 5 calls per day by their smartphone. Moreover, 52% of the students were found to use their smart phones ~~a~~t night time.

Table 3 shows that among the overall study population, a greater number of male students are addicted to smart phone (78.6%) as compared to female students, which was found to be statistically significant ($p < 0.05$).

Out of the 50 students, a total of 56% students were found to be positive for the addiction to smart phone uses. The SAS-SV scores ranged from 16 to 54, with an average score of 33 (±10.75). Mann Whitney U test shows that males have statistically significant ($p < 0.05$) higher median values of SAS-SV scores compared to that of female students ($p < 0.05$).

In this way, the overall observation of the study indicated more usage of smart phone in male respondents.

Table 4 shows that a greater number of male students are poor sleepers (64.3%) as compared to female students but it was not statistically significant ($p = 0.802$). The PQSI scores ranged from 2 to 19, with an average score of 6 (±2.25). Mann Whitney U test shows that male students have almost equal median values as female students.

Table 3. Distribution of undergraduate students in a degree college of Kolkata according to scores of smart phone addiction scale-short version (SAS-SV) between genders (n=50)

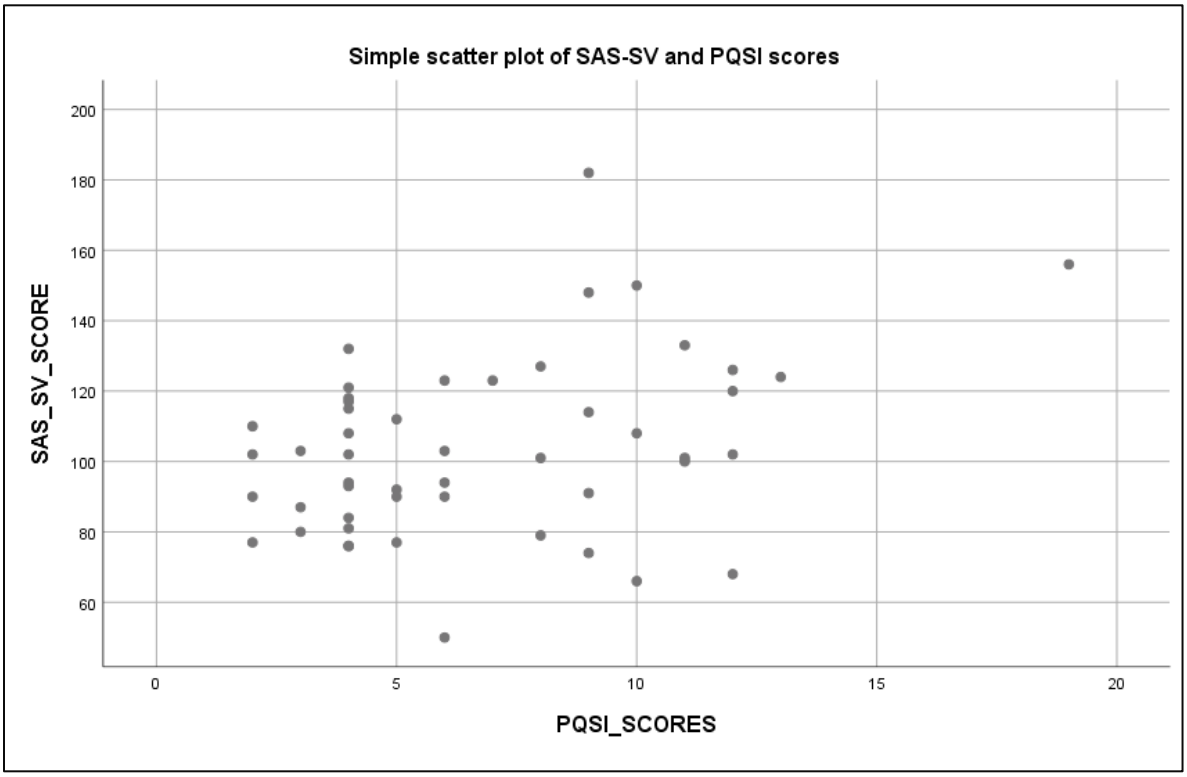
Gender	Smartphone addicted	Not addicted to smart phone	Median ± IQR
Male (N=14) SAS-SV ≥31	11 (78.6)	3 (21.4)	34.5 ± 9.5
Female (N=36) SAS-SV ≥33	17 (47.2)	19 (52.8)	32 ± 9.5
Total (N=50)	28 (56.0)	22 (44.0)	33 ± 10.75
Mann Whitney U test	Z = -1.985 p = 0.047*		

(Figures in the parentheses indicate percentages)
Pearson's Chi square $\chi^2 = 4.020$, df = 1, p = 0.047*
*Statistically significant

Table 4. Distribution of undergraduate students in a degree college of Kolkata according to Pittsburgh Sleep Quality Index (PQSI) scores between genders (n = 50)

Gender	Poor sleeper PQSI ≥ 5	Good sleeper PQSI < 5	Median ± IQR
Male (N=14)	9 (64.3)	5 (35.7)	6 ± 5.5
Female(N=36)	20 (58.3)	16 (41.7)	6 ± 5.0
Total (N=50)	29 (58.0)	21 (42.0)	6 ± 2.25
Mann Whitney U test	Z = - 0.251 p = 0.802		

(Figures in the parentheses indicate percentages)
Pearson's Chi square $\chi 2 = 0.149$, df = 1, p = 0.700



r = 0.363, p = 0.010*
*Statistically significant

Figure 1. Association of SAS-SV scores and PQSI scores of undergraduate students in a degree college of Kolkata (n =50)

The scatterplot prepared by plotting PSQI scores in X-axis and SAS–SV scores in Y-axis (Figure), shows that significant positive correlation was found between SAS-SV scores and PQSI scores (r = 0.363, p=0.010*) indicating that smart phone addiction is a strong factor influencing the quality of sleep among student respondents.

4. DISCUSSION

All the students (100%) owned a smart phone, this implies the importance of smart phone as a favourite accessory as similar to studies by Saha *et al.* [22], who reported 96.6% possession of smart phone by students which is much higher compared to 77% ownership as found by Datta *et al.* in Kerala [23]. The present study revealed that 62% of student respondents were found to possess a smart phone for last 1 to 5 years while 24% owned a smart phone for more than five years while implies most of the students have been using smart phone for quite some time, approximately since secondary section at school.40% students reported usage of smart phone daily for > 5 hours and 24% were found to use smart phone 4 to 5 hours /day which is quite alarming. Similar studies by Kwon *et al.* reported 56.3% students used smart phone for less than 5 hours in Korea [24]. Again, Ghosh *et al.* [13] found that the average time spent in smart phone is 214.62 minutes (approximately more than 4 hours) among nursing students in Nadia, West Bengal. Present study revealed the total number of calls made with smart phone/day ranged from 3 to 5 among 40% students which is lower than nursing students (50.55%) at Kalyani. Nadia, West Bengal [13]. This difference may be due to variability in number of subjects studied.

Present study revealed that 78.6% of male students and 47.2% female students were addicted to smart phone as

revealed by SAS-SV scores, the difference between genders being statistically significant ($p < 0.05$). The findings were higher than 46.15% students (47.87% males and 45.45% females) as reported by Dharmadhikari *et al.* [25] among students of Government Medical College in Western Maharashtra. However, in contrast, studies among students of Suleyman Demirel University, Turkey [15] revealed SAS-SV scores were significantly higher in females (80.50) than males (66.59). This difference may be attributed to geographical and socio-economic differences.

Sleep quality being assessed by PSQI showed the average score of 6 (±2.25), 58% students (64.3% males and 58.3% females) were found to be poor sleepers with higher PQSI scores though not statistically significant. The values are lower than Ghosh *et al*. [13] who reported very high PQSI score of 10.87 Studies on medical students in Maharashtra [25] found 46.67% were poor sleepers with a mean value of 17.70 (± 6.14). The sleep impairment can be attributed to medical background which varies from degree college as in present study.

Current study found significant positive correlation between SAS-SV scores and PQSI scores ($r = 0.363$, $p=0.010$*) similar to studies at Maharashtra ($r = 0.31$, $p < 0.01$) and also in China and Saudi Arabia [26, 27]. This reiterates smart phone addiction is a strong factor resulting in poor sleep quality.

5. CONCLUSION

The pilot study strongly hinted over usage of smart phone and its effect on sleep quality among youngsters to be a matter of serious concern. Large scale studies involving multiple institutions can help to conduct interventions and sensitization of studentsabout the health risks associated with unnecessary use of smart phone and can also endeavor to promote sleep hygiene.

6. ACKNOWLEDGEMENTS

This study would not have been possible without the assistance and encouragement extended by Principal, Dr. Arnab Ghosh of Prasanta Chandra Mahalanobis Mahavidyalaya and active cooperation of student participants.

7. REFERENCES

1. *https://www.thehindu.com/sci-tech/technology/mobile-revolution-in-india-turns-25/article33037159.html.Accessed on 23rd September, 2024.*
2. *https://swarajyamag.com/technology/the-evolving-smartphone-scenario-in-india-what-are-indians-doing-with-their-phones.html. Accessed on 20th September, 2024.*
3. *Ahmed, O., Griffiths, M. D. and Hossain, M. A., "Psychometric assessment of the 18-Item Bangla Mental Health Inventory (Bangla MHI-18)", Psychological Studies, vol.67, (2022), pp 110-122. DOI: 10.1007/s12646-022-00645-y*
4. *Paul, B., Saha, I., Kumar, S., Samim Ferdows, S. K. and Ghose, G., "Mobile phones: time to rethink and limit usage", Indian Journal of Public Health, vol.59(1), (2015), pp 37-41.DOI:10.4103/0019-557X.152856*
5. *Saha, S. R. and Guha, A. K., 'Impact of social media use of university students", International Journal of Statistics and Applications, vol. 9(1), (2019), pp 36-43. DOI: 10.5923/j.statistics.20190901.05*

6. *Choudhury, S., Saha, I., Som, T. K., Ghose, G., Patra, M. and Paul, B., "Mobile phone involvement and dependence among undergraduate medical students in a medical college of West Bengal, India", Journal of Education and Health Promotion, vol 8(1), (2019), pp 1-7. DOI: 10.4103/jehp.jehp_134_18*
7. *Subba, S. H., Mandelia, C., Pathak, V., Reddy, D., Goel, A., Tayal, A., Nair, S. and Nagaraj, K., "Ringxiety and the mobile phone usage pattern among the students of a medical college in south India". Journal of Clinical and Diagnostic Research: JCDR, vol. 7(2), (2013), pp 205-209. DOI:10.7860/JCDR/2013/4652.2729*
8. *Shad, R., Thawani, R. and Goel, A., "Burnout and sleep quality: a cross-sectional questionnaire-based study of medical and non-medical students in India", Cureus, vol.7(10)e361, (2015), DOI:10.7759/cureus.361*
9. *Chatterjee, S. and Kar, S. K., "Smartphone addiction and quality of sleep among Indian medical students". Psychiatry, vol.84 (2), (2021), pp 182-191. DOI:10.1080/00332747.2021*
10. *Roberts, J. A., Yaya, L. and Manolis, C., "The invisible addiction: cell-phone activities and addiction among male and female college students", Journal of Behavioral Addictions, vol. 3(4), (2014), pp 254-265. DOI:10.1556/JBA.3.2014.015*
11. *American Psychiatric Association: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Arlington, VA, American Psychiatric Association, (2013).*
12. *Saxena, Y., Shrivastava, A. and Singh, P., "Mobile usage and sleep patterns among medical students", Indian Journal of Physiology and Pharmacology, vol. 58(1), (2014), pp100-103.*
13. *Ghosh, T., Sarkar, D., Sarkar, K., Dalai, C. K. and Ghosal, A., "A study on smart phone addiction and its effects on sleep quality among nursing students in a municipality town of West Bengal", Journal of Family Medicine and Primary Care, vol. 10(1), (2021), pp 378-386. DOI: 10.4103/jfmpc.jfmpc_1657_20*
14. *Thomée, S., Harenstam, A. and Hagberg, M., "Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults-a prospective cohort study", B M C Public Health. vol. 11, (2011), pp 66. DOI: 10.1186/1471-2458-11-66*
15. *Demirci, K., Akgonul, M. and Apkinar, A., "Relationship of smart phone use severity with sleep quality, depression, and anxiety in university students", Journal of Behavioral Addictions, vol. 4(2), (2015), pp 85–92. DOI: 10.1556/2006.4.2015.010*
16. *Kim, H., "Exercise rehabilitation for smartphone addiction", Journal of Exercise Rehabilitation, vol. 9(6), (2013), pp 500-505. DOI:10.12965/jer.130080*
17. *Sahu, M., Das, A., Chattopadhyay, B., Paul, B. and Bhattacharyya, M..," Revised socioeconomic status scales for the year 2021: Updation based on latest base year series 2016", Medical Journal of Dr. D. Y. Patil Vidyapeeth, vol. 9, (2021), pp 22–26, DOI: 10.4103/dypj.dypj_25_21*
18. *Viola, D. M., "Negative health review of cell phones and social media", Journal of Mental Health and Clinical Psychology, vol.5(1), (2021), pp 7–18. DOI:10.29245/2578-2959/2021/1.1232*
19. *Cohen, S. and Williamson, G., "Perceived stress in a probability sample of the United States" In: The social psychology of health; Spacapam, S. and Oskamp, S. (Eds), Sage, Newbury Park. CA. 1988, pp 31-67.*
20. *https://www.das.nh.gov/wellness/docs/percieved%20stress%20scale.pdf.Accessed on 28th September, 2024.*
21. *https://www.sleep.pitt.edu/psqi. Pittsburgh Sleep Quality Index (PSQI). University of Pittsburgh Sleep Medicine Institute. University of Pittsburgh. Accessed on 24th May, 2024.*
22. *Saha, I., Som, T. K., Choudhury, S., Ghose, G. and Paul, B., "Mobile phone usage pattern among undergraduate medical students in a Medical College of West Bengal, India", Journal of the Indian Medical Association, vol. 117(8), (2019), pp 11 – 15.*
23. *Datta, S., Nelson, V. and Simon, S., "Mobile phone use pattern and self-reported health problems among medical students", Journal of Evolution of Medical and Dental Science, vol. 5(21), (2016), pp 1116-1119. DOI:10.14260/jemds/2016/259*

24. *Kwon, Y. S. and Paek, K. S., "The influence of smartphone addiction on depression and communication competence among college students", Indian Journal of Science and Technology, vol. 9(41), (2016), pp 1 – 8. DOI: 10.17485/ijst/2016/v9i41/103844*
25. *Dharmadhikari, S. P., Hershey, S. D., and Bhide, P. P., "Prevalence and correlates of excessive smartphone use among medical students: a cross-sectional study", Indian Journal of Psychological Medicine, vol.41 (6), (2019), pp 549-555. DOI: 10.4103/IJPSYM.IJPSYM_75_19*
26. *Ibrahim, N. K., Baharoon, B. S., Banjar, W. F., Jar, A. A., Ashor, R. M. and Aman, A. A., "Mobile phone addiction and its relationship to sleep quality and academic achievement of medical students at King Abdulaziz University, Jeddah, Saudi Arabia", Journal of Research in Health Sciences, vol. 18(3), (2018), e00420.*
27. *Chen, B., Liu, F., Ding, S., Ying, X., Wang L. and Wen, Y., "Gender differences in factors associated with smartphone addiction: a cross-sectional study among medical college students", B M C Psychiatry, 17(341), (2017), pp 1-9. DOI 10.1186/s12888-017-1503-z*
