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A Cross-Sectional Study to Assess the Impact of Smartphone Use on Daily Activities of Living Among Undergraduate Students in a Selected College in Bangalore

Neha Grace D. Cunha[1,*], Hindumathi B.[2], Jessy Jacob[3]

Abstract

Introduction: *Smartphones are compact devices which are commonly used by undergraduate students. Nowadays it is evident that around 4.76 h are spent by the students for entertainment and are at risk of addiction and have impact in terms of academic, physical, social, economic, psychological and behavioral activities on daily basis.* ***Aim:*** *The aim of the study was to assess the impact of smartphone use on daily activities of living among undergraduate students.* ***Methodology:*** *The study employed a non-experimental, cross sectional research design with the quantitative approach, using randomized purposive sampling technique. A total of 318 nursing students were chosen. The data collection tool consisted of two parts: (1) Baseline variables, and (2) Smartphone impact tool for assessing the impact of smartphones on daily activities. The smartphone impact tool had content validity of 0.7, parallel-form reliability with WHOQL-BREF r value 0.892.* ***Results:*** *The smartphone use had moderate impact on physical, psychological, social, academic domain with the means of 19.9±5, 28.1±6.2, 11.4±3.3, and 22.5±5.2 respectively. However, there was a mild impact on Economic domain with mean of 14±4. The overall impact of smartphone uses on daily activities among undergraduate students had moderate level of impact with mean value of 111.34±24.6.* ***Conclusion:*** *Undergraduate students are more prevalent to use smartphone, as access is very easy. There is moderate risk of having the impact of smartphone use on their daily activities. The administrators of education and service need to provide adequate guidance regarding the impact of smartphone use.*

Keywords: Smartphone, impact, activities of daily living, assess, undergraduate students

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INTRODUCTION

Smartphones are compact devices, usually pocket-size, colored, touch screen, and the most common use is to place and receive calls for voice communication and short text messages. These devices consist of multiple applications such as a digital camera to capture pictures and to make video, media players, calendar to save events and as reminders, the Global Positioning System navigation, video calling, video games, E-mails, social media apps, calculator, Google, and many more applications. Smartphones have become an integral part of society, including our educational and professional lives. Smartphone use is highest amongst people aged 18–29 years and therefore is highly represented in the college setting.

In a classroom environment, smartphone causes distractions, as students use the phone during class to check social media, multi-task or contact friends; these activities impact the daily activity of learning behavior. The smartphone serves as a source of entertainment for students, rather than a working instrument. It has been found to draw students' attention away from their daily activities such as studying, homework and assignments. Anxiety is particularly problematic among college students, as it often impedes the learning experience. Smartphones in the class create anxiety due to fear of missing out, as students notice other things going on amongst friends while they are in-class. With the distraction of smartphones, it is likely that smartphone use reduces students' daily activity of mindfulness during lectures, inhibiting the learning experience and increasing anxiety [1].

Neuro-morphological, neurochemical, neurophysiological, neurobehavioral and neuropharmacological evidence suggest that the brain remains in its active state of maturation during adolescence; such evidence supports the hypothesis that the adolescent brain is structurally and functionally vulnerable to environmental stress, risky behavior and addiction. Computed tomography and MRI studies also provide evidence in support of this hypothesis. Brain maturation occurs during adolescence [2]. Therefore, the prefrontal cortex development functions of self-control are still developing in adolescents; nursing students who belong to adolescent group are prone to use the smartphone beyond their control and it adversely affects the health of the nursing students and indirectly the patients' health.

In India there is evidence of 76% of nursing students are using smartphone at moderate level, and 23% at mild level, indicating all 99% of nursing students use smartphone [3].

Around 72% of the undergraduate students had moderate level of smartphone dependency, and 71.6% of students had moderate level of impact on academics due to smartphone usage; the impact on academics and smartphone dependency had shown a significant relationship at $p<0.01$ [4].

Descriptive studies in India reported that a majority (32.60%) of nursing students used the smartphone for less than 2 h at a stretch and at night 57.40%. The majority (91.90%) used their smartphones at home. WhatsApp (57.40%) was the most preferred app used. The undergraduate nursing students report that the main usage of a smartphone was for entertainment (78.90%). The majority (73.30%) of the nursing students kept their phones on a table near the bed while sleeping. The majority (89.60%) of nursing students spent 1-2 h per day talking; 58.50% received 1-5 calls per day, whereas 50.00% received and replied to 1-10 SMS messages per day. A few (3.30%) reported that they were awakened at night by smartphone usage. And 2.60% of the nursing students reported craving for smartphone usage. 3.70% were stressed when the smartphone was not available. The reason for over usage of smartphones was for entertainment (77.00%). Most of the nursing students preferred individual games (65.60%). 72.6% of nursing students were moderately addicted and 5.2% were severely addicted to smartphones [5].

A study investigated the effects of smartphone use on the perceived academic performance of elementary school students. The findings revealed that 79% of the students used smartphones. The proportion of parents who enforced no control over their children's smartphone use was significantly higher than that of parents who enforced strict or conditional control ($F = 8.539$, $p < 0.001$). Students with proactive low self-control and reactive low self-control reported significantly higher smartphone use for leisure and entertainment compared to students with proactive high self-control and reactive high self-control ($F = 8.77$, $p < 0.001$). Learning activities also showed a significant difference between the overuse and non-overuse smartphone groups, $F(1, 497) = 117.98$, $p < 0.001$. Regression analysis further indicated that smartphone use and self-control had a significant relationship with academic performance (coefficient = −0.664, $t = 10.2$, $p < 0.001$) [6].

The report on adverse effects of smartphone addiction among undergraduate students, reveals that students' poor health was significantly associated with smartphone addiction (Odds ratio (OR) =1.98; 95% CI=1.22–3.21). Poor physical health, psychological and mental health, poor academic

performance, procrastination and impulsivity, reduced social interaction, solitude, and suicide are the most observed adverse effects of smartphone addiction among university students [7].

Around 38% of undergraduate students noticed shoulder pain, 35% noticed tangling sensation, 39% noticed strain in eyes, 32% students noticed pain in ears, 40% students suffered with headache, 26% with anxiety and 5% with insomnia due to smartphone use [4]. There is significant relationship between smartphone use duration and calls with poor sleep quality (p at 0.05 and 0.02) [8].

A cross-section survey study on nursing students using self-reported questionnaire on effects of smartphone use on health releveled that about 38% of students noticed shoulder pain, 35% of students noticed tangling sensation, 39% noticed strain for eyes, 32%, students noticed pain in ears, 40% students suffered with headache, 26% with anxiety and 5% with insomnia [9].

A cross sectional study to assess the smartphone addition and its impact on sleep quality assessed the sleep quality of nursing students using observations if the self-administered questionnaire, and found that there is significant relationship between smartphone use duration and calls with poor sleep quality p at 0.05 and 0.02 [9].

Due to excessive smartphone use, real-life communication and empathy can decline, while online friendship may increase, and perceived social support may be decreased. This can lead to conflicts in relationship, negatively impact undergraduate students' life with decrease in academic performance and has negative impact on physical health [10].

The impact of smartphone uses on course comprehension and psychological well-being revealed statistically significant differences between the experimental and control groups. The experimental group showed higher course comprehension (M = 4.16, SD = 0.56), lower anxiety (M = 1.48, SD = 0.67), and greater mindfulness (M = 4.19, SD = 0.73) compared to the control group, which demonstrated lower course comprehension (M = 3.86, SD = 0.56), higher anxiety (M = 1.84, SD = 0.97), and lower mindfulness (M = 3.71, SD = 0.89). Correlational analysis indicated a positive relationship between mindfulness and course comprehension (r = 0.48) and a negative relationship between anxiety and course comprehension (r = –0.32), both significant at the $p < 0.05$ level [10].

METHODOLOGY

A Quantitative study design was used to assess the impact of smartphone use on daily activities of living among undergraduate students in a selected college of nursing, Bangalore. The setting was Narayana Hrudayalaya College of Nursing, Bangalore. Sampling technique was purposive sampling with samples of 318 nursing students. The sample size was calculated based on impact prevalence: 50%, precision: 5%, confidence: 95% [9]. Formula used was:

$$n = \frac{z^2 \, X \, P \, [1-P]}{d^2}$$

Inclusion criteria of sample were:

- Undergraduate students who are currently perusing nursing course in a recognized college of nursing,
- Undergraduates' students those who are providing the informed consent.
- Undergraduate students those who are willing to participate.

Exclusion criteria of sample were:

- Undergraduate students who are diagnosed with mobile addiction.
- Undergraduate students who are not willing to participate.

The study period was for 3 months. The study design is shown in Figure 1.

Development of Tool

The tool was constructed based on the review of literature, discussion with experts and experience of the investigator as shown in in Figure 2.

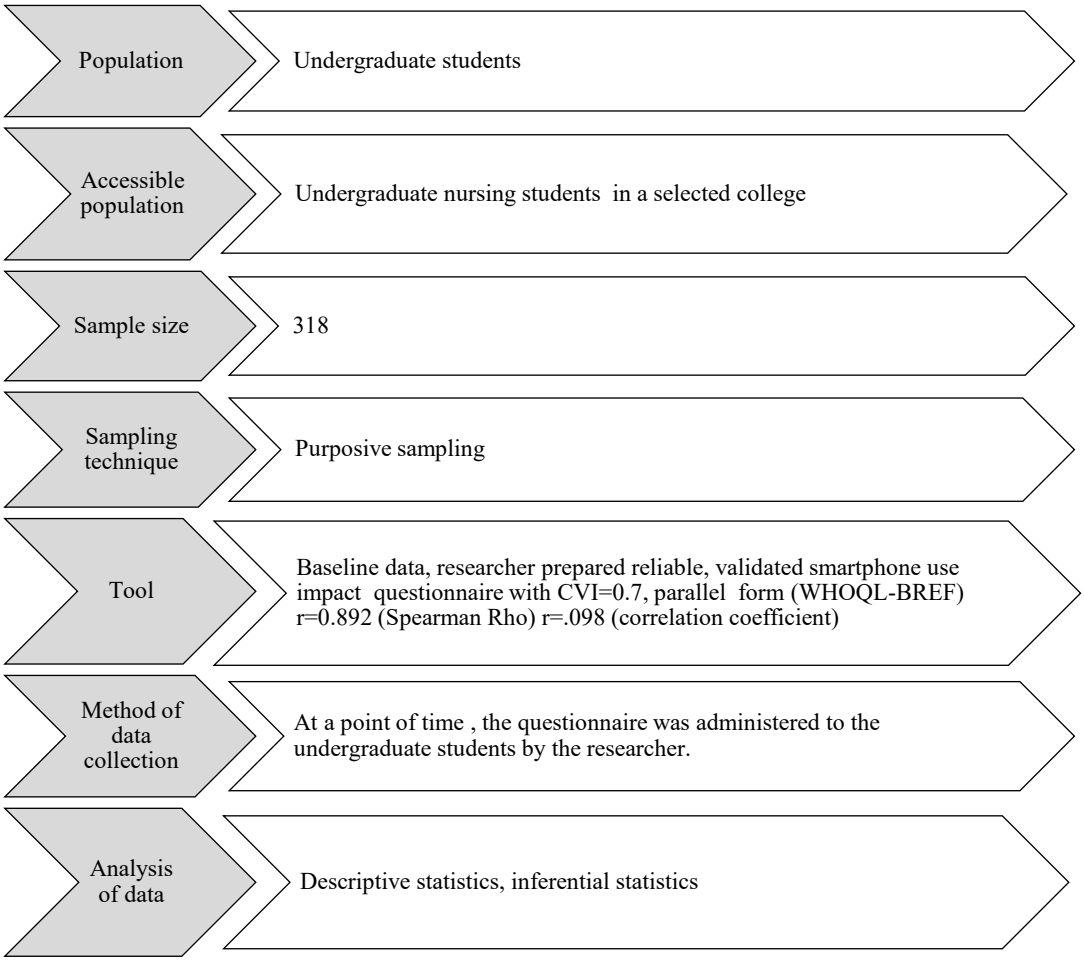

Figure 1. Schematic representation of study design.

Methods of Measurements of Outcome of Interest

Baseline variables: Age, gender, marital status, course, family, income, place of residence, parents occupation, duration of smartphone use, classroom use of smartphone, duration of use, data used per day, and purpose of use.

Outcome Variable: Impact on Daily Activities Due to Smartphone Use

Dependent Variable: Activities of daily activities.
Independent variable: Smartphone use.
Confounding variable: Baseline variables of undergraduate students.

Data Collection Tool

In this study, the instrument used consists of two sections.

Section 1: Baseline Variables

This section gathered demographic and background information, including age, gender, marital status, course of study, type of family, monthly income, place of residence, parents' occupation, duration of smartphone use, use of smartphones in the classroom, total duration of use per day, daily data usage, and the primary purpose of smartphone use.

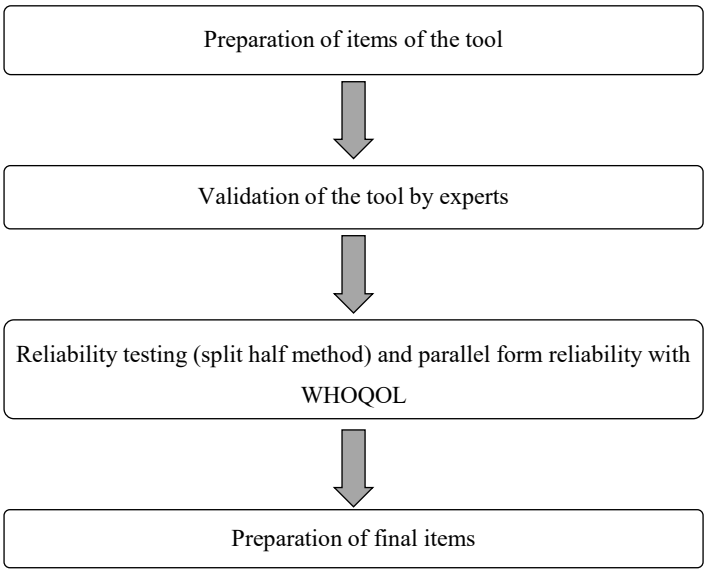

Figure 2. Steps in the development of tools.

Section 2: Smartphone Impact Questionnaire

It consisted of *Smartphone Impact questionnaire* which was used to assess the impact of smartphone use on daily activities of living. Smartphone use impact questionnaire was researcher-developed Likert Rating scale which consisted of 45 items. The questionnaire was divided into six domains such as physical (8 statements), psychological (11 statements), academic (9 statements), behavior (6 statements), economic (6 statements), and social (5 statements). Individual scores on the psychosocial questionnaire ranged from 1 to 5. The score was calculated and the level of impact on daily activities was determined based on score which ranged from 54–270. The interpretation of the scores was as follows: 45–105 mild impact on daily activities, 106–165 moderate impact on daily activities, and 166–225 severe impact on daily activities.

Content Validity of the Tool

The content validity of the tool was established by giving the tool to experts. The experts were requested to give their opinion. The tool was given to five experts, of which, four experts responded, they included one psychiatric social worker, two clinical psychologists, and one psychiatrist. The experts were requested to give opinions and suggestions regarding the relevancy, adequacy and appropriateness of the smartphone impact questionnaire. 10 questions were included based on the suggestion of the experts. The content validity index was 0.7.

Reliability of the Tool

The reliability of the tool is the degree of consistency with which a tool measures the attribute it is supposed to be measuring. Reliability of the tool was calculated using split half method of 318 samples. Spearman's Rho formula was used to find out the reliability. The r value was 0.892, the Parallel-form reliability with standardized WHOQL-BREF questionnaire was assessed for correlation coefficient with researcher prepared impact questionnaire. The correlation coefficient r value was .098.

Hypothesis

H_1: There will be significant association of selected baseline variables and impact of smartphone use on daily activities of living.

Methods of Data Collection

Data was collected in the following steps:

1. The ethical clearance was obtained from Institutional ethics committee.

2. The formal permission was obtained from authorities of selected college, Bangalore.
3. The study samples were selected based on the inclusion criteria.
4. Written informed consent was taken from the subjects.
5. The investigator collected the data from available and accessible population by administering the structured questionnaires; each student was given 45–50 min to complete it

Plan for Data Analysis

The data analysis was done using descriptive statistics:

1. Demographic information was calculated by using frequency and percentage.
2. The data obtained was analyzed using descriptive and inferential statistics.
3. Frequency and percentage distribution was used to describe the baseline variables.
4. Mean and standard deviation was used to assess the impact of smartphone use on daily living activities of students.
5. Chi square test was used to test the association between the selected baseline variables and impact of smartphone use on daily living activities among students.

RESULT

Assessment of Demographic Variables

Majority (99.7%) of undergraduate students had smartphone, 72.3% of them use phone in class, 43.4% had mobile data usage of 1 to 2 GB per day, 88.7% use smartphone for recreation purpose, they belonged to age group of 20 years (23.9%), females (71.1%), unmarried (97.5%), belonged to BSc Nursing course, having family income above Rs. 50,000 and were residing at hostels (65.7%), having professional as their parents occupation (43.7%).

The majority of the undergraduate students were in the age group of 20 years (23.9%), followed by 17 and 21 years (21%), 19.2% of the were of 19 years, 14.5% of them were of 18 years and .3% belonged to age group of above 22 years.

In regard to gender, 71.1% were females and remaining 28.9% of them were males. The Majority (97.5%) of the undergraduate students were unmarried and 2.5% were married.

Majority (56.3%) of the undergraduate students belonged to BSc Nursing course, followed by 39.9% belonged to GNM course and 3.8% belonged to Post BSc course.

The majority (61.9%) of undergraduate students had family income of above Rs. 50,000, followed by 20.1% has family income of below Rs. 25,000 and 17.9% belonged to Rs. 25,000–50,000.

The majority (65.7%) of undergraduate students had residence as hostel, 21.1% were from their home, 13.2% of the undergraduate students were from PG.

Majority (43.7%) of university students had parent's occupation as professional, followed by 41.2% were of semi-professional, 10.1% of them with skilled worker, 4.1% of clerical, and .9% of them were unemployed.

Majority (99.7%) of undergraduate students had smartphone and remaining .3% had no smartphone, among them, 92.8% of them had one smartphone, 4.4% had two smartphones and 2.8% had more than two.

Majority (72.3%) of undergraduate students use phone in class and 27.7% do not use smartphone, 72% of them bring smartphone to class and 28% of the undergraduate students do not bring smartphone to class. Majority (60.1%) of the undergraduate students leave their phone prior to the class and remaining 39.9% do not leave phone prior to class.

Majority (43.4%) of the undergraduate students had usage of 1–2 GB of mobile data, 34.6% had usage of less than 1 GB of mobile data, followed by 22% of the undergraduate students who had mobile data usage of more than 2 GB.

Majority (88.7%) of the undergraduate students use smartphone for recreation, 9.2% use it for academic purpose, while 2.2% of the undergraduate students use it for communication purpose.

Majority (96.2%) of the undergraduate students were not having current illness and remaining 3.8% of them had illness currently.

Table 1 indicates that the overall impact of smartphone use on daily activities among undergraduate students had moderate level of impact with mean value of 111.34±24.6.

Table 1. Level of Impact of smartphone use on daily activities of living among undergraduate students (n=318).

Group	**Undergraduate students**	
	Mean	***Standard deviation***
Overall impact	111.34	24.6

Table 2. Domain wise analysis of Level of Impact of smartphone use on daily activities of living among undergraduate students (n=318).

Domain	**mean**	**Standard deviation**
Physical	19.9	5.0
Psychological	28.1	6.2
Social	11.4	3.3
Academic	22.5	5.2
Behavior	14.9	3.9
Economic	14.0	4.0

Table 2 shows that the smartphone use had moderate impact on physical, psychological, social, and academic domain with the mean of 19.9±5, 28.1±6.2, 11.4±3.3 22.5±5.2 respectively. However, there was a mild impact on economic domain with mean of 14±4.

In the chi-square association analysis, the undergraduate students' baseline variables such as Gender, Course, Duration of use and Use of phone in class had significant association with impact on daily activities of living with smartphone use. The remaining Baseline variables such as age, marital status, family income, place of residence, parents' occupation, presence of smartphone, number of smartphone use, duration of smartphone used and average data of smartphone use has no significant association with impact of daily activities of living with smartphone use.

The undergraduate students' baseline variables such as Gender, Course, Duration of use and Use of phone in class has significant association with impact on daily activities of living with smartphone use. The remaining Baseline variables such as age, marital status, family income, place of residence, parents' occupation, presence of smartphone, number of smartphone use, duration of smartphone used and average data of smartphone use has no significant association with impact of daily activities of living with smartphone use. Hence H_1 is accepted in case of selected base line variables such as Gender, Course, Duration of use and Use of phone in class with impact of smartphone use on activities of daily living and H_1 is rejected for others.

DISCUSSION

The study findings show similar results with another study's findings in the baseline variable characteristics like majority undergraduate students belonged to age group of 18 to 21 years, had majority of (91.1%) females, majority (73.7%) were from hostel stay, and 57.4% participants used Whatsapp [9].

In the present study, the mean value of the overall impact of smartphone use was 111.34±24.6 which indicated that the undergraduate students had moderate level of impact in daily activities of living due to smartphone use. Similarly, in another descriptive study, findings revealed that the undergraduate students had moderate level of smartphone addition with 72.6% [9].

Strength and Limitation

Generalization of the study will be limited to the population studied, which includes the undergraduate nursing students in a selected setting where a greater number of students are females. Generalization cannot be done for larger population as the tool used is researcher-prepared tool.

IMPLICATION AND CONCLUSION

It is a concern now, as the smartphone use is increasing day by day as the technology advancement has taken higher role in students' life. The bio-psychosocial wellbeing of undergraduate students depends on smartphone use, the study's findings should serve as a wakeup call for the nursing practice, education and administration.

Ethical Policy and Institutional Review Board Statement

Nursing undergraduates provided informed consent for their voluntary participation in the study. The Institutional Ethical committee of Narayana Health Academic Ethics Committee (NHAEC), Bangalore, Karnataka, India issued an ethical clearance certificate (Ref No NHH/AEC-CL-2023-1125 dated December 21 2023). Permission was obtained for data collection from the Narayana Health Academic Ethics Committee (NHAEC) and The Principal, Narayana Hrudayalaya College of Nursing, Bangalore.

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Conflicts of Interest

There are no conflicts of interest.

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