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# Impact of Smartphone Usage on the Mental Health of Graduate Students in Kathmandu, Nepal

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## Abstract

Smartphones are increasing in use among its user that supports learning process of students. Thus, the main objective of the study is to examine the impact of smartphone usage on the mental health of graduate students in Kathmandu. The study adopted descriptive, relational, and causal research designs to investigate the impact of smartphones on students' mental health for better classroom achievement. The study employed smartphone usage as independent variable and mental health of students as dependent variable. The primary sources of cross-sectional data has been collected distributing the structured questionnaire. The 130 questionnaire was distributed to the target respondents and received only 100 (76.92 percent) useful questionnaires from the respondents. The findings of the study revealed a significant relationship between use of smartphone and mental health of graduate students. Thus, the use of smartphone shows that with the increase in use of smartphone there will be positive influence on mental health of graduate students but found insignificant. The implication of the study depicts useful and significant for parents, manufacturers, educational institutions, regulatory bodies, and its users. The novelty of the study reflects the discovery of the influence of smartphone usage in the Nepalese context representing the graduate students located in Kathmandu.

**Keywords:** Communication, mental health, smartphone, social media, university
**JEL CLASSIFICATION:** I100, I18, I21, M15

## Introduction

The features involving the sound of smartphones help clear audio delivery, recording, and playback control, allowing flexible revision, and ease through headphones or voice assistants, enhancing learning. Because of these characteristics, smartphones can be used effectively in both formal and informal education particularly in learning and sharing activities.

Smartphone addiction is characterized as a behavior addiction, loss of control due to excessive absorption and fixation with using a smartphone, worry and anxiousness that results in everyday disorder, and a preference for a virtual world that is more fun when using a smartphone than when interacting with friends (Kim, et al., 2015). The evolving mobile information and communication technologies (ICTs) have raised debates about the potential effects on mental health. The communication and media function of smartphones makes them potential substitutes for computers (Sok, Seong, Ryu, & H, 2019). The studies have shown the associations between poor mental health outcomes and excessive or intensive use of phone calls, texts, IM, and emails. Mental well-being investigates hedonic well-being, which includes affective emotions and cognitive assessments of life satisfaction, and eudemonic well-being, which includes psychological functioning and self-realization. The nervous system has been proven to be the most sensitive to the effects of the electromagnetic field of a mobile phone. Some previous studies have also shown high rates of mental disorders, typically depression, anxiety, and stress, among university students around the world who are enduring a special period of great challenges and risks. In everyday life, many people pay more attention to

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personal privacy (Rusman , 2017); mobile phones require passwords, very mindful that other people do not have permission to view their mobile phones, so smartphones are personal goods. Smartphones are a real-time information provider with advanced computing capabilities that have shrunk the inequalities in Internet Access (IA) and provide more equal opportunities for many people. Many smartphone users carry their phones everywhere and use them for an average of one hundred and fifty times per day. The addictive use could result in accidents, psychological detachment, countless negative effects on physical health, and various types of mental illness (Ayandele, Popoola, & Oladiji, 2020). The evolving mobile information and communication technologies have raised debates about the potential effect on mental health. With the innovation and development of modern science and technology, smartphones will become smaller and smaller, and their functions will become more and more. How to actively affect the mental health of college students using mobile phones is a top priority (Mei, et al., 2019). The media function of a mobile phone is compatible with the content of traditional media and online media, and the means of communication and content of smartphones. In a relatively free learning environment in college and universities, smartphones are the main means for college students to obtain information, analyze information, and communicate with others. College students' dependence on mobile phone has become a common phenomenon. The use of mobile phones enables college students to update their information at any time and actively participate in social activities.

The mental health (MH) has been established as not the mere absence of psychopathological. The most commonly studied psychopathological constructs in relation to problematic smartphone use and usage frequency include variables measuring the level of depression, anxiety, stress, and low self-esteem (Elhai, et al., 2017). Mental well-being investigates hedonic well-being that includes affective emotions and cognitive self-realization. The people with greater mental well-being tended to have lower risks for anxiety and depression. The incidence of mental health problems has increased worldwide. These observations have raised concerns about the adverse effects of excessive mobile phone use on the physical and mental health of students. The interactions of problematic mobile phone use and sleep quality with mental health need further study. Therefore, the study aims to test the relationships between levels of smartphone use and problematic smartphone use with both depressive symptoms and anxiety symptoms.

Studies on smartphone use and mental health in universities have been limited, primarily in schools. As smartphones become more popular, it is crucial to assess their impact on university students' mental health. Every research project has to have specific goals that highlight the purpose of the work. The study's main goal was to investigate how students' use of smartphones affected their mental health.

## Review of Literature

A literature survey and literature review are essential research tools in academic fields, providing a comprehensive overview of previous published works and identifying relevant theories, methods, and research gaps.

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Theoretical Foundation

This study reviews social cognitive theory (SCT) and Uses and gratifications theory (UGT), which focus on how people regulate behavior through control and reinforcement to achieve goal-directed behavior. SCT explains how people use media for their own needs, while UGT focuses on how people satisfy their needs when they fulfill them.

Social Cognitive Theory (SCT)

The SC theory was developed by Bandura (1991) as a social cognitive theory, which is based on the concept that learning is affected by cognitive, behavioral, and environmental factors. Social cognitive theory (SCT) started as social learning theory (SLT) in the 1960s by Bandura. Social cognitive theory suggests people learn through observation, with self-regulation through self-monitoring, judgment, and affective self-reaction. Four key aspects include attention, retention, reproduction, and motivation.

The fourth aspect concerns motivation, which propels the learner to attention, practice, and retention. (Hmieleski & Baron, 2009) The study suggests that understanding the impact of dispositional variables requires a thorough examination of their interaction with key behavioral and environmental factors.

Uses and Gratification Theory (UGT)

Blumler & Katz (1974 ) developed the uses and gratifications theory. The UGT theory suggests that media users actively choose and use media sources that fulfill their needs, rather than the media's effects. It identifies various needs and gratifications, suggesting media satisfaction is subjective and specific to each individual. A uses and gratification theory perspective on why people purchase virtual goods (Kaur, Dhir, Chen, Malibari, & Almotairi, 2020). The UGT aims to explain the relationship between different uses and gratifications of mobile instant messaging apps, continuation, and purchase intentions.

**Review of Empirical Literature**

Wang, et al. (2014) studied on student life assessing mental health (MH), academic performance(AP) and behavioral trends of college students using smartphone. The survey was created using Google Forms on an online platform through which it was disseminated. The study included both dependent and independent variables. The study included different student life apps and sensing systems, like automatic and continuous sensing activity detection, conversation detection, and sleep detection. The study included a correlation with mental health. The study included the degree of correlation between sensing data and outcomes using the Pearson correlation. The study used different types of scales, like the depression scale, the perceived stress scale, the loneliness scale, and the flourishing scale. The study explains various scales used in psychiatry, including depression, perceived stress, loneliness, and flourishing. The study suggests providing feedback on hidden states to students and stakeholders, emphasizing the importance of accurate measurement of depression, stress, loneliness, and self-perceived success.

Kim, et al. (2015) investigated the relationship among smartphone addiction tendency, depression, aggression, and impulsion as a dependent variable of mental health, while smartphone was the independent variable. The purpose of the study was to analyze the impact

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of smartphone addiction on aggression, depression, and impulsivity. The study found that smartphone addiction significantly influences psychosocial factors like depression and aggression, with men experiencing more severe addiction. The study found a positive correlation between smartphone usage and addiction severity, depression, and aggression, with impulsion being the most significant factor in internet addiction.

Tao, et al. (2017) investigated the effect of sleep quality on the association between problematic mobile phone use and mental health symptoms in Chinese college students. The variables included the mental health, i.e., sleep, anxiety, depression, as dependent variables, whereas the cellular phone was an independent variable. The study found that poor sleep quality significantly increases the risk of mental health problems in students with problematic mobile phone use compared to those without such issues. Improving sleep quality could be an effective strategy to reduce these risks. However, the study had limitations, including cross-sectional nature, anonymous responses, and recall bias.

Elhai, Tiamiyu and Weeks (2018) examined the relationship between depression, social anxiety, rumination, and problematic smartphone use among college students. It found that depression and social anxiety severity accounted for variance in rumination, which correlated with problematic smartphone use levels. The study also suggested brain circuitry deficits as underlying problematic smartphone use. However, limitations included a convenience sample, self-report measures, smartphone frequency, and lack of longitudinal data for causal inferences.

Visnjic, et al. (2018) explore the relationship between mobile phone use and mental health by measuring the levels of depression, anxiety, and stress among university students in Serbia and Italy. The findings of the study strongly indicated that the intensity and the modality of mobile phones used could be a factor that influenced causal pathways leading to mental health problems in university student populations. The study findings suggest that a stronger predictor of depression among students in both countries was male gender.

Wang and Zheng (2019) examined the relationship between smartphone usage time and mental health of college students in china. The study included both dependent and independent variables, where the independent variable was smartphone usage time, while the dependent variable was the mental health of college students. The study concludes the impact of smartphone usage on college students' interpersonal communication, learning, thinking, and psychological state, suggesting the need for improved mental health education.

Guo, et al. (2020) studied the problematic smartphone use and mental health in Chinese adults. The study analyzed smartphone usage and mental health, focusing on the relationship between smartphone usage and mental well-being. It found that individuals with affecting disorders had lower mental wellbeing levels. However, the independent association of PSU with mental well-being was supported in those screened negative for anxiety or depression.

Melcher and Torous (2020) investigated the expanding need for mental health services on college campuses increased interest in smartphone apps for mental health. The study aimed to evaluate the quality of mental health apps recommended by colleges to students, suggesting that counseling centers use an app evaluation framework.

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Ayandele et al. (2020) investigated the addictive use of smartphones, depression, and anxiety among female undergraduates in Nigeria. The study investigates the link between smartphone addiction and depression and anxiety symptoms among female undergraduate students. It study suggests that technology breaks and moderating smartphone use to mitigate its negative impact on mental health.

The use of smartphones are real-time information provider with advanced computing capabilities that has shrunk the inequalities in internet access and provides more equal opportunities for many people (Ayandele, Popoola, & Oladiji, 2020). The evolving mobile information and communication technologies have raised debates about the potential effect on mental health (Guo, et al., 2020). The smartphone is a cellular telephone with an integrated computer and other features not originally associated with telephones, such as an operating system, web browsing, and the ability to run software applications. The use is gradually becoming a compelling learning tool used to enhance teaching and learning in distance education. Smartphones can be used by individuals in both a customer and business context, and are now almost integral to everyday modern life. Many consumers use their smartphones to engage with friends, family, and brands on social media. Smartphones, with high-resolution displays and web browsing capabilities, are primarily used by students, but their excessive use can negatively impact learning and academic performance, particularly during college.

Mental health encompasses both hedonic and eudemonic well-being, encompassing affective emotions, cognitive assessments of life satisfaction, and psychological functioning and self-realization. Additionally, the mental health problem has increased worldwide and has raised concern about the adverse effects of excessive mobile phone use on the mental health of college students (Tao, et al., 2017). Mental health can affect daily living, relationships, and physical health. Mental health encompasses cognitive, behavioral, and emotional well-being, influencing stress, relationships, and decision-making. Smartphones can disrupt college students' mental health, affecting stress, depression, and anxiety, and potentially causing mental illness.

The study analyzed the impact of smartphone usage on the mental health of university students through a theoretical and empirical review and formulated several hypotheses.

*AH1: There is a significant relationship between the use of smartphones and the mental health of students.*

**Table 1.** *Summary of Review of Empirical Studies*

| Authors/Year | Major Findings |
|---|---|
| Wang et al.(2014) | The study found a significant relationship between the automatic objective sensor data from smartphones and mental health and educational outcomes of the student body.<br>Identified a significant positive relationship between healthy sleep and daily activity patterns in the students. |
| Kim et al.(2015) | Identified a significant and positive relationship among smartphone addiction tendency, depression, aggression, and impulsion in college students.<br>Observed the significant and positive effect of smartphone addiction on the mental health of college students.<br>Identified the relationship between impulsiveness and the security of internet addiction on the mental health of students. |

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| | |
|---|---|
| Tao et al.(2017) | Showed the significant effect of sleep quality on the association between problematic mobile phone use and mental health symptoms in students.<br>Found the significant interaction of insomnia and sleep duration with depression by using the mobile phone.<br>Observed a significant and positive relationship between sleep quality and the mental health of students. |
| Elhai, Tiamiyu and Weeks(2018) | Identified a relationship between social anxiety severity and increased levels of problematic smartphone use.<br>Showed a significant and positive relationship between social anxiety severity and smartphone use frequency. |
| Visnjic et al.(2018) | Identified the significant relationship between the manner of mobile phone use and depression, anxiety, and stress in students.<br>Observe the significant influence of mobile phone use on the causal pathway leading to mental health. |
| Wang and Zheng(2019) | Identified the significant relationship between the smartphone usage time and the mental health of college students.<br>Found the significant impact of smartphone use on the mental health of the college students using smartphones.<br>Showed the significant and positive effect on college students' mental health on use of mobile phone. |
| Guo et al.(2020) | Observed the significant relationship between problematic smartphone use and mental health in students.<br>Showed the negative effect on the impaired mental well-being outcomes associated with problematic smartphone use. |
| Melcher and Torous(2020) | Identified the significant relationship between the smartphone app and mental health of college students.<br>Found the significant effect of a smartphone app on a college counseling center's site of the college students. |
| Ayandele, Popoola and Oladiji(2020) | Identified a significant relationship between the addictive use of smartphones and symptoms of depression, anxiety among female undergraduate is students.<br>Showed the significant difference in symptoms of depression and anxiety between normal and addicted female undergraduate smartphone users. |

Research Framework

The theoretical model for the relationship is formulated as equation below:

$Y = a+bx+e$ .....(i)

Where,

a = Intercept

b = Coefficient of use of smartphone

Y = Mental health (MH)

X = Impact of smartphone use (ISU)

e = Error term of the smartphone


***Figure1.*** Research framework

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A research framework is a useful tool for organizing ideas and creating conceptual distinctions. This study examines the impact of smartphones on students' mental health, focusing on the independent and dependent variables. Smartphones, which combine various functions, play a growing role in people's lives.

The framework defines the smartphone as an independent variable from the study of (Ayandele, Popoola, & Oladiji, 2020), (Wang, et al., 2014), (Kim, et al., 2015), (Tao, et al., 2017), (Elhai, Tiamiyu, & Weeks, 2018), (Visnjic, et al., 2018), (Wang & Zheng, 2019), (Guo, et al., 2020) and (Melcher & Torous, 2020). The dependent variable, mental health, is defined as not the mere absence of psychopathological symptoms, which leads researchers to broaden the investigation field to positive psychology. Mental health encompasses depression, aggression, and impulsion. Mental health occurs at time when the students are particularly vulnerable to mental illness. As mental health is the dependent variable it was taken from (Wang, et al., 2014), (Kim, et al., 2015), (Tao, et al., 2017), (Elhai, Tiamiyu, & Weeks, 2018), (Visnjic, et al., 2018), (Wang & Zheng, 2019), (Guo, et al., 2020), (Melcher & Torous, 2020) and (Ayandele, Popoola, & Oladiji, 2020).

## Methods

The study investigated the impact of smartphone use on the mental health of university students in Sitapaila, Nepal. It used quantitative, descriptive, relationship, and causal research to analyze variables and patterns. The study included students from various faculties and genders, selected through convenience sampling techniques.

The study utilized a self-administered structured questionnaire with a 5-point Likert scale, developed and distributed to students using Google Forms, utilizing primary data sources. To evaluate the use of smartphones, four items were extracted from (Shakoor, Fakhar, & Abbas, 2021). Similarly, mental health was assessed using four items taken from the study work of (Zhao, et al., 2022). The questionnaire starts with a summary of the study's purpose and confidentiality. Respondent were asked about their gender, educational qualification, and smartphone usage hours in the general background. Similarly, the basic and variable-related questions, and a Likert scale question to assess the student's overall perception of the effect of smartphone use on mental health.

## Results

The study examines the impact of smartphone usage on students' mental health, utilizing questionnaire data and statistical tools, and presents findings through descriptive analysis.

The study conducted a field survey of 130 students in the Sitapaila area to investigate the impact of smartphone usage on their mental health. Only 100 of the 130 questionnaires were valid, with 24 not returned and 6 invalid due to errors. Respondents were asked to respond using a 5-point Likert scale. The data was analyzed using correlation and regression analysis.

General Information of Respondents

Table 2 shows general information about respondents, with males comprising 58 percent and females at 42 percent. No equal participation rates were observed by gender, as shown in Table 2. Moreover, the age group of respondents below 20 years represented 15 percent, the age

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group between 21 to 25 remained 19 percent, the age group between 26 to 30 was 55 percent, as the majority of respondents and the age of participants above 30 was 11 percent. Similarly, the respondents holding a bachelor's degree were 21 percent, and the majority of respondents were master's degree holders 79 percent.

**Table 2.** *General Information of Respondents*

| Variables | Characteristics | Frequency | Percent |
|---|---|---|---|
| Gender | Male | 58 | 58 |
| | Female | 42 | 42 |
| | **Total** | **100** | **100** |
| Age | Below 20 Years | 15 | 15 |
| | 21 to 25 | 19 | 19 |
| | 26 to 30 | 55 | 55 |
| | Above 30 | 11 | 11 |
| | **Total** | **100** | **100** |
| Education | Bachelor | 21 | 21 |
| | Master | 79 | 79 |
| | **Total** | **100** | **100** |

Smartphone Daily Use of Respondents

The level of respondents' daily smartphone use is shown in the table. There were 51 students with less than five hours a day of smartphone daily use and 49 students with more than five hours a day of smartphone daily use. According to Table 3, 51 percent used smartphones daily for less than five hours, while 49 percent used smartphones daily for more than five hours a day.

**Table 3.** *Smartphone Daily Use among the Respondents*

| Smartphone daily uses | Frequency | Percent |
|---|---|---|
| less than 5 hrs a day | 51 | 51 |
| More than 5 hrs a day | 49 | 49 |
| Total | 100 | 100 |

Smartphone Usage Duration of the Respondents

Table 4 illustrates the profile of the respondents based on their smartphone usage duration. According to Table 4, 57 percent of students have used smartphones for more than 5 years, while 43 percent of students have used smartphones for less than 5 years. In terms of smartphone usage duration, there were no equal participants. The table illustrates a higher percentage of students using smartphones for more than five years than that of students using smartphones for less than five years.

**Table 4.** *Smartphone Usage Duration of the Respondents*

| Smartphone usage duration | Frequency | Percent |
|---|---|---|
| More than 5 years | 57 | 57 |
| less than 5 years | 43 | 43 |
| Total | 100 | 100 |

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Smartphones Interfere with Sleeping Among Respondents

Table 5 represents the results on the responses on the opinion regarding the smartphones interfere with sleeping. Out of the total respondents, 67 agreed that smartphone usage interferes sleeping, while 33 disagreed.

**Table 5.** *Smartphone Interferes with Sleeping Among Respondents*

| Response | Frequency | Percent |
|---|---|---|
| No | 33 | 33 |
| Yes | 67 | 67 |
| Total | 100 | 100 |

Smartphone Boost Self-Esteem among Respondents

In terms of smartphones boosting self-esteem, 58 respondents think that smartphones do not boost self-esteem, while 42 think that smartphones boost self-esteem. As Table 6 presents, the majority of students (58 percent) find that smartphones does not boost self-esteem whereas remaining (42 percent) finds it boost self-esteem.

**Table 6.** *Smartphone Boost Self-Esteem among Respondents*

| Response | Frequency | Percent |
|---|---|---|
| No | 58 | 58 |
| Yes | 42 | 42 |
| Total | 100 | 100 |

Smartphone Craving after a Short Time among Respondents

Smartphone crave after a short time is presented in Table 7. It demonstrates that, the 48 out of 100 respondents agreed that they crave for the smartphone after short time period, which is the 48 percent of total respondents whereas the 52 perceive that they disagree with the smartphone crave after short time period, which is also 52 percent of total respondents.

**Table 7.** *Smartphone Crave After Short Time among Respondents*

| Response | Frequency | Percent |
|---|---|---|
| No | 52 | 52 |
| Yes | 48 | 48 |
| Total | 100 | 100 |

Perception of the Major Factor that Increases Students' Smartphone Use

Various factors play a vital role in the growing use of smartphones. Factors such as entertainment, communication, study and research, and social media influence. Table 8 presents the multiple factors that encourage students to use smartphones. As shown in Table 8, 26.80 percent stated that communication is the main factor for increasing the use of smartphones, while 25.40 percent stated that entertainment increases smartphone use. Similarly, 25 percent stated that study and research increase the use of smartphones, while only 22 percent stated that social media increases smartphone use.

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**Table 8.** *Perception of the Major Factor that Increases Students' Smartphone Use*

| Statements | Responses | |
|---|---|---|
| | N | Percent |
| Entertainment | 70 | 25.40% |
| Communication | 74 | 26.80% |
| Study and research | 69 | 25.00% |
| Social media influence | 63 | 22.80% |
| Total | 276 | 100.00% |

A Dichotomy group tabulated at value 1.

Smartphone use can negatively affect mental health, leading to suicidal thoughts, poor academic performance, focus issues, sleep loss, and low self-esteem. Ranking questions assign weights based on alternatives. The choice with the lowest mean score is ranked as the most important choice that is a weighted mean 2.13, and the one with the highest weighted mean score that is 3.06, is ranked as the least important.

**Table 9.** *Opinion on the Most Important Reason behind the Effect of the Use of Smartphones*

| Features | Rank 1 | Rank 2 | Rank 3 | Rank 4 | Total responses | Weighted value | Weighted mean | Rank |
|---|---|---|---|---|---|---|---|---|
| Suicidal feelings and self-injury | 14 | 13 | 26 | 47 | 100 | 306 | 3.06 | 4 |
| Poor academic performance | 30 | 29 | 28 | 13 | 100 | 224 | 2.24 | 2 |
| Lack of focus | 31 | 37 | 20 | 12 | 100 | 213 | 2.13 | 1 |
| Sleep loss and lack of self-esteem | 25 | 21 | 26 | 28 | 100 | 257 | 2.57 | 3 |
| Total | 100 | 100 | 100 | 100 | | 1000 | | |

Survey on Use of Smartphones

The study assessed the impact of mobile phone use on students' mental health using the Likert scale, focusing on their perception of recognition statements. Table 10 shows that the maximum number of respondents, with a weighted mean score of 3.81, agreed on the statement that they used to work on the assignment. Likewise, the majority of respondents, with a weighted mean of 3.43, agreed on the statement I used to record the lectures. With the weighted mean of 3.67, the statement they used to search for information was agreed. Finally, with a weighted mean of 3.59, the respondents agreed on the statement that they used to work on a presentation.

**Table 10.** *Survey on the Use of Smartphones*

| Statements | Ratings | | | | | Total responses | Weighted value | Weighted mean |
|---|---|---|---|---|---|---|---|---|
| | SDA | DA | N | A | SA | | | |
| I use to search for information | 2 | 8 | 32 | 37 | 21 | 100 | 367 | 3.67 |
| I use to work on assignment | 2 | 4 | 19 | 61 | 14 | 100 | 381 | 3.81 |
| I used to record the lectures | 3 | 10 | 36 | 43 | 8 | 100 | 343 | 3.43 |
| I used to work on presentation | 3 | 10 | 31 | 37 | 19 | 100 | 359 | 3.59 |
| Grand weighted mean | | | | | | | | 14.50 |

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Survey on Mental Health

The perception that students' smartphone usage affects mental health was collected by asking the respondents about to provide their views regarding the given statement on interaction Table 11 reveals that the majority of the respondents' shows neutral response to the statement using my phone distract me from negative or unpleasant thought with the weighted mean value 3.22. Similarly, another statement, using my phone, distracts me when they under pressure, showing an agreed response with a maximum of weighted mean value 3.44. The statement using my phone disturbs me from tasks that are tedious or difficult, and got the majority of responses with the weighted mean of 3.99.

**Table 11.** *Survey on Mental Health*

| Statements | Ratings | | | | | Total responses | Weighted value | Weighted mean |
|---|---|---|---|---|---|---|---|---|
| | SDA | DA | N | A | SA | | | |
| Using my phone distracts me from negative or unpleasant thoughts | 8 | 8 | 43 | 36 | 5 | 100 | 322 | 3.22 |
| Using my phone distracts me when I'm under pressure | 2 | 12 | 34 | 44 | 8 | 100 | 344 | 3.44 |
| Using my phone disturbs me from tasks that are tedious or difficult | 5 | 12 | 29 | 47 | 7 | 100 | 339 | 3.39 |
| Grand weighted mean | | | | | | | | 10.05 |

Descriptive Statistics for all Samples

Table presents the mean, median, mode, standard deviation, and variance of the variables studied among all sample respondents. Table 12 reveals the descriptive status for the whole sample. It is found that the median for the independent variable, use of smartphones to be higher at 3.50 than the dependent variable, mental health. The dependent variable, mental health, has the greatest mode value, followed by the independent variable, use of smartphones. However, the use of smartphones is determined to have the greatest mean, with a value of 3.63, compared to the mental health of students. Uses of smartphones have the highest standard deviation and variance, with values of 0.66 and 0.43, respectively.

**Table 12.** *Descriptive Statistics for all Samples*

| Variable/statistics | N | Mean | Median | Mode | STD | Variance |
|---|---|---|---|---|---|---|
| Use of smartphones | 100 | 3.63 | 3.50 | 3.5 | 0.66 | 0.43 |
| Mental health | 100 | 3.35 | 3.33 | 3.67 | 0.65 | 0.42 |

**Correlation**

For the entire sample, a correlation analysis is performed. Correlation analysis helps in examining the relationship between the variables being studied. The correlation analysis of the variables under study is presented in Table 13. The correlation between use of smartphones and mental health of students is studied in this research.

**Table 13.** *Relationship between Variables for all Samples*

| Variables | | Use of Smartphones | Mental Health |
|---|---|---|---|
| Use of Smartphones | Pearson Correlation | 1 | 0.012 |
| | Sig. (2-tailed) | | 0.983 |

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| | | | |
|---|---|---|---|
| Mental Health | N | 100 | 100 |
| | Pearson Correlation | 0.012 | 1 |
| | Sig. (2-tailed) | 0.983 | |
| | N | 100 | 100 |

Spearmen correlation analysis of the variable is performed for all sample, which is presented in Table 13. As shown in the table, the correlation between use of smartphone and mental health is observed to be insignificant (as the P value is more than 0.05) and null hypothesis is accepted.

Regression Analysis

Regression analysis is performed to determine the impact of independent variable on the dependent variables. It aims to check the degree of relationship between two variables. In this study, the regression analysis is done to know the impact smartphone uses in mental health of students.

**Table 14.** *Coefficient for the Use of Smartphones*

| Coefficients a | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|---|---|---|---|---|---|
| | B | Std. Error | Beta | | |
| (ConstAnt) | 3.342 | 0.365 | | 9.166 | 0 |
| Use of smartphones | 0.002 | 0.099 | 0.012 | 0.021 | 0.983 |

A Dependent Variable: Mental Health

Table 14 reveals the result of the coefficient for the use of smartphones. The finding showed a positive effect of smartphone usage on the mental health of graduate students, but found to be insignificant. It means that a rise in smartphone usage, however, leads to an increase in the mental health of students. Moreover, a one percent increase in smartphone usage increases the mental health of students.

## Discussion and Conclusion

Discussion

The study investigated the impact of smartphone usage on the mental health of graduate students in Sitapaila, Kathmandu. The purpose of the study was to analyze the impact of smartphone addiction on mental health. The findings of the study showed a positive influence of smartphone usage on the mental health of graduate students, but found to be insignificant. Therefore, the study showed that smartphone use does not significantly affect students' mental health. The finding is consistent with Kim et al. (2015), who observe the positive relationship between smartphone use and the mental health of students. The result of the study of Tao et al. (2017) also confirms the linkage between the uses of smartphones on the mental health of students.

**Conclusion**

The study investigates the impact of smartphone usage on students' mental health, using statistical tools like descriptive, correlation, and regression analysis. Primary data was collected through a structured questionnaire, and the findings were analyzed using mean, median, mode, standard deviation, variance, correlation, and regression.

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The relationship between the use of smartphones and the mental health of students is observed to be insignificant. The coefficient of use of smartphones shows that an increase in smartphone use does increase the mental health of students but insignificantly.

The study examined the relationship between smartphone use and mental health among graduate students in the Sitapaila, Kathmandu using descriptive, correlational, and causal research designs, utilizing primary data from a structured questionnaire. The study was conducted on 100 respondents. In this study, data were evaluated using mean, median, mode, standard deviation, variance, and correlation and regression analysis.

Additionally, It can be concluded that providing mental health apps, educational resources, and avenues for social interaction through smartphones helps in supporting students' mental health.

Policy Implication

The study examines the impact of smartphone use on students' mental health, providing practical implications for students, researchers, teachers, and educational institutions. It helps parents and teachers understand the impact of smartphones on mental health, enhancing classroom participation and guiding teachers to a better understanding of student behavior and mental health issues. However, this study is not free from limitations. This research is constrained by its coverage regions, including small sample size, restricted variables, and reliance on cross-sectional data confined to the Sitapaila area, Kathmandu, only. Future research needs to explore influencing factors with longitudinal studies, larger sample sizes, and broader variables to enhance users' experience, benefiting parents, producers, academic institutions, regulatory authorities, and smartphone users.

## Authors Contribution Statement

Conceptualization: 1 & 2
Writing Initial Draft: 1, 2, 3, 4, 5 & 6
Methodology: 1, 2, 3, 4, 5 & 6
Data Analysis: 1, 2, 3, 4, 5 & 6
Data Collection: 5 & 6
Re-write and revision: 1 & 2

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## Declaration statement

The authors declare no conflict of interest.

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