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| Close-up image showing the leaf-sides of two oversized books side-by-side on a bookshelf, with additional books in soft focus background |
| **IMPACT OF MOBILE PHONE USAGE ON SLEEPING PATTERNS OF STUDENTS**  Team 7 (Icons) – Rohit Rameshwaram  Shiva Kumar Kotha  Sai Teja Bheema  Revanth Reddy  Chandrahas Reddy Komma |
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**CHAPTER-I**

**ABSTRACT**

**Mobile Phone Usage during Nights among Male and Female Graduate Students in Wichita State University**

The main goal of this study is to find out how mobile phone usage throughout the night affects sleep among major students in Wichita State University. In today's society, technology has played a significant role and had a significant impact on every individual's life, and one of the most prominent technological applications has been the cell phone. Among the younger generation, cell phone usage is extremely high. This research was carried out among Wichita State University major students. The purpose of this study is to look into the impact of late-night mobile phone usage on these major students' sleep quality. This study drew in a total of 116 students and took place at Wichita State University. The analysis of data was computed using the Multiple Linear Regression. Results obtained have shown that there is no significant difference between the all independent variables in our data.

### CHAPTER-II

### INTRODUCTION

**1.1 Background of the study**

When it comes to the contemporary day, technology has gone through various stages of development, and as a result, it has evolved into something that is highly particular to each individual. Without the presence of technology in today's world, it is estimated that over half of the population would be unable to complete their daily routine, which includes personal, professional, and general chores. Technology comes in a variety of ways, with social media being one of the most well-known. Every individual now has access to any platform under the social media umbrella thanks to technological advancements. In addition, among all types of technology, the mobile phone has the biggest number of users.

The use of a mobile phone is not restricted by age or time. Almost everyone these days is engrossed in their use of it throughout the day, as well as their daily activities. The majority of people are directly influenced by multitasking activity because they are seen engaging in a general activity and are forced to engage in mobile phone usage. It is a new type of addiction that has emerged in the technological world.

Access to these technologies has been quite simple, resulting in the easy possession of at least one type of technology. Speaking of it, the highest end technologies are mobile phones, that comes in varying models and brands, iPods, laptop, computers, Ipad’s etc. Mobile phone is one of the most commonly used form of technology and an average individual is seen to be engaging in the use of it in an average of 80% time of their daily routine. Mobile phones, which come in a variety of types and brands, iPods, laptop computers, Ipads, and other high-end technologies are examples. The mobile phone is one of the most widely utilised forms of technology, with the average person using it for 80% of their daily routine.

Specifically, the younger generations are the demographic that is most engrossed in the use of high-end technologies, particularly the mobile phone. It is required in schools, universities, and any other educational setting for the acquisition of information and knowledge. Many of them, on the other hand, have a habit of using their phones excessively late at night.

After a long day of routine, a typical average individual need at least a full cycle of 8 hours of sleep. However, with this new trendsetting usage of technology, the younger generations have developed a radical and unique sleep cycle pattern. The majority of them had a higher rate of involvement with this item at night when compared to other times of the day. This has had a great number of negative consequences, particularly in terms of sleep quality among the younger generation, who are directly affected by sleep disturbance induced by mobile phone use off-beam.

This can be described using Henry Murray's (1938) Psychogenic Needs theory, which explains the various types of needs that people attempt to fulfil. With this, technology and mobile phone usage is a need that can be classified as a materialistic need, in which people seek to own at least one piece of technology, information needs, in which people believe that only by owning this device can they obtain any type of information at any time, and affection needs. With the concerns of this usage of mobile phone and its high engagement during the nights, the most affected area has been an individual’s sleeping pattern.

This illness has paved the way for a slew of other issues, including lower performance, difficulty to focus on a task, mental health issues, and biological health issues. Many people are unaware that their improper usage of a mobile phone has had a detrimental impact on their sleep and has resulted in sleep disruption. Aside from that, gender differences in mobile phone usage may play a minor influence. This could occur in terms of the purpose of use, the hours of use, and how this might contribute to differences in sleep quality between the genders.

Around 1.4 billion people have used a smartphone in the last five years. In China and India, less than 70% of people own a smartphone. In the United States of America, 81 percent of people own a smartphone, up from only 35 percent in the first poll of smartphone ownership in 2011. There are 19 percent of people aged 65 and up, 49 percent of people aged 50 to 64, 74 percent of people aged 30 to 49, and 83 percent of those aged 18 to 29 years own a smartphone.

Long-term use of a smartphone has health consequences, including headaches, poor focus, irritability, depression, and sleep disturbances. Adolescents have a significant sleep problem. Adolescents are more likely than adults to suffer from insomnia, with 20-30% of high school students experiencing excessive daytime sleepiness. It could be caused by prolonged use of a smartphone. The electromagnetic field was emitted by the cell phone. Melatonin is influenced by it. Melatonin is a hormone generated by the pineal gland that regulates various physiological processes such as sleep, metabolism, and reproduction that occur in daily or seasonal cycles. Melatonin has the ability to impact the human circadian timing system. The regulatory systems ensure that this rhythm is correctly entrained in the light-dark cycle under physiological settings. As a result, increased melatonin secretion at night can act as a clock and calendar for all body cells. Human studies have found that the electromagnetic field created by mobile phones has a negative impact on melatonin generation. In this situation, a lack of melatonin can lead to sleep problems. The goal of this study was to see if there was a link between the length of time spent on a mobile phone and sleep quality in adolescents.

There have been a lot of previous studies on this subject, although they are restricted and narrowed in scope among school-aged youngsters. With this study, I plan to conduct a study among Wichita State University master's students to broaden the study of this research topic in a collegiate setting among students of various expertise.

**1.2 Research Problem**

1. To study the relationship between mobile phone usage during nights and sleep disruption.
2. To study the difference between gender and mobile phone usage during nights

**1.3 Objectives**

1. To determine the effect of mobile phone usage during nights and sleep disruption among master’s students  
2. To compare the difference between male and female mobile phone usage during nights among undergraduate students

**1.4 Research Questions**

1. What is the relationship between mobile phone usage during nights and sleep disruption?
2. What is the difference between gender and mobile phone usage during nights?

**1.5 Hypothesis**

1. The relationship between mobile phone usage during nights and sleep disruption is significant  
2. There is a significant difference between gender and mobile phone usage during nights

**CHAPTER-III**

**PROBLEM STATEMENT**

In the current period, the trend of mobile phone usage among young adults/adolescents is rapidly increasing and progressing, resulting in an increasing number of users day by day. This is due to new advancements in science and technology, which result in the introduction of a variety of new applications into the market each year. The study is necessary since multiple studies have shown that smartphone misuse can lead to sleep difficulties, including sadness, anxiety, and poor sleep quality. Sleep is a crucial aspect of a healthy existence, and it is strongly tied to health, so university students with high depression and anxiety scores should be closely watched for smartphone addiction.

**CHAPTER-IV**

**LITERATURE REVIEW**

According to Gamble et al., 2014, there were delayed sleep and wake schedules or wake lags among Australian adolescents associated with the use of mobile phones, laptops, and television sets, resulting in health and educational results. The research looked at sleep patterns, drowsiness, sleep problems, the presence of electronic gadgets in the bedroom, and how often people used them in bed at night. The findings suggested that on weekdays and weekends, there are dose-dependent relationships with later sleep onset. Over 70% of teenagers said they have two or more electronic devices in their room at night.

According to the study by Durusoy et al., 2017, among participants, 2021 (94.0%) were using mobile phones, and 129 (6.0%) were not. 4% of users spoke for less than 10 minutes each day, and 52.2 percent sent/received 75 or more messages per day. Mobile phone users had 1.90 (95 percent CI 1.30– 2.77), 1.78 (1.21–2.63), and 1.53 (1.05–2.21) times greater headache, weariness, and sleep disruptions, respectively. The number of calls per day, the total duration of calls per day, the total amount of text messages per day, the position and state of the mobile phone at night and making calls while charging as exposures all showed dose response correlations. Headache, concentration difficulties, weariness, and sleep disturbances were observed as general symptoms, as well as ear warmth and flushing as local symptoms.

According to a study by Exelmans et al.,2016 a cross-sectional study was conducted where half of the people polled had a smartphone, and six out of ten of them took their phone calls to bed. After lights off, they are sending/receiving text messages and/or phone calls, which significantly predicted respondents' PSQI scores. Respondents' later self-reported rise time, higher insomnia score, and increased weariness were all predicted by their usage of a mobile phone before bed. In younger responders, more bedtime mobile phone use was linked to more weariness and later rise times.

**CHAPTER-V**

**PROPOSED METHODOLOGY**

The study involved a sample of 116 students from different university majors and academic backgrounds. The study adopted the following series of steps starting with the data collection and understanding like various data points given, the independent variables and dependent variables i.e., questionnaire items, followed by data pre-processing which includes checking missing values, outliers analysis, bringing down all the variable values to a similar scale, making the data legitimate.

The pre-processed data was uploaded on Jupyter notebook and the further analysis was performed using Python version 3.10.0. Exploratory data analysis was conducted to allow data scientists to get deep insight into a data set and at the same time provide specific outcomes that a data scientist would want to extract from the data set. The functional form of regression was defined followed by partitioning of data and the multiple linear regression model was built. The major regression parameters were estimated and the best fit model was chosen.

**CHAPTER-VI**

**ANALYSIS AND RESULT**

For the analysis part, after reading we know that there is a lot of rescaling required in the different fields of the dataset. So, manually rescaled few variables like height, weight, gpa etc., values in excel.

A picture containing table

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Then performed a descriptive analysis, from that we know there are a lot of missing values and feature BMI is empty, as it is highly correlated with height and weight, we got rid of it.

Table

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To deal with the missing values both in numerical and categorical features we used imputation technique Simple Imputer from sk-learn and replaced the null values with the most frequent data point(mode).­­

Graphical user interface, text, application, email

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After that we performed outlier analysis, from that even few outliers seemed fine. So, we didn’t use any method to deal with outliers.

Chart, box and whisker chart

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Plotted correlation plot to check the correlation between the variables, from the plot below it is clear that there are no strong correlated values between the variables.

A screenshot of a computer

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For the feature scaling part, we did normalize all the numerical variables, so that every variable is on same scale between [0,1]. For the normalization part we used MinMaxScaler from sklearn.

For the categorical variables, we created dummy variables to perform regression, we did apply filter methods and shortlisted features for the regression analysis. We used shortlisted variables as the independent variables and avg. hours of sleep per night as dependent variables.

For this OLS regression we got here are the results,

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For the model 2, as there are a lot of noise data which is not that significant for the regression analysis. So, now we only considered all numerical variables as independent and the sleep hours as dependent.

Here are the results for model 2,

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From the results, this model can predict 91% of the avg. hours of sleep.

**CHAPTER VII**

**CONCLUSION**

Since, we have multiple variables in our data and with that data we can run an OLS regression. We see that our model has R-squared value 91%, meaning that this model explains 91% variance in our dependent variable. Furthermore, the Adj. R-squared 90% is the value adjusted based on the number of observations and the degree-of-freedom of the residual.

In addition to that, F-statistic 56.81which is a good value that represents how significant the fit is which the mean squared error of the model divided by the mean squared error of the residuals.

**CHAPTER VIII**

**LESSONS LEARNT FROM THE CLASS**

1. **Linear Regression Model:** Predicting the continuous variables if we want to predict any numeric data with independent variables
2. **Exploratory Data Analysis:** Visualization and relationship between the variables before running the model.
3. **Data Mugging:** Balancing the data, finding out of the null values, and replacing with the mode method in statistics.
4. **Filter Methods:** Filter methods are used to reduce the number of variables an increase the accuracy of the model. Principal component Analysis is also used to reduce the number of features in the data.
5. **Classification:** Classification is used to classify the data using Logistic Regression, Support Vector Machine (SVM), KNN.

**CHAPTER IX**

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