



**Shikshan Prasarak Santha's
Padmabhushan Vasantraodada Patil Mahavidyalaya
Kavathe Mahankal
DEPARTMENT OF STATISTICS**



**Case Study Report on
“Study of Smartphone Usage and Sleep Patterns in college Students”**

**Submitted to
Department of Statistics,
P. V. P. Mahavidyalaya,
Kavathe Mahankal**

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**As a partial fulfillment of the SEC-I (P): Practical on Data Analysis
Using MS-Excel – I for B.Sc. II (Semester III)**

***Under the guidance of*
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Kavathe Mahankal**

2025-2026

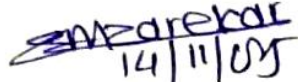
CERTIFICATE

This is to certify that *Miss. Kore Yogita Vasant, Miss. Koshti Divya Subhash and Miss. Mali Vaishnavi Bhimrao* of B.Sc. II (Semester III), P. V. P. Mahavidyalaya, Kavathe Mahankal have successfully completed the case study report entitled “*Study of Smartphone Usage and Sleep Patterns in college Students*” based on SEC-I (P): Practical on Data Analysis Using MS-Excel – I, as prescribed by the curriculum of Shivaji University, Kolhapur, under my supervision and guidance during the academic year 2025 – 2026.



Guide

Department of Statistics
P. V. P. Mahavidyalaya,
Kavathe Mahankal



Examiner's Signature



Head

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P. V. P. Mahavidyalaya,
Kavathe Mahankal

Place: Kavathe Mahankal

Date: 10/11/2025

DECLARATION

We hereby declare that the Case Study Report entitled “*Study of Smartphone Usage and Sleep Patterns in college Students*” submitted in partial fulfillment of the requirements of SEC-I (P): Practical on Data Analysis Using MS-Excel – I for B.Sc. II (Semester III) is our original work carried out under the guidance of Dr. A. M. Suryawanshi, Assistant Professor, Department of Statistics, P. V. P. Mahavidyalaya, Kavathe Mahankal.

We further declare that this report has not been previously submitted to any other university or institution for any other degree.

Place: Kavathe Mahankal

Date: 10/11/2025

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Abstract:

This study investigates the relationship between smartphone usage and sleep patterns among college students. Data were collected through a structured questionnaire and analyzed using MS Excel. The findings revealed that excessive smartphone use, especially during nighttime, negatively affects sleep duration and quality. The study emphasizes the need for awareness regarding healthy smartphone habits to improve sleep hygiene among students.

Introduction:

Smartphones have become an integral part of modern life, serving as powerful tools for communication, education, and entertainment. For college students, in particular, smartphones are indispensable for staying connected with peers, accessing online learning materials, managing schedules, and engaging in social media. However, excessive smartphone use, especially during nighttime hours, has raised growing concerns regarding its potential negative effects on sleep quality and duration.

Sleep plays a crucial role in maintaining both physical and mental health, influencing cognitive function, academic performance, mood regulation, and overall well-being. Disruptions in sleep—such as reduced sleep time, irregular sleep schedules, or poor sleep quality—can significantly affect students' concentration, memory retention, and daily functioning. With the rise of social networking platforms, mobile games, and streaming services, students often experience difficulty in maintaining healthy sleep routines due to prolonged screen exposure and constant notifications.

Moreover, blue light emitted from smartphone screens can suppress melatonin production, a hormone responsible for regulating sleep-wake cycles. This physiological interference, combined with behavioral factors such as late-night scrolling or chatting, may contribute to insomnia and delayed sleep onset. In addition, smartphone dependency has been linked to stress, anxiety, and decreased self-regulation, which further exacerbate sleep problems.

Given these concerns, it is essential to understand the relationship between smartphone usage patterns and sleep behaviors among college students. This study aims to assess how the duration, timing, and purpose of smartphone use impact students' sleep quality and quantity. By analyzing these associations, the research seeks to provide insights that may help promote healthier smartphone habits and improve students' overall sleep hygiene and academic productivity.

Objectives:

- ❖ To study the pattern of smartphone usage among college students.
- ❖ To assess the average sleep duration of students.
- ❖ To analyze the relationship between smartphone use and sleep duration.
- ❖ To provide recommendations for healthy smartphone use.

Hypotheses:

The null and alternative Hypotheses are:

H₀: There is no significant negative relationship between smartphone usage hours per day and sleep duration hours per night among college students.

H₁: There is a significant negative relationship between smartphone usage hours per day and sleep duration hours per night among college students.

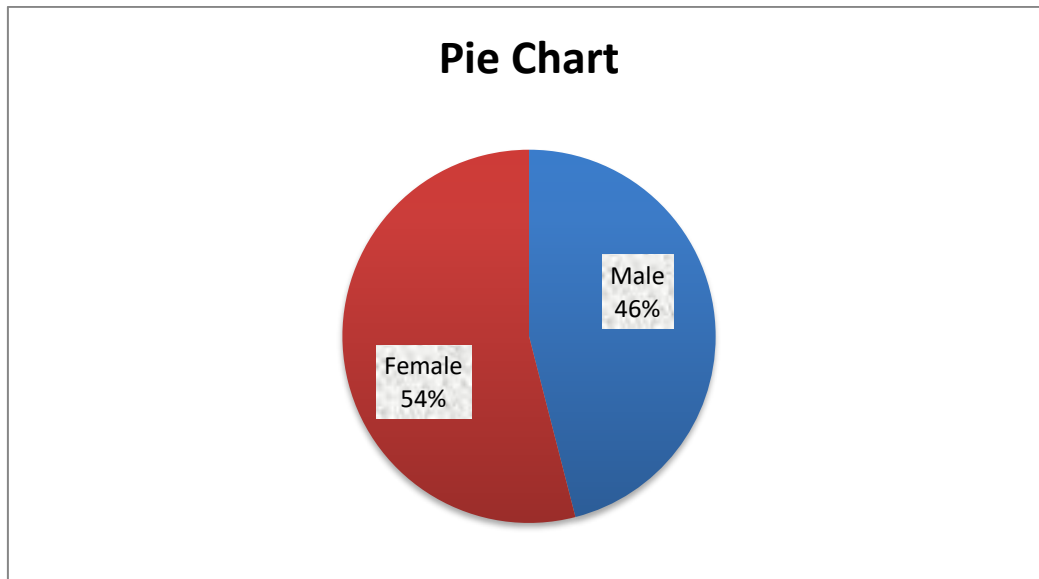
Methodology:

- ✚ Population: College students (aged 18–23 years).
- ✚ Sample Size: 50 students (randomly selected).
- ✚ Data Collection Tool: Structured questionnaire
- ✚ Variables: Independent variable - Smartphone usage (hours/day); Dependent variable - Sleep duration hours per night.
- ✚ Data Analysis Tools: Descriptive statistics, graphical representation (pie chart, bar chart), and correlation analysis.

Statistical Analysis:

1) Graphical representation:

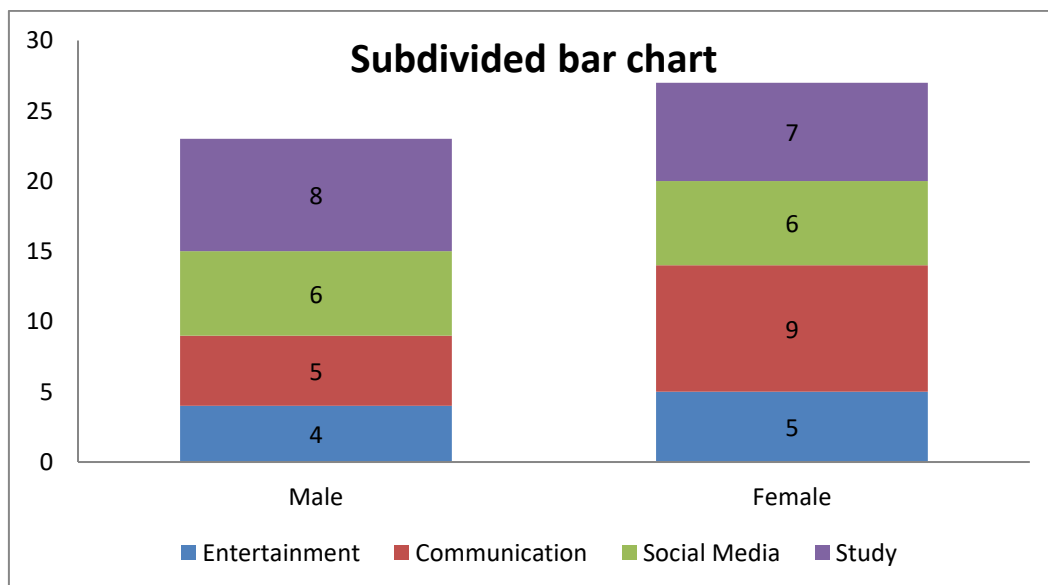
A. Pie chart



Interpretation:

The pie chart illustrates the gender distribution of the students who participated in the study. Out of the total respondents, 54% are female and 46% are male. This indicates that the majority of participants in the study were female students, suggesting a slightly higher representation of females in the sample population. The near-balanced proportion between male and female participants ensures that the data collected provides a fair comparison of smartphone usage and sleep patterns across genders.

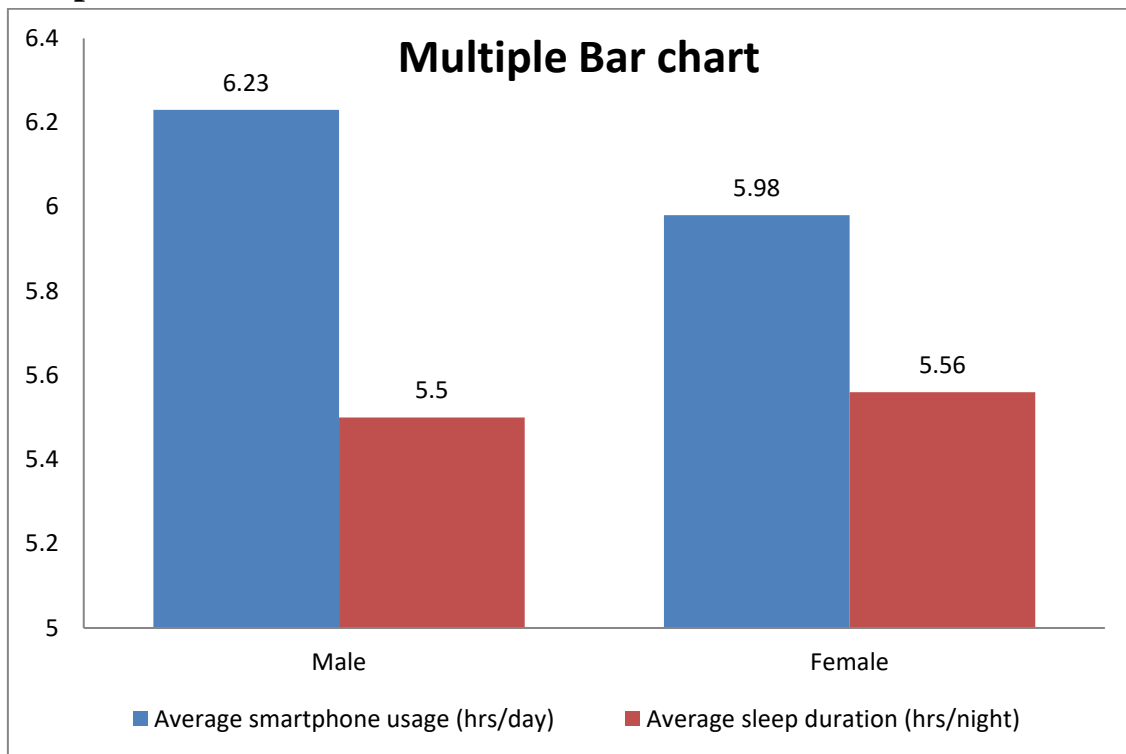
B. Subdivided Bar chart:



Interpretation: The subdivided bar diagram illustrates the various purposes of smartphone usage among male and female college students, categorized into four main activities: entertainment, communication, social media, and study.

For male students, the highest proportion of smartphone use is for study, followed by social media, communication, and entertainment. This suggests that males tend to use smartphones more for academic purposes compared to other activities. In contrast, female students use smartphones predominantly for communication, followed by study, social media, and entertainment. This indicates that females rely more heavily on smartphones for maintaining communication and social interactions.

C. Multiple Bar Chart

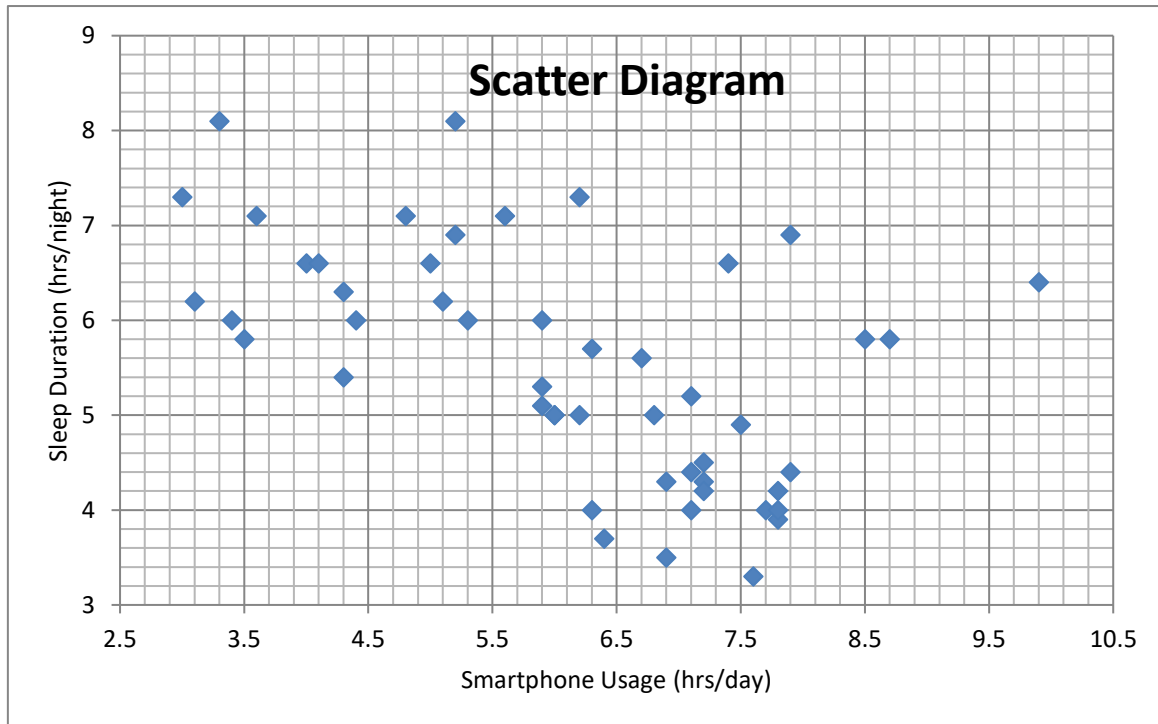


Interpretation:

The findings of this study indicate a clear relationship between smartphone usage and sleep duration among college students. The data show that both male and female students spend a considerable amount of time on their smartphones each day, with males reporting slightly higher average usage (6.23 hours/day) compared to females (5.98 hours/day). Correspondingly, sleep duration is lower among students with higher smartphone usage. Males, who have the greater smartphone use, also exhibit a shorter average sleep duration (5.5 hours/night), while females record slightly more sleep (5.56 hours/night).

This inverse relationship suggests that increased smartphone usage, particularly during late hours, may contribute to reduced sleep duration. Prolonged exposure to screens and nighttime device use could disrupt sleep quality by delaying sleep onset and affecting the body's natural circadian rhythm.

D. Scatter Diagram



The scatter diagram displays the relationship between smartphone usage (hours per day) and sleep duration (hours per night) among college students. Each point represents an individual student's data for the two variables.

From the graph, it can be observed that as smartphone usage increases, the sleep duration tends to decrease. Students who spend more hours on their smartphones (around 8–10 hours per day) generally report shorter sleep durations, while those with moderate smartphone usage (4–6 hours per day) show longer sleep durations. This indicates a negative correlation between smartphone usage and sleep duration, meaning that higher smartphone use is associated with reduced sleep.

2) Descriptive Statistics: Mean, Median, Mode, Variance and Standard Deviation to summarize student performance.

Measure	Excel Function	Smartphone Usage (hrs/day)	Sleep Duration (hrs/night)
Mean	=AVERAGE()	6.10	5.53
Median	=MEDIAN()	6.25	5.65
Mode	=MODE()	5.90	6.00
Variance	=VAR.S()	2.67	1.53
Standard deviation	=STDEV.S()	1.63	1.24

Interpretation:

- ❖ The statistical analysis reveals that the average smartphone usage among students is 6.10 hours per day, while the average sleep duration is 5.53 hours per night. This indicates that students spend a considerable amount of time on their phones, which may be influencing their sleep duration.
- ❖ The median values (6.25 hours for smartphone use and 5.65 hours for sleep) are close to the means, suggesting that the data is fairly symmetrical.
- ❖ The mode for smartphone usage is 5.90 hours, indicating that most students commonly use their phones for around 6 hours daily, while the most frequent sleep duration is 6.00 hours per night.
- ❖ The variance and standard deviation values show the spread of data. Smartphone usage has a higher variance (2.67) and standard deviation (1.63) compared to sleep duration (variance = 1.53, standard deviation = 1.24), implying that there is greater variability in how much time students spend on their phones than in how long they sleep.

3) Correlation analysis:

The Excel function = CORREL(Smartphone Usage (hrs/day), Sleep Duration (hrs/night)) calculate correlation between smartphone usage hours per day and sleep duration hours per night among college students.

The value of correlation coefficient is: $r = -0.5430$

Degrees of freedom for correlation = $n-2 = 50- 2 = 48$

Significance level (α) = 0.05

Critical value of r at 48 degrees of freedom with 5% significance level = 0.279

Interpretation:

The absolute value of r (0.5430) is greater than critical value of r (0.279). Hence we reject null hypothesis at 5% level of significance and conclude that there is a significant negative relationship between smartphone usage hours per day and sleep duration hours per night among college students. This means that as smartphone usage increases, sleep duration tends to decrease.

This suggests that higher smartphone usage is associated with reduced sleep duration among college students, which may have implications for their health, concentration, and academic performance.

Conclusions:

Overall, the findings indicate that excessive smartphone use negatively impacts sleep duration, underscoring the importance of maintaining balanced smartphone habits to promote better sleep quality and overall well-being. While both male and female students engage in similar smartphone activities, males tend to prioritize study-related use, whereas females show greater involvement in communication-related activities. These results reveal gender-based differences in smartphone usage patterns, reflecting variations in academic behavior and social engagement among college students. Consequently, there is a need to raise awareness about the effects of excessive smartphone use on sleep patterns and well-being. Promoting responsible smartphone management, digital discipline, and healthy bedtime routines can contribute to improved sleep quality and enhanced academic performance.

References:

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3. Dewald JF, Meijer AM, Oort FJ, Kerkhof GA, Bogels SM. The influence of sleep quality, sleep duration and sleepiness on school performance in children and adolescents: a meta-analytic review. *Sleep Med Rev*. 2010;14(3):179–189.

Questionnaire:

1. Name of Student: _____
2. Gender: Male Female
3. Age: _____ years
4. Course / Class: _____
5. Average smartphone usage per day
6. Time spent on smartphone before sleep: _____
7. Average sleep duration per night: _____
8. Sleep quality: (1=Poor, 5=Excellent)
9. Use smartphone in bed before sleeping? Yes/No
10. Purpose of smartphone use: Entertainment/ Communication/ Social Media/ Study