Impact of Smartphone Usage on Sleep Quality and Mental Wellbeing of School Students

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ARTICLEINFO

ABSTRACT

The present study investigates the impact of Smartphone usage on Sleep Quality and Mental Wellbeing among School Students. This study comprises of 150 school students as particularly selected through the technique of simple random sampling from Shree Bharath Vidyaashram CBSE Senior Secondary School, Pondicherry. Smartphone usage scale, the Warwick mental well-being scale and Pittsburgh Sleep Quality Index was used to establish the relationship and predictive relationship among smartphone usage, sleep quality and mental wellbeing along with the demographic variables. The data analysis were done with MICRISOFT EXCEL to test descriptive statistics, Pearson Correlation Coefficient and Simple Linear Regression analysis. The findings revealed that smartphone usage as statistically both positive and negative significant relationship with quality of sleep and mental wellbeing among school students respectively. This study also found that the smartphone usage among school students had significant influence on students sleep quality and mental wellbeing and also reveals the statistical difference among those variables with respect to demographics. This study has a wide implication and recommendation to prevent students from excessive smartphone usage which leads to addictive behavior and also suggested to improve their quality of sleep and mental wellbeing among those emerging adolescents.

Keywords : Smartphone usage, Sleep Quality, Mental Wellbeing, Age, Pearson Correlation, Simple Linear Regression.

I. INTRODUCTION

In the 21st century, the rise of technology and media has significantly impacted adolescents and the educational system, with India having the highest proportion of smartphone users. The majority of smartphone owners are aged 15-29, with 22% checking their phones frequently. This rapid increase in mobile phone usage has led to problems such as mobile addiction, stress, depressive symptoms, and

lack of sleepiness, poor academic performance, and affecting students' well-being. Research shows that smartphone use can have potential health effects, interfere with school or work performance, reduce social interactions, and disrupt quality sleep. Educational and counseling programs are suggested to prevent premature smartphone use and minimize dependency. This study aims to investigate the prevalence of smartphone usage among higher secondary school students and its relationship to sleep quality and mental wellbeing during the period 22/8/2023 to 8/10/2023.

Aim of the study:

It aimed to examine impact of Smartphone usage on sleep quality and mental wellbeing among school students.

Objectives of the study:

· To investigate the relationship among Smartphone usage, sleep quality and mental wellbeing among school students.

· To find the impact of Smartphone usage on sleep quality and mental wellbeing among school students.

Hypotheses:

H1: There will be a significant relationship between smart phone usage and sleep quality among school students among school students.

H2: There will be a significant relationship between smart phone usage and mental wellbeing among school students among school students.

H3: There will be a significant impact of smart phone usage on sleep quality and mental wellbeing among school students.

II. METHODOLOGY

Variables in the present study

- Independent Variable- Smartphone usage
- Dependent Variable- Sleep Quality and Mental Wellbeing

Independent Variable: Smartphone Usage

This variable represents the factor that the researcher manipulates or controls. In this case, it is the amount or pattern of smartphone usage among participants. It could involve variables such as the duration of daily smartphone usage, specific applications used, frequency of use, etc.

Dependent Variables:

a. Sleep Quality: This variable represents the aspect of the participants' sleep patterns that is being measured or observed. Sleep quality could be evaluated using various metrics such as sleep duration, sleep disturbances, sleep efficiency, or subjective assessments of sleep satisfaction.

b. Mental Wellbeing: This variable signifies the psychological state or overall mental health of participants. It could encompass a range of measures, including but not limited to stress levels, anxiety, depression, overall mood, and perceived psychological well-being.

The study aims to investigate the relationship or potential impact of the independent variable (smartphone usage) on the dependent variables (sleep quality and mental wellbeing). Researchers may examine how different levels or patterns of smartphone usage correlate with changes in sleep quality and mental wellbeing among the study participants.

The research design and methodology would involve collecting data on smartphone usage, sleep quality, and mental wellbeing from a sample population to analyze potential associations or effects of smartphone usage on sleep and mental health. Statistical analyses, such as regression analysis or correlation studies, might be employed to explore the relationships between these variables.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

185

Empirical Measurement of the variables:

Description	Measurable variables	Tools Used
Demographics	Study status, gender, age, area of living, hours of sleep, hours of smartphone usage	General Questionnaire
Smartphone usage	Usage of Smartphone	Smartphone usage scale(30 items)
Sleep Quality	Quality of Sleep	Pittsburgh Sleep quality scale index (19 items)
Wellbeing	Mental Wellbeing	Warwick-Edinburgh Mental Wellbeing Scales (14items)

Descriptions of Tools:

Smartphone usage scale: The Smartphone Usage scale, developed by Shankhabela Mukherjee and Subrata Dasgupta (2020), measures smartphone usage among students using a 5-point Likert format. The scale consists of 30 statements and has no time limit for completion. The scores range from 30-150, with high usage indicating 108-150, average usage 78-107, and low usage 77-30. The scale's reliability and validity are reasonably good, with acceptable validity.

The Warwick Mental well-being scale (2006) is a 14-item scale measures mental wellbeing and psychological functioning positively, scoring items on a 1 to 5 Likert scale. The scale's reliability and validity are well established, with high scores indicating high mental wellbeing, and a minimum and maximum score is 14 and 70. Reliability and Validity for this scale is well established

Pittsburgh Sleep Quality Index: The Pittsburgh Sleep Quality Index (PSQI) was created in 1988 to assess sleep quality and sleep patterns over a 1-month period. It measures seven components: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction. Scores range from 0 to 21, with higher scores indicating poorer sleep quality. Good sleepers have a global PSQI score of 5 or less. The scale's reliability and validity are considered acceptable.

Data collection:

The data is collected primarily from Shree Bharath Vidyaashram CBSE Senior Secondary School, Pondicherry; (N=150) participants were selected through random sampling. The investigator approached the heads of the institutions and provided a consent form to ensure confidentiality and no remuneration. The investigator cleared any doubts during the process, and the questionnaires took 15-30 minutes for both male and female participants from 11th and 12th classes on 29/08/2023.

Data Analysis:

The raw scores are entered into an Excel sheet for analysis, which is then summarized and analyzed using MS Excel software.

The statistical tools used in the present study are

- Frequencies Distribution
- Descriptive Statistics
- Pearson Correlation Coefficient
- Simple Linear Regression Analysis

Frequencies Distribution: This statistical tool is used to show the number of times each value appears in a dataset. It presents a summary of categorical data by displaying the count or percentage of each category within a variable. It's useful for understanding the distribution and prevalence of different categories within a dataset.

Descriptive Statistics: Descriptive statistics provide a summary of the main characteristics of a dataset. It

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

186

includes measures such as mean, median, mode, range, variance, standard deviation, and quartiles. Descriptive statistics help in understanding the central tendency, variability, and shape of the data distribution.

Pearson Correlation Coefficient: This statistical method measures the strength and direction of the linear relationship between two continuous variables. It calculates a value between -1 and +1, where:

+1 indicates a perfect positive linear relationship, -1 indicates a perfect negative linear relationship, and 0 indicates no linear relationship between the variables. Pearson's correlation coefficient is often used to assess the association between two continuous variables, such as exploring the relationship between smartphone usage and sleep quality or mental wellbeing.

Simple Linear Regression Analysis: This statistical technique examines the relationship between two continuous variables by predicting the value of one variable (dependent variable) based on the value of another variable (independent variable). It determines the equation of a straight line that best fits the data and

helps in understanding how changes in the independent variable influence changes in the dependent variable. Simple linear regression can be used to predict sleep quality or mental wellbeing based on smartphone usage, for example.

In our study, these statistical tools could be employed to analyze the data collected on smartphone usage, sleep quality, and mental wellbeing. Frequencies distribution and descriptive statistics would help in summarizing the characteristics and distribution of the variables. Pearson correlation coefficient would explore the strength and direction of the relationship between smartphone usage and sleep quality/mental wellbeing, and simple linear regression would assess the predictive relationship between smartphone usage and these dependent variables.
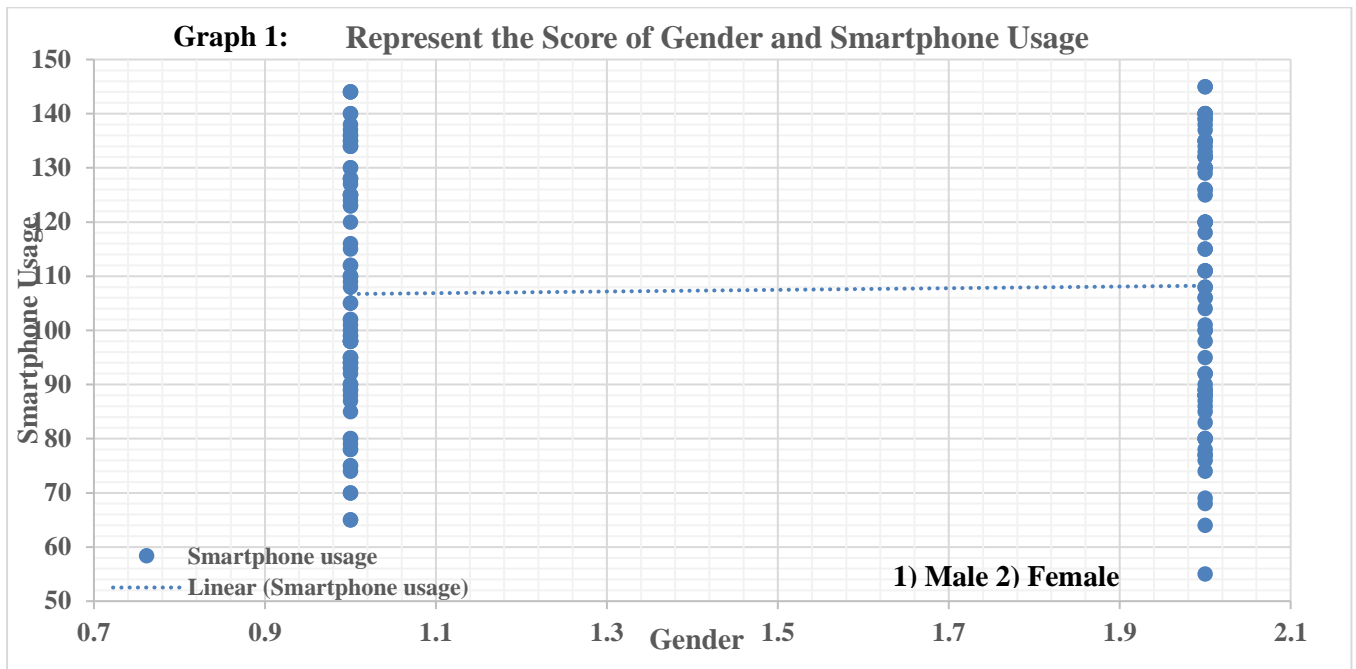
III. RESULT AND DISCUSSION

The statistical treatment of collected data through the MICRISOFT EXCEL Software;

Table : 1.1 Shows the Frequency Distribution of the sample (N=150)

S.No.	Variables		Frequency	Percentage
1	Class	11th	88	58.7
		12th	62	41.3
2	Gender	Male	80	53.3
		Female	70	46.7
3	Age	15-16	128	85.3
		17-18	22	14.7
4	Area of living	Rural	88	58.7
		Urban	62	41.3
5	Hours of Smartphone usage (per day)	½ hours	34	22.7
		1-2 hours	86	57.3
		3-5 hours	20	13.3
		Above	10	6.7
6	Hours of Sleep (per day)	Below 4 hours	7	4.7
		5-6 hours	42	28.0
		6-7 hours	45	30.0
		7-8 hours	56	37.3

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

187

GRAPHICAL ANALYSIS

Graph 1:   Represent the Score of Gender and Smartphone Usage
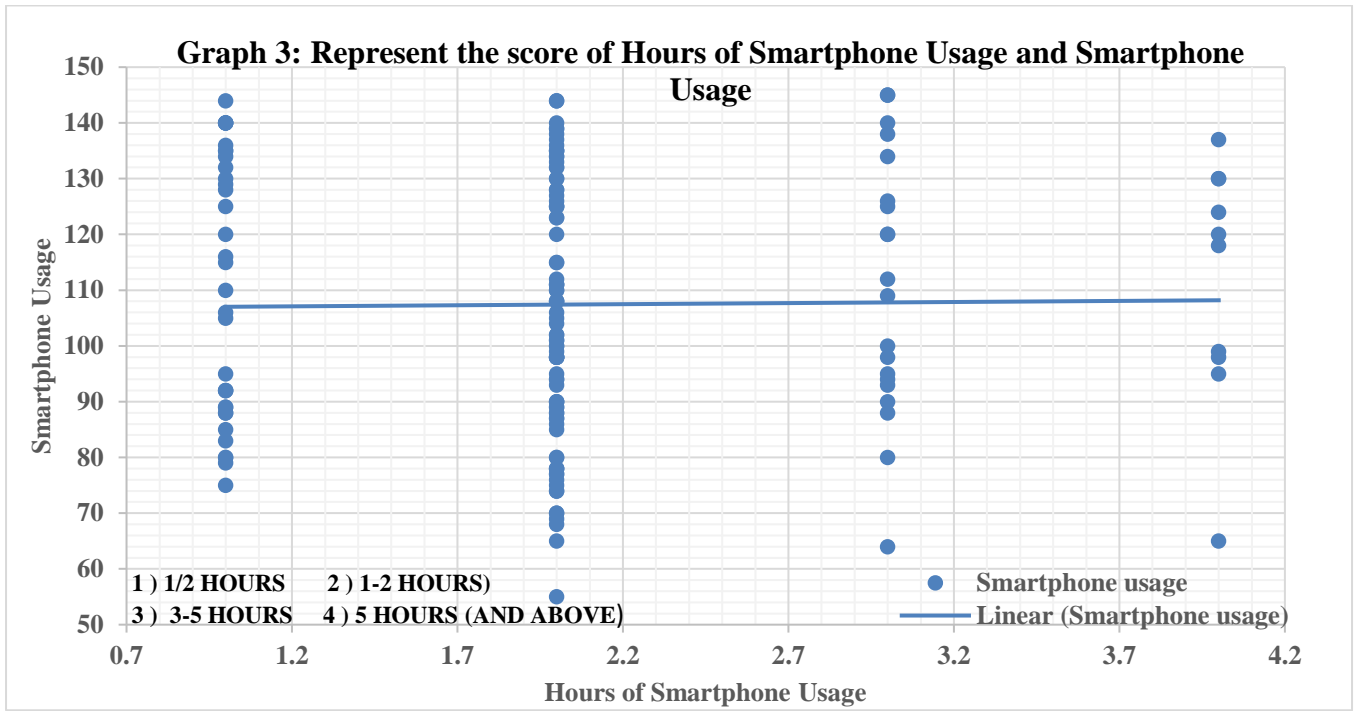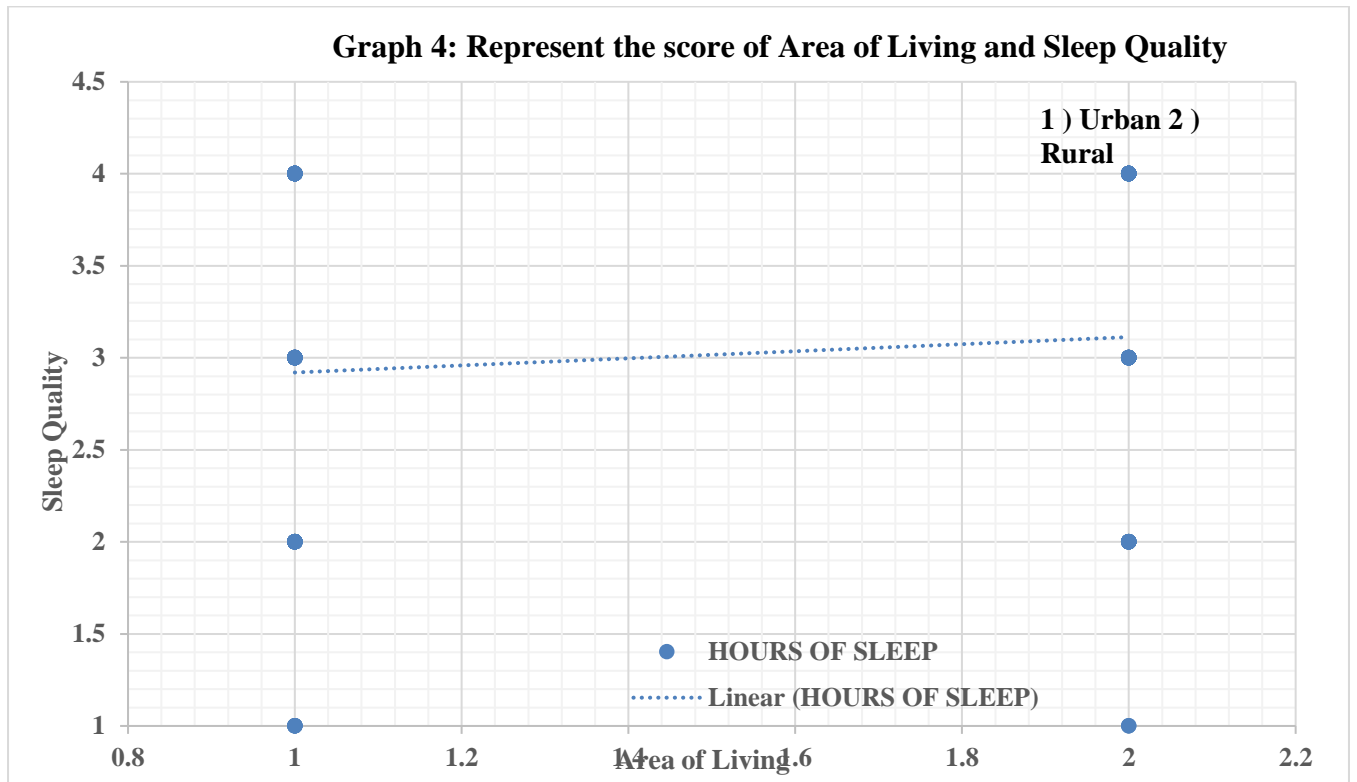
The above Scatter graph shows that impact of smartphone usage score of female students is maximum compare to male students.

Graph 2:   Respresent the Score of Area of Living & Smart Phone Usage
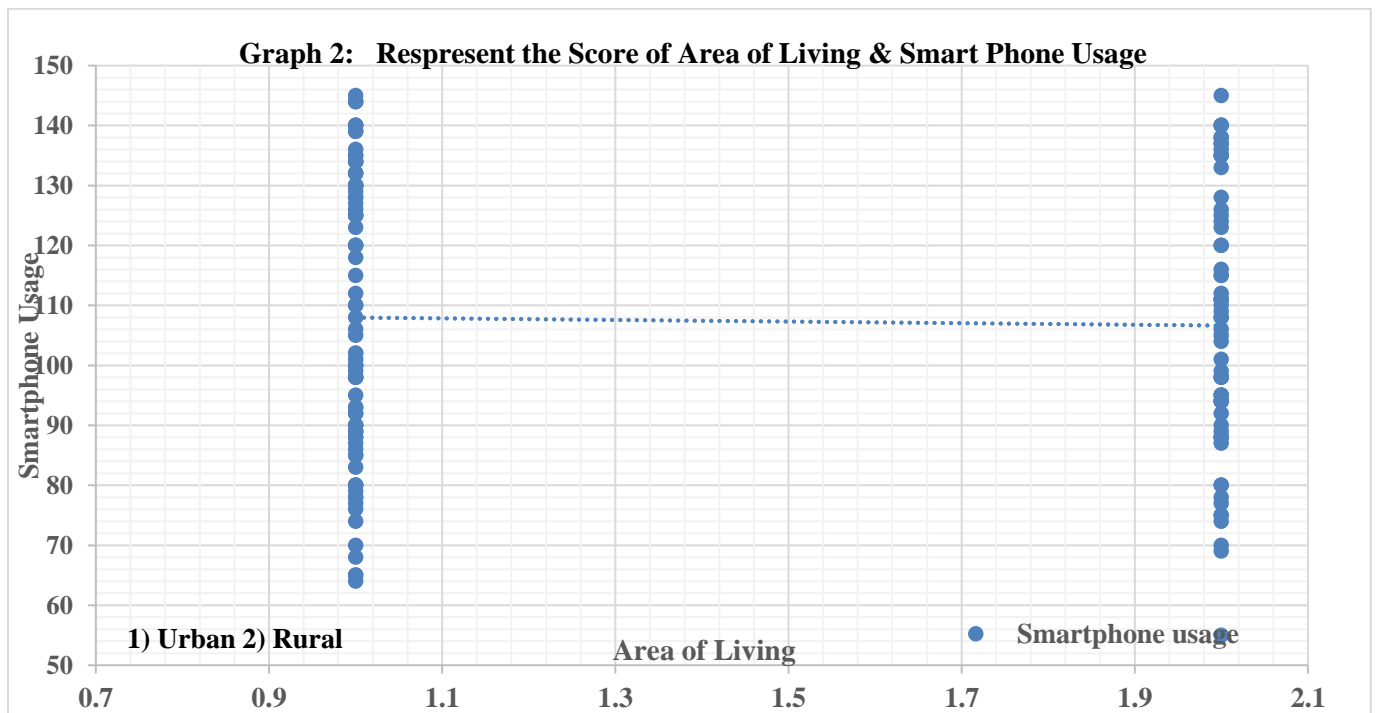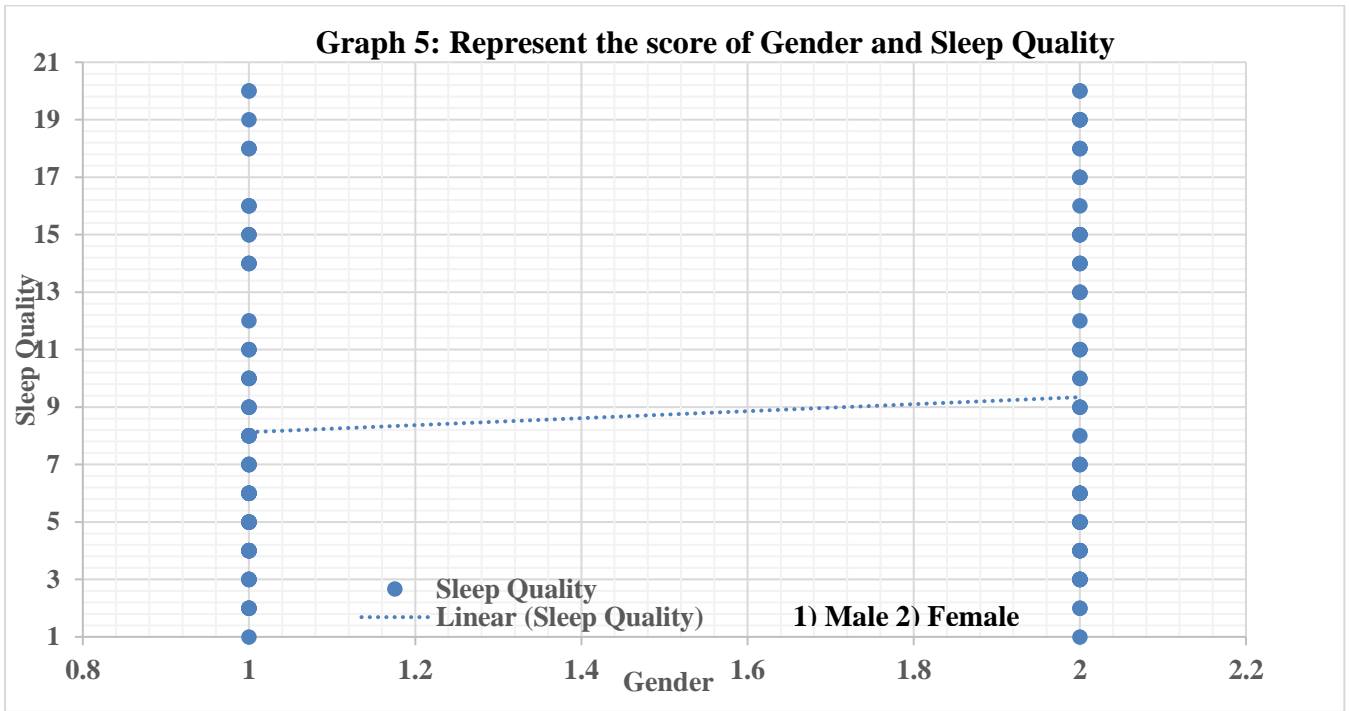
The above Scatter graph shows that impact of smartphone usage score of urban students is maximum compare to rural students.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

188

Graph 3: Represent the score of Hours of Smartphone Usage and Smartphone Usage

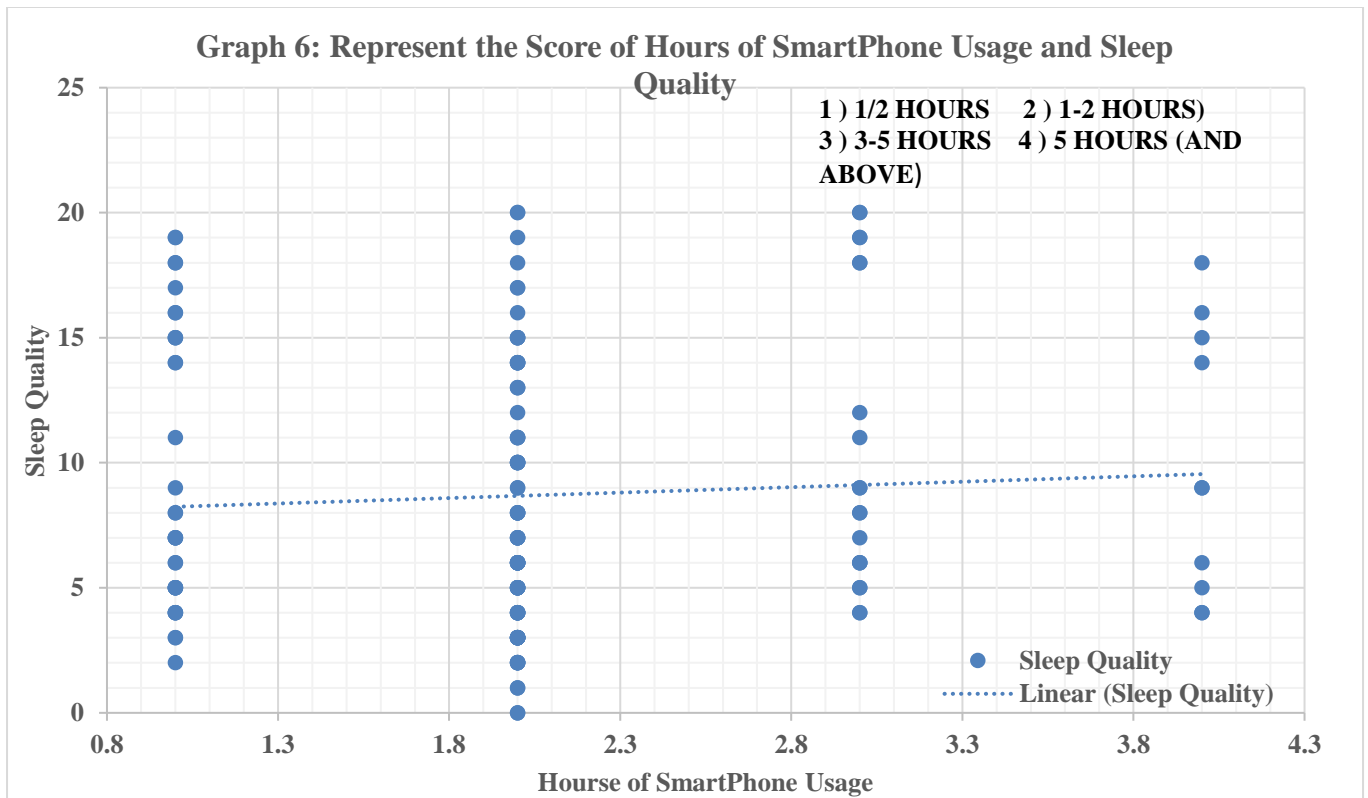1) 1/2 HOURS   2) 1-2 HOURS)
3) 3-5 HOURS   4) 5 HOURS (AND ABOVE)

The above Scatter graph shows that impact of smartphone usage user score is maximum of 1-2 hours and minimum at 5 hours and above.

Graph 4: Represent the score of Area of Living and Sleep Quality
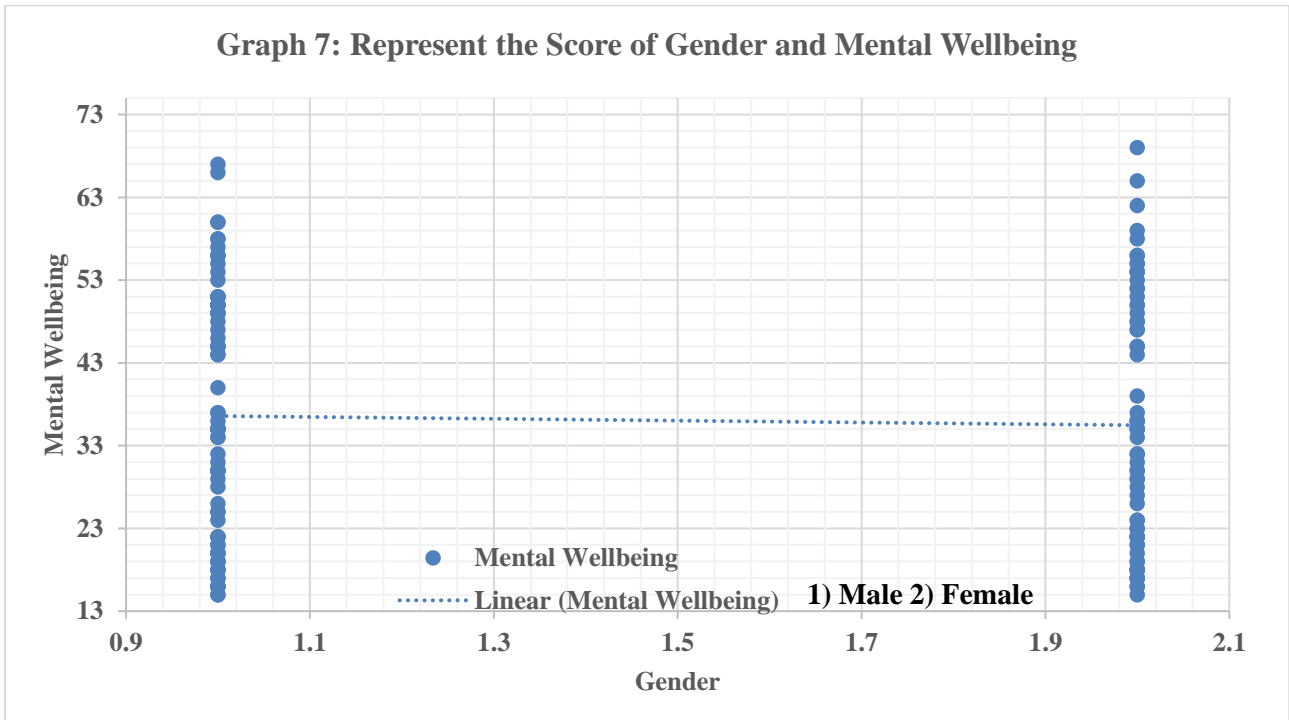
1) Urban 2) Rural

The above Scatter graph shows that impact of sleep quality score is good for rural and poor for urban. Note: Good Sleepers – More than 5, Poor Sleepers – Less than 5
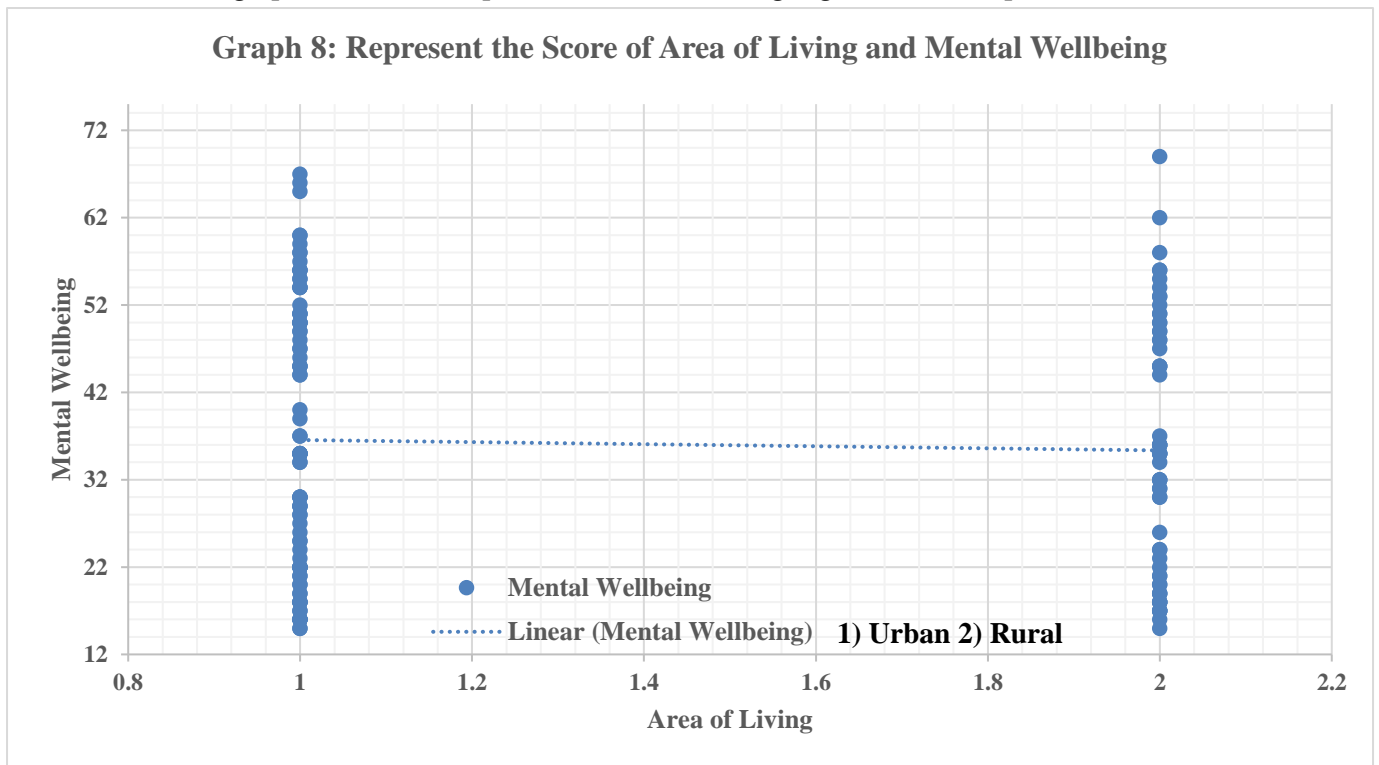
International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

189

Graph 5: Represent the score of Gender and Sleep Quality

The above Scatter graph shows that impact of sleep quality is good for male and poor for female.

Graph 6: Represent the Score of Hours of SmartPhone Usage and Sleep Quality

1) 1/2 HOURS   2) 1-2 HOURS)
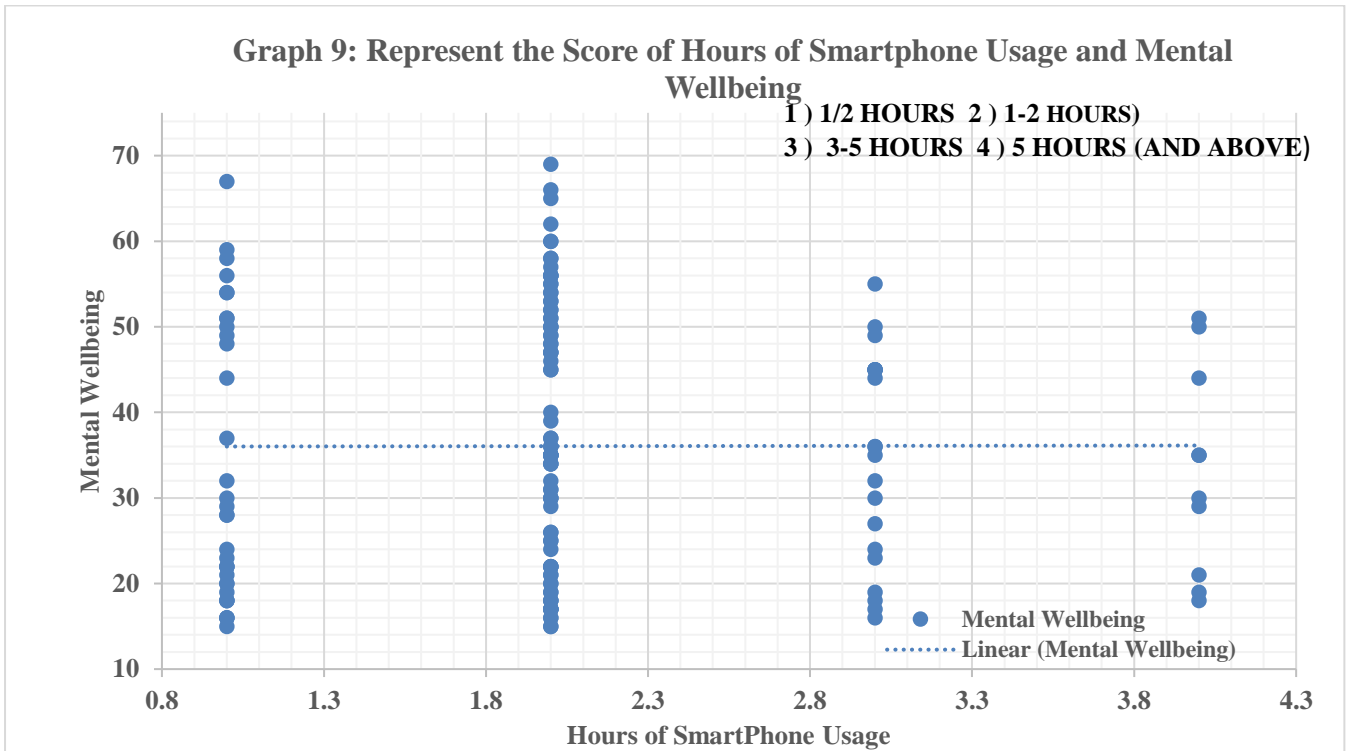3) 3-5 HOURS   4) 5 HOURS (AND ABOVE)

The above Scatter graph shows that impact of sleep quality score is less in ½ hour smartphone users and maximum in above 5 hours smartphone users.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

190

Graph 7: Represent the Score of Gender and Mental Wellbeing

The above Scatter graph shows that impact of mental wellbeing is good male and poor for female.

Graph 8: Represent the Score of Area of Living and Mental Wellbeing

The above Scatter graph shows that impact of mental wellbeing is good is rural and poor in urban.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

191

Graph 9: Represent the Score of Hours of Smartphone Usage and Mental Wellbeing

1) 1/2 HOURS 2) 1-2 HOURS)
3) 3-5 HOURS 4) 5 HOURS (AND ABOVE)

The above Scatter graph shows that good mental wellbeing in students using (1/2 to 2 hours) smartphone usage and poor mental wellbeing in student using (3 to 5 hours) smartphone usage.

Graph 10: Represent the Score of Sleep Quality with Smart Phone
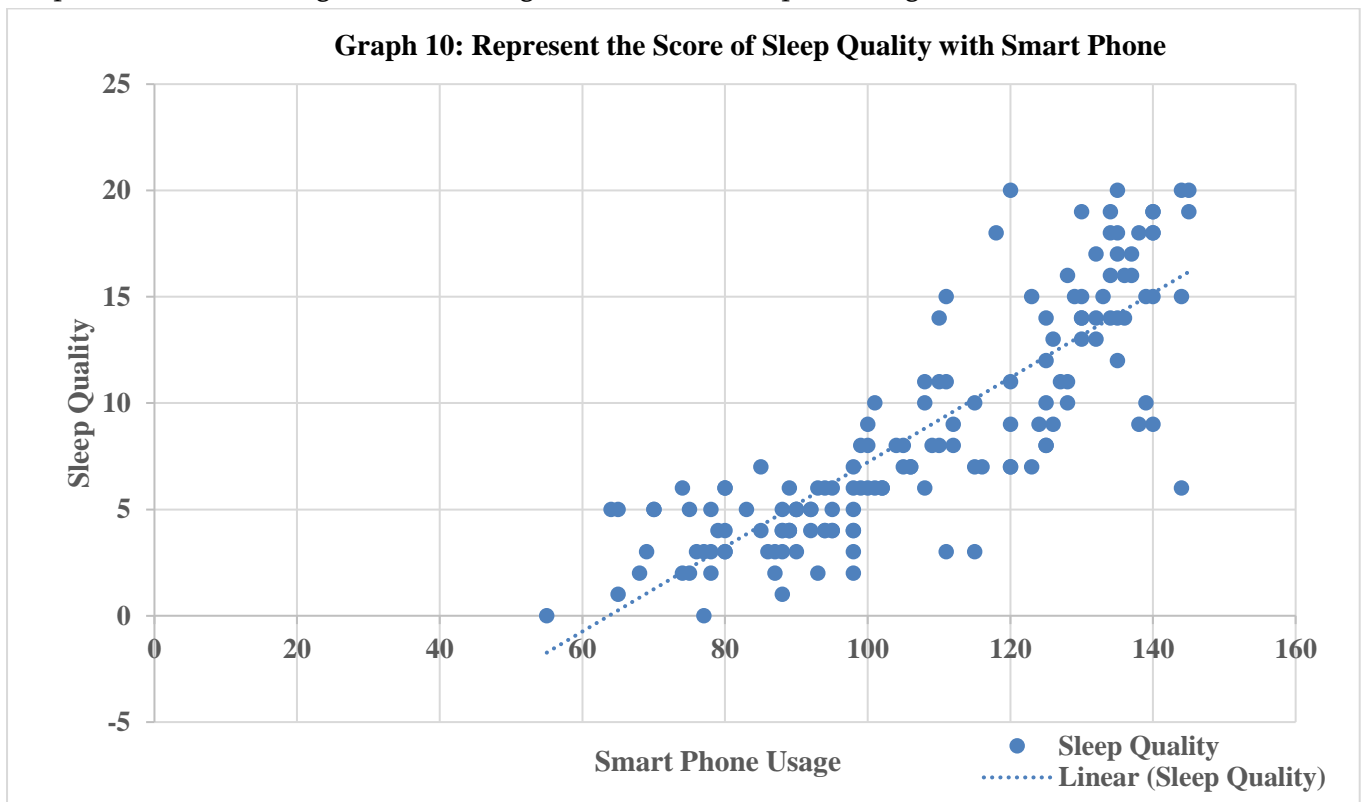
The above Scatter graph shows the impact of sleep quality with smart phone usage score (less 70) are good sleep quality and more than (70 and above) poor sleep quality.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

192

Graph 11: Represent the Score of Smart Phone Usage with Mental Wellbeing
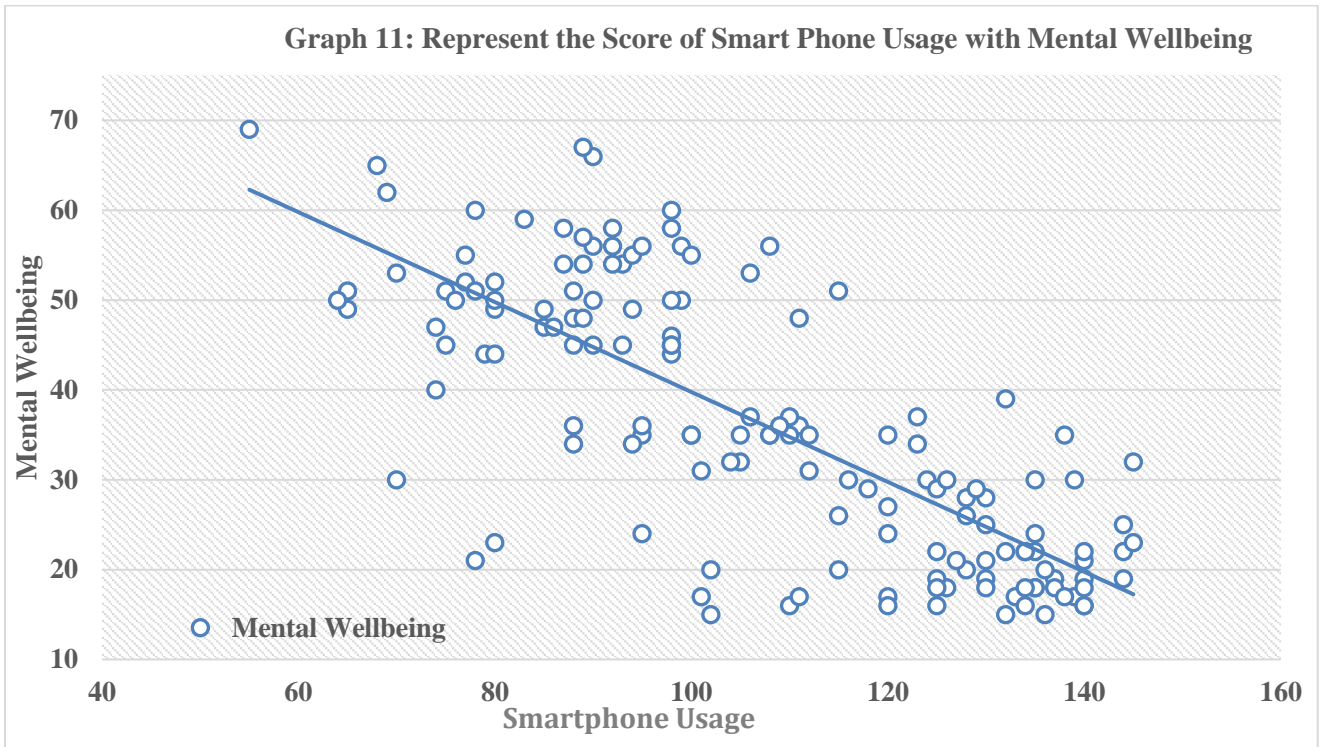
The above Scatter graph shows the impact of mental wellbeing with smart phone usage score (less 70) are good mental wellbeing of maximum (60-70) and smart phone usage score (greater than 70) are poor mental wellbeing of minimum value (less than 50).

Graph 12: Represent the Score of Sleep Quality with Mental Wellbeing
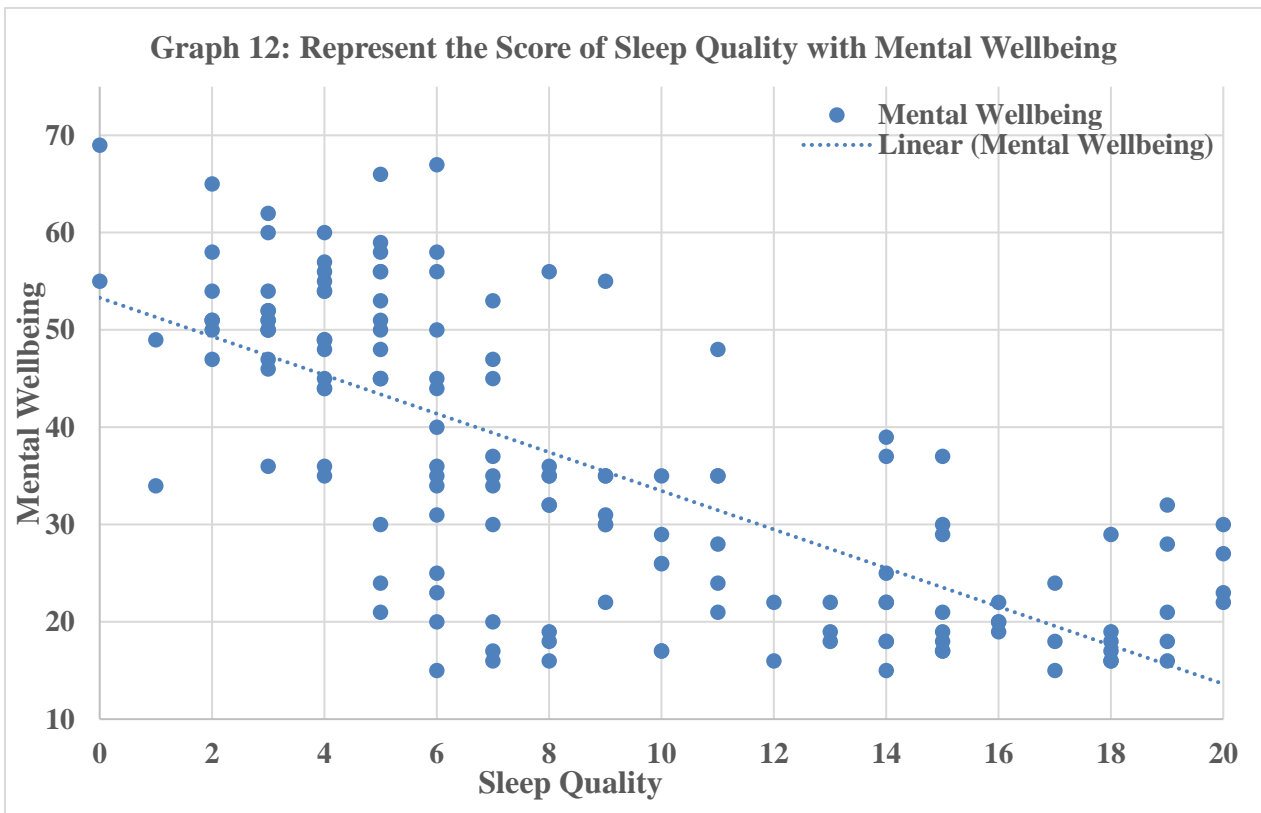
The above Scatter graph shows the impact of mental wellbeing with sleep quality score (less 5) are good mental wellbeing and more than (5 and above) poor mental wellbeing.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

193

Table: 1.2 shows the Pearson Correlation Analysis between Smartphone usage and sleep quality and mental wellbeing

Variable	Mean	Standard Deviation	N
Smartphone Usage	107.43	22.822	150
Sleep Quality	8.69	5.389	150
Mental Wellbeing	36.05	14.930	150

Formula:

Mean: $\dfrac{\text{Sum of observations}}{\text{No. of observations}}$

Standard Deviation:

$$SD = \dfrac{\sum (X-M)^2}{N}$$

$$SD = \dfrac{\sum X^2}{N}$$

Variables	Sleep Quality	Mental Wellbeing
Smartphone usage	0.842**	-0.765**

Note: **Correlation is significant at 0.01(Sig.2 tailed)

Table 1.2, illustrates that there is a relationship between smartphone usage and sleep quality .The Smartphone usage and Sleep quality was positively correlated [r =0.842, p<0.01].This finding suggest that students who use smartphone a lot had poor sleep quality, it implies that the score of smartphone usage increases the sleep quality score also increases.

Furthermore, The Smartphone usage and mental wellbeing was negatively correlated [r = -0.765, p<0.01].This finding suggest that students who use smartphone a lot had poor mental wellbeing, it implies that the score of smartphone usage increases the score of mental wellbeing also decreases. **Hence the stated hypothesis, "There will be a significant relationship between smartphone usage and sleep quality,** smartphone usage and mental wellbeing among school students" is accepted.

Table: 1.3 shows the Simple linear regression analysis in predicting the Smartphone usage on sleep quality and mental wellbeing

Variable	R²	B value	F Value	p Value
Sleep Quality	0.709	0.199	361.271	0.000
Mental Wellbeing	0.585	-0.500	208.557	0.000

Note: Predictor Variable - Smartphone Usage; Dependent Variable- Sleep Quality & Mental Wellbeing.

Y= a + bx

Where Y is the dependent variable (variable on the Y-axis), X is the independent variable (i.e. it is plotted on the X axis), B is the slope of the line and A is the y-intercept.
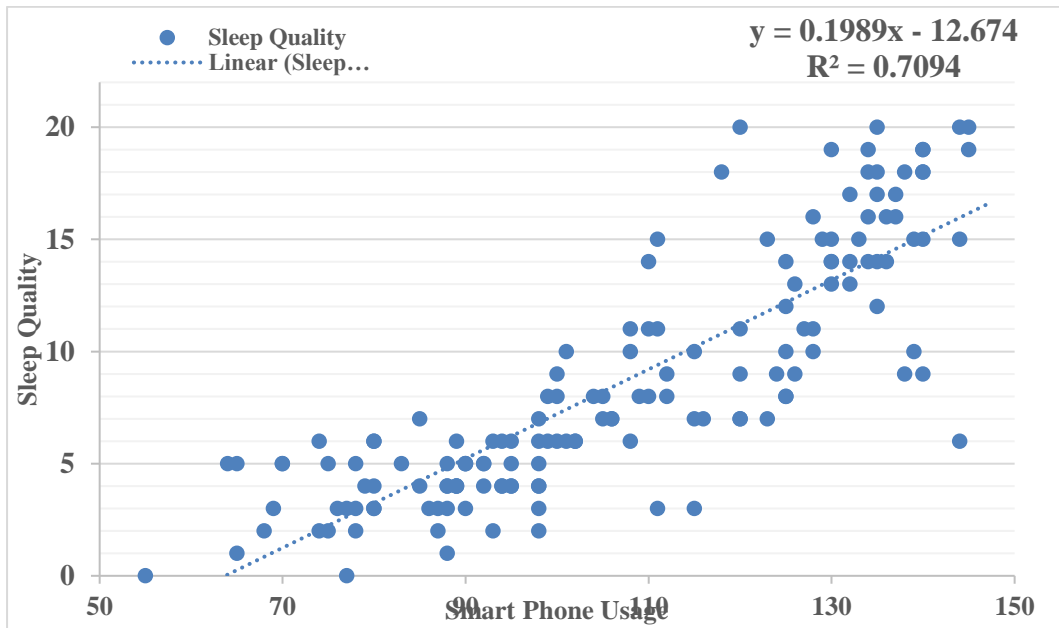
R^2= A statistical measure of how well the regression line approximates the actual data and how well the model fits the data.

B value = represents the slope.

F VALUE = determine whether the test is statistically significant.

P VALUE = tells us the significance of the independent variables.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

194

Graph 13 : Regression Graph for Sleep Quality and Smart Phone Usage

Graph 14 : Regression Graph for Sleep Quality and Smart Phone Usage
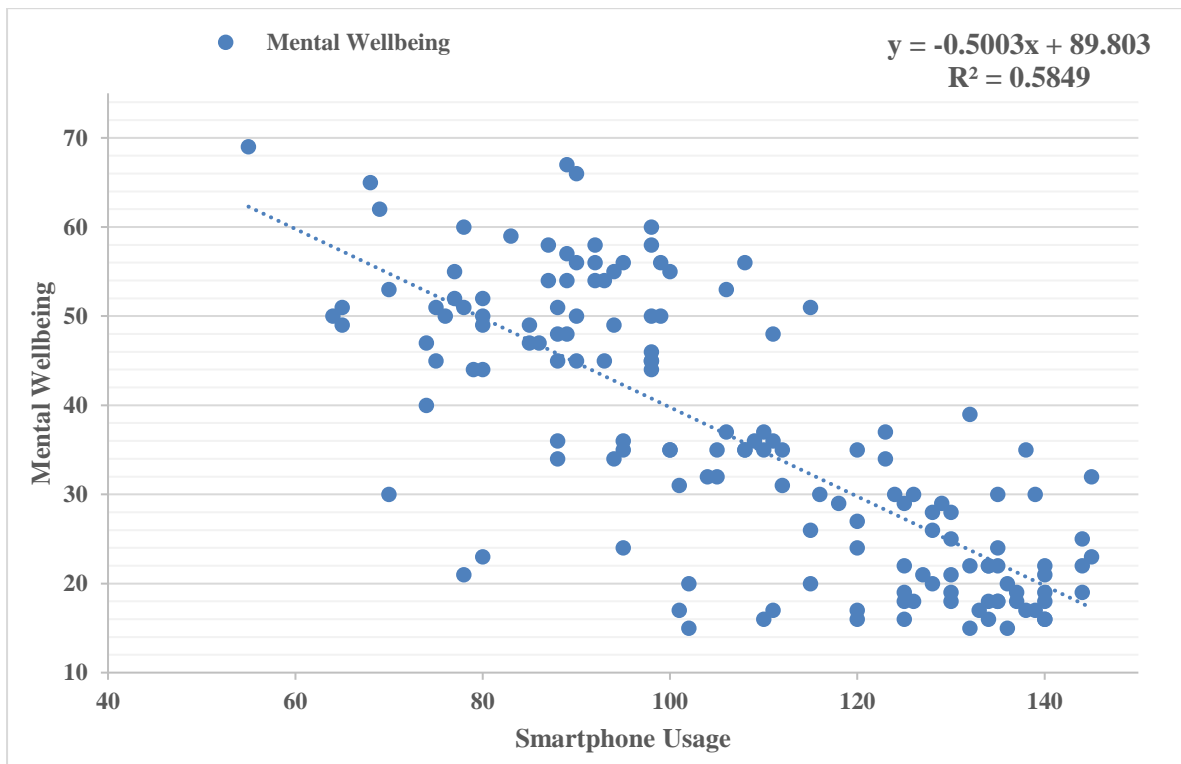
Table, 1.3 shows that the predictor variable smartphone usage predicts the sleep quality positively with $(R^2=0.709, p<0.01)$.

International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

195

Based on the table, the model fit data with **F=361.271 and p<0.01**. R square value **(R²=0.709)** suggested that the predictor variable smartphone usage explained about **70.9%** of the variance in sleep quality. That is, for each one unit increase in smartphone usage, the sleep quality increased by **0.199 units**.

Table 1.3, also reveals that, the predictor variable smartphone usage predicts mental wellbeing negatively with **(R²=0.585, p<0.01).**

Based on the table, the model fit data with **F=208.557 and p<0.01**. R square value **(R²=0.585)** suggested that the predictor variable smartphone usage explained about **58.5%** of the variance in mental wellbeing. That is, for each one unit increase in smartphone usage, the mental wellbeing will decreases by **-0.500 units**.

As a result, it was concluded that smartphone usage has a significant influence on both sleep quality & mental wellbeing among school students.

IV. CONCLUSION

According to the obtained results, the present study reveals a significant influence of smartphone usage on sleep quality, and mental wellbeing among school-going students. Excessive smartphone usage is linked to poor sleep quality and mental wellbeing, potentially leading to addiction and other mental health issues. The finding highlights the importance of understanding the psychological needs and providing necessary support to the students.

V. IMPLICATION

This study has implications for parents, teachers, educational administrators, policy makers, mobile phone companies, other persons who are all involved in the lives of students. Awareness programs can be designed based on the results for the school students, parents and teachers about the negative consequences of smartphone usage and the precautions to be taken, to minimize the negative effect. It also helps the policy makers in education sector to design the online education programs without affecting the wellbeing of the students.

Suggestion for Future the Researches

Qualitative Research Methods: This study has used the quantitative research design by utilizing a questionnaire, has limitations in understanding the students at different levels. It is suggested that a combination of qualitative methods like interviews and observations is needed for a more comprehensive understanding.

Bibliography

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International Journal of Scientific Research in Science, Engineering and Technology | www.ijsrset.com | Vol 10 | Issue 6

196

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VI. REFERENCES

[1]. Joshua Saji Kokkaparambil, Dr, Cynthia Sara James (2023), The impact of Smartphone addiction on Sleep Quality and Psychological Wellbeing among Young Adult. The International Journal of Indian Psychology ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print).

[2]. Shankhabela Mukherjee, Subrata Dasgupta,(2023), Development and validation of the smartphone use scaleThe International Journal of Indian Psychology ISSN 2348-5396 (Online) | ISSN: 2349-3429 (Print).

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197