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I affirm that I have identified all my sources and that no part of my dissertation paper uses unacknowledged materials.

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I would like to acknowledge that this project was completed entirely by me and not by someone else.

Shreyasi Kayam

Introduction

Social media is a computer-based technology that makes it easier to share information, ideas, and opinions through online communities and networks. Social media encompasses a wide range of applications and platforms that let users communicate online, from Instagram to Twitter. Humans are naturally social beings. We require the company of others in order to flourish in life, and the quality of our relationships has a significant bearing on both our happiness and mental health. On the other hand, a lack of strong social connections can endanger one's mental and emotional health. Social media has a huge impact on the opinions of young people. More than 4.7 billion people, or approximately 60% of the world's population, use social media. It now plays a significant role in peoples' everyday lives.

Social networking websites' primary goal is to make it easier for people to socialize, regardless of barriers like distance. Social media can provide a virtual alternative for young people who find it difficult to interact with others in the real world and help them avoid feeling lonely. Utilizing social media increases oxytocin synthesis, which lowers stress levels and fosters positive emotions. Students have access to blogs, pictures, and videos, many of which have instructional value. The emergence of social media has resulted in a reduction in global distance. Young people can now communicate with people from all over the globe with ease and benefit from exposure to diverse cultures and ideas.

Social isolation results from social media, despite the fact that it appears to connect more people and force them to remain informed. Since young people usually spend most of their time online, it decreases the amount of face-to-face encounters among them. Youth who are socially isolated may experience a variety of negative impacts, including physical, emotional, mental, and psychological problems. This can then result in depression, worry, and a host of other issues. The use of cyberbullying and theft on social media also raises the likelihood and frequency of identity theft. It may also serve as a diversion. There is a chance of addiction because using social media so readily produces rewards and happy feelings.

In conclusion, social networking has been shown to affect our youth in both positive and negative ways. This research aims to investigate the psychological effects of social media on students, including social isolation, depression, and anxiety. This is to determine whether social media significantly affects loneliness and anxiety.

Data Description

Source of data:

To conduct this study, a web-based survey gathered data from a total of 100 undergraduate students of St. Xavier's College, Kolkata.

Data Collection:

Participants completed an online self-report questionnaire. This method requires minimal cost and time. The items of the questionnaire included gender, questions related to mental health problems like anxiety and loneliness, questions related to social media usage.

Data Set:

There was a total of 100 participants, out of which 65 were females and 35 were males.

We have the following variables-

1. Social media usage
2. Anxiety
3. Loneliness

Measures:

The three variables in this study are measured using three distinct scales. The Social Media Engagement Questionnaire (SMEQ) is the first one, and it's used to assess social media usage. The scale has five items with the response scale provided in an 8-point Likert scale from 0 (not one day) to 7 (everyday).

The 7-item Generalized Anxiety Disorder Scale (GAD-7) was used to measure anxiety. The scale asks respondents to choose from four choices, ranging from "not at all" to "nearly every day," to evaluate the severity of their symptoms.

The three-item UCLA Loneliness scale was used to assess loneliness. There are three possible answers: hardly ever, some of the time, and often.

Objective of study

This study examines the relationship between social media and the mental health status of students. The objective of our study is to check whether social media usage has a significant impact on mental health issues of a student i.e. anxiety and loneliness.

Results

We begin with our first variable 'Social media usage'. It has been measured by 5-item SMEQ scale. The descriptive statistics of the SMEQ scores is presented by table 1. The table includes the mean, median, mode, minimum, maximum, standard deviation, skewness, kurtosis, quartile 1 and 3, and inter quartile range of the 5 items of SMEQ. Table 2 shows the descriptive statistics of the total computation of the SMEQ scores.

Table 1: Descriptive statistics of SMEQ scores

	Item 1	Item 2	Item 3	Item 4	Item 5
Mean	5.650	3.870	2.350	2.090	2.350
St Dev	1.982	2.769	2.728	2.606	2.823
Minimum	0.000	0.000	0.000	0.000	0.000
Maximum	7.000	7.000	7.000	7.000	7.000
Median	7.000	4.000	1.000	1.000	0.500
Mode	7	7	0	0	0
N for mode	57	33	44	47	50
Q1	5.000	1.000	0.000	0.000	0.000
Q3	7.000	7.000	4.750	3.000	5.000
IQR	2.000	6.000	4.750	3.000	5.000
Skewness	-1.42	-0.15	0.73	0.96	0.67
Kurtosis	0.96	-1.58	-1.07	-0.58	-1.27

Table 2: Descriptive statistics of SMEQ combined scores

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Social media usage	100	0.000	35.000	16.310	9.695

Our second variable is ‘Anxiety’. It has been measured by 7-item GAD-7 scale. Similar tables 3 and 4 are made for the variable Anxiety which represent the descriptive statistics of the GAD-7 scores.

Table 3: Descriptive statistics of GAD-7 scores

	Item 1	Item 2	Item 3	Item 4	Item 5	Item 6	Item 7
Mean	1.35	1.54	1.67	1.43	0.94	1.25	1.39
St Dev	0.9252	1.077	1.064	1.075	1.081	1.067	1.136
Minimum	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Maximum	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Median	1.0	1.0	2.0	1.0	1.0	1.0	1.0
Mode	1	1	2	1	0	1	1
N for mode	48	34	31	33	46	35	32
Q1	1.0	1.0	1.0	1.0	0.0	0.0	0.0
Q3	2.000	3.000	3.000	2.000	1.750	2.000	2.750
IQR	1.000	2.000	2.000	1.000	1.750	2.000	2.750
Skewness	0.41	0.07	-0.23	0.16	0.86	0.40	0.24
Kurtosis	-0.62	-1.27	-1.17	-1.22	-0.59	-1.06	-1.34

Table 4: Descriptive statistics of GAD-7 combined scores

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Anxiety scale	100	0.000	21.000	9.570	5.840

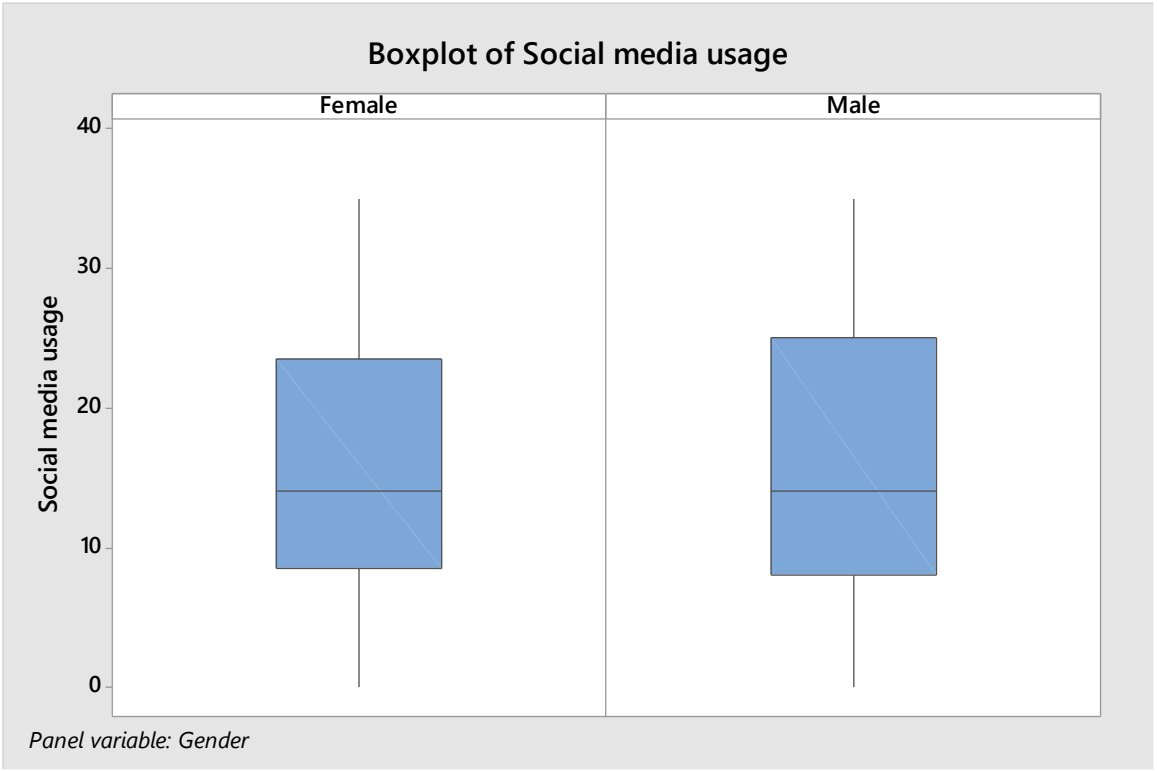
The variable ‘Loneliness’ has been measured by 3-item UCLA scale. Again, similar tables are made which represent the descriptive statistics of the UCLA scores.

Table 5: Descriptive statistics of UCLA scores

	Item 1	Item 2	Item 3
Mean	1.98	1.99	2.03
St Dev	0.6960	0.6889	0.7311
Minimum	1.0	1.0	1.0
Maximum	3.0	3.0	3.0
Median	2.0	2.0	2.0
Mode	2	2	2
N for mode	52	53	47
Q1	1.25	2.00	1.25
Q3	2.00	2.00	3.00
IQR	0.75	0.00	1.75
Skewness	0.03	0.01	-0.05
Kurtosis	-0.90	-0.85	-1.10

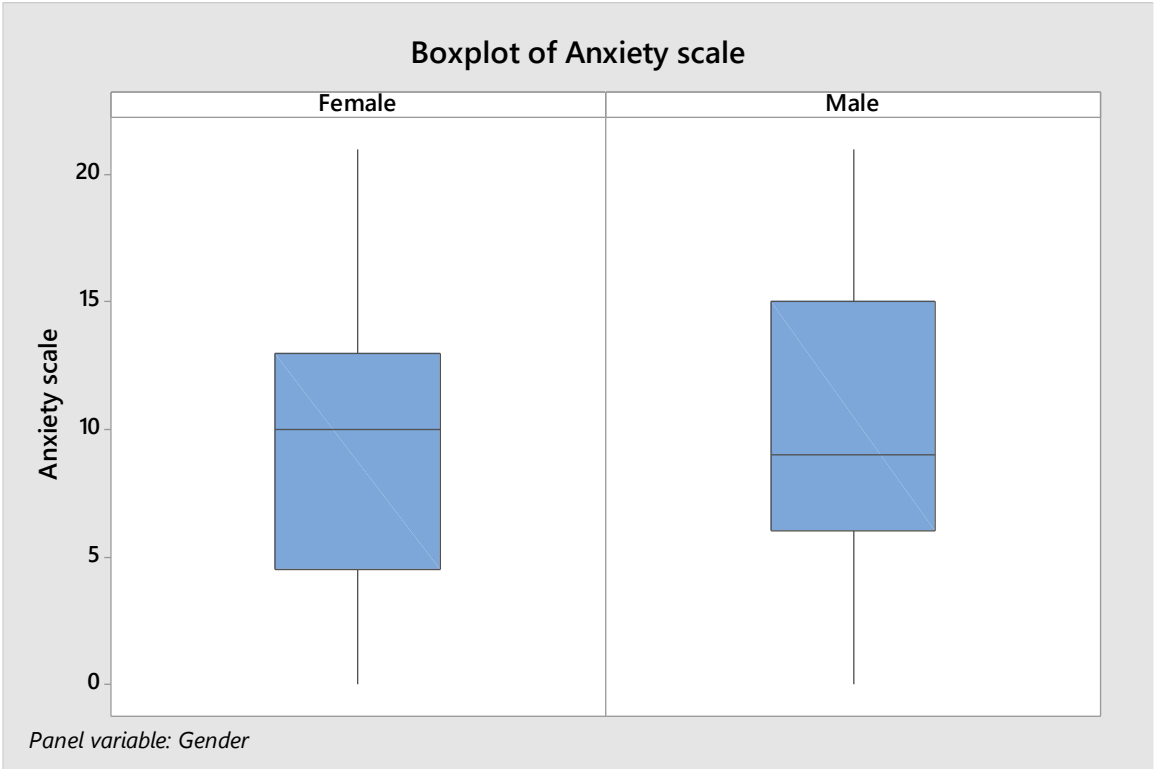
Table 6: Descriptive statistics of UCLA combined scores

Variables	N	Minimum	Maximum	Mean	Std. Deviation
Loneliness scale	100	3.000	9.000	6.000	1.864



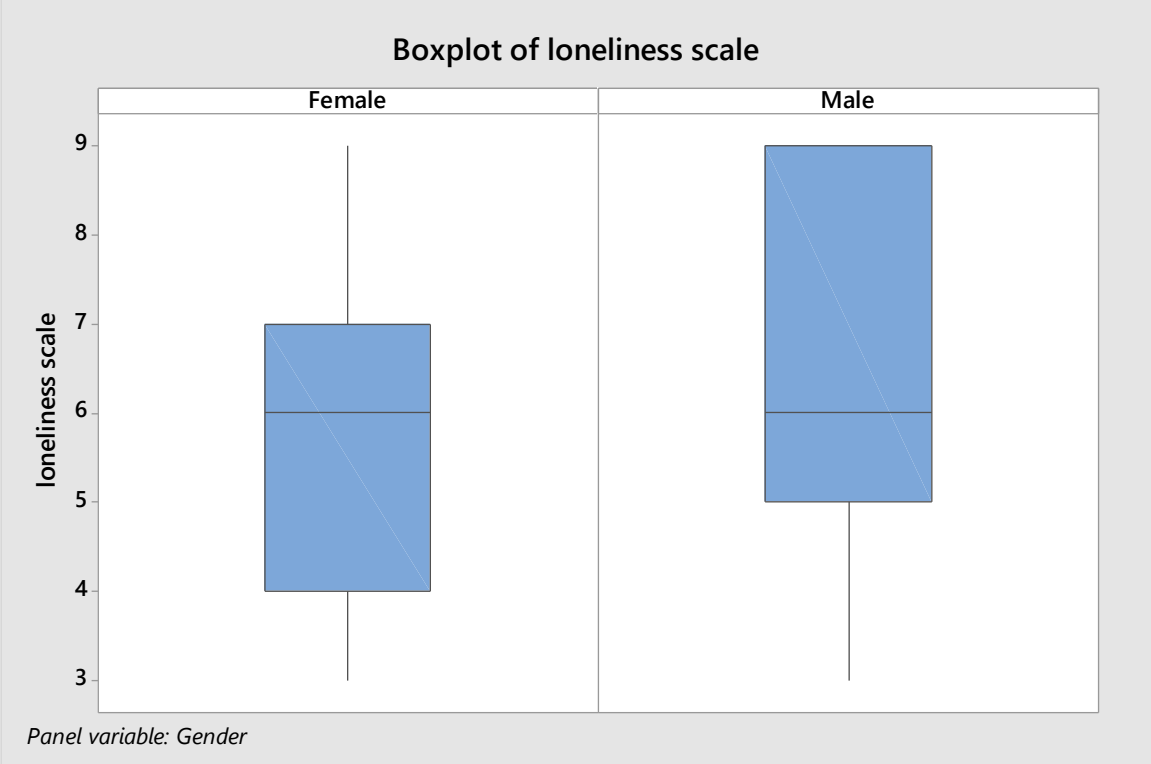
Graph 1: Boxplot of Social media usage for males and females

The median for both the genders is 14, thus on an average both males and females have moderate social media usage. The IQR for males is 17 and for females is 14. For females, there is lesser spread in the middle 50% of the data than for males. For females there is slightly lesser variability in the data than for males.



Graph 2: Boxplot of Anxiety for males and females

The median for males and females is 9 and 10 respectively. This means that the mean anxiety level is higher for females. IQR for males is 9 and for females is 8.5. For females, there is lesser spread in the middle 50% of the data than for males. For females there is slightly lesser variability in the data than for males. 3rd quartile (Q_3) for males is 15 and for females is 13 i.e. the highest 25% of the anxiety scores for males is higher than that for females.



Graph 3: Boxplot of Loneliness for males and females

The median for both the genders is 6. IQR for males is 4 and for females is 3.For females there is slightly lesser variability in the data than for males. 3rd quartile (Q_3) for males is 9 and for females is 7. The highest 25% of the loneliness scores for males is even higher than all the loneliness scores for females. Thus, comparatively loneliness level is more in males than in females.

The data is gathered on the three variables Social media usage, Anxiety and Loneliness in numerical forms using suitable measures as previously mentioned. We can now divide the data into categories and perform categorical analysis. The contingency tables are given as follows:

Social media usage	Anxiety				Total
	Mild	Moderate	Moderately severe	Severe	
Low	19	22	16	7	64
High	10	6	10	10	36
Total	29	28	26	17	100

Table 7: A 2x4 contingency table

Let A and B be two attributes defined as Anxiety and Social media usage respectively. Let A_1, A_2, A_3, A_4 be defined as the four levels of A denoting mild anxiety, moderate anxiety, moderately severe anxiety and severe anxiety respectively. Similarly, let B_1, B_2 be defined as the two levels of B denoting low and high social media usage respectively. Here, both the attributes A, B are ordinal.

Now, to judge the association between anxiety and social media usage of a person, i.e. to compute the association between A and B, we use the following measures:

Kendall's measure of concordance (Kendall's Tau-b) and Goodman and Kruskal's Gamma.

Using Minitab, we get the following results,

No. of concordant pairs	1094
No. of discordant pairs	658
The total no. of observations	100
Kendall's Tau-b	0.149228
Goodman and Kruskal's Gamma	0.248858

From the data, we can conclude that, there is a moderate association between Anxiety and social media usage of a person i.e. a person with high social media usage is perceived to have high anxiety level.

Social media usage	Loneliness			Total
	Low	Moderate	High	
Low	16	36	12	64
High	8	19	9	36
Total	24	55	21	100

Table 8: A 2x3 contingency table

Let X and Y be two attributes defined as Loneliness and Social media usage respectively. Let X_1, X_2, X_3 be defined as the three levels of X denoting low, moderate and high loneliness level respectively. Similarly, let Y_1, Y_2 be defined as the two levels of Y denoting low and high social media usage respectively. Here, both the attributes X, Y are ordinal.

Now, to judge the association between loneliness and social media usage of a person, i.e. to compute the association between X and Y, we use the following measures:

Kendall's measure of concordance (Kendall's Tau-b) and Goodman and Kruskal's Gamma.

Using Minitab, we get the following results,

No. of concordant pairs	772
No. of discordant pairs	612
The total no. of observations	100
Kendall's Tau-b	0.06107
Goodman and Kruskal's Gamma	0.11560

From the data, we can conclude that, there is a mild association between Loneliness and social media usage of a person i.e. a person with high social media usage is perceived to have high loneliness level.

Ordinal Logistic Regression (I)

We want to find out how social media usage influences anxiety of a person. Anxiety is the response variable with categories that have a natural order from mild to severe anxiety. The four categories of the response variable are mild, moderate, moderately severe and severe anxiety. The response variable is ordinal. Thus, we use ordinal logistic regression to model the relationship between the predictor and the response. The predictor here is the social media usage of a person which has two categories – low and high.

Let Y denote the response variable anxiety and X be the predictor social media usage. So we are provided with the data (y_1,x_1), …….(y_n,x_n) where n = 100 which is the total number of data points.

We use Minitab to perform ordinal logistic regression. The following results are obtained.

Logistic Regression table

Predictor	Coefficient	SE coefficient	Z	p	Odds ratio	95% CI Lower	Upper
Const(1)	-1.18881	0.342882	-3.47	0.001			
Const(2)	0.155453	0.313126	0.50	0.620			
Const(3)	1.35150	0.341282	3.96	0.000			
Social media usage	-0.648074	0.378213	-1.71	0.087	0.52	0.25	1.10

Interpretation

To test, H_0 : There is no association between social media usage and anxiety.
H_1 : Not H_0.

We use a significance level of 0.05 to assess the statistical significance of the model and the goodness of fit of the model. Therefore $\alpha = 0.05$.

Through computation, the p-value has come out to be 0.087. As the p-value > α, the association is not statistically significant. We fail to reject the null hypothesis. We cannot conclude that there is a statistically significant association between the response anxiety and the predictor social media usage.
We cannot conclude that changes in social media usage are associated with changes in the probabilities that the different events occur.

Log-likelihood	-135.279
Somers' D	0.12
Goodman-Kruskal Gamma	0.25
Kendall's Tau-a	0.09

Small value of log-likelihood indicates that the model is not a good fit to the data. Somers' D, Goodman-Kruskal Gamma, Kendall's Tau-a have values close to zero which indicates that the model does not have a predictive relationship with the response. The relationship between social media usage and anxiety is weak.

Ordinal Logistic Regression (II)

We now again perform ordinal logistic regression for the predictor social media usage but for the response Loneliness. This is to check how loneliness is influenced by social media usage of a person. Loneliness is categorized into three levels namely, low, moderate and high. This is also an ordinal response variable, therefore ordinal logistic regression has been used to model the relationship between the two variables.

Let Z denote the response variable loneliness and X be the predictor social media usage. So we are provided with the data (z_1,x_1), …….(z_n,x_n) where n = 100 which is the total number of data points.

We use Minitab to perform ordinal logistic regression. The following results are obtained.

Logistic Regression table

Predictor	Coefficient	SE coefficient	Z	p	Odds ratio	95% CI Lower	Upper
Const(1)	-1.16187	0.347985	-3.34	0.001			
Const(2)	1.32422	0.355373	3.73	0.000			
Social media usage	-0.259511	0.402049	-0.65	0.519	0.77	0.35	1.70

Interpretation

To test, H_0 : There is no association between social media usage and loneliness.
H_1 : Not H_0.

We use a significance level of 0.05 to assess the statistical significance of the model and the goodness of fit of the model. Therefore $\alpha = 0.05$.

Through computation, the p-value has come out to be 0.519. As the p-value > α, the association is not statistically significant. We fail to reject the null hypothesis. We cannot conclude that there is a statistically significant association between the response loneliness and the predictor social media usage.
We cannot conclude that changes in social media usage are associated with changes in the probabilities that the different events occur.

Log-likelihood	-99.698
Somers' D	0.05
Goodman-Kruskal Gamma	0.12
Kendall's Tau-a	0.03

Small value of log-likelihood indicates that the model is not a good fit to the data. Somers' D, Goodman-Kruskal Gamma, Kendall's Tau-a have values close to zero which indicates that the model does not have a predictive relationship with the response. The relationship between social media usage and loneliness is weak.

Conclusion

The study shows that there is a moderate positive association between anxiety and social media usage. This means that a student with high social media usage has high anxiety level. Whereas, we cannot exactly get a predictive relationship between the two because the model was not a good fit for the data. Thus, we cannot predict the response from the social media usage of a student. There's a similar case with loneliness, which also has a mild positive association with social media usage. But, loneliness cannot exactly be predicted by the social media usage of a student. Though we know that the variables are associated, we cannot know to what degree there is a relationship with social media.

Social media usage might play an important role in the mental health status of a student. But this association doesn't mean that it is the causing factor. Therefore, this study shows that social media is seen to be slightly associated with the mental health status of student i.e. anxiety and loneliness but it is not its cause. Thus, social media usage cannot exactly be used to predict the level of anxiety and loneliness in a student.

References

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https://patient.info/doctor/generalised-anxiety-disorder-assessment-gad-7
Generalised Anxiety Disorder assessment (GAD-7)

Social Isolation and Loneliness in Older Adults: Opportunities for the Health Care System

Effects of Social media use on Psychological Well- Being: A Mediated Model

Appendix

Calculations for the descriptive statistics were done using Minitab. The steps are –

Stat ⟶ Basic Statistics ⟶ Display Descriptive statistics ⟶ Variables (Anxiety/Social media usage/Loneliness) ⟶ Statistics

Select mean, median, mode, minimum, maximum etc and then click OK. We get the desired outputs in the Session window.

The boxplots were obtained using Minitab by the following steps –

Graph ⟶ Boxplot ⟶ One Y (Simple) ⟶ Graph variables (Anxiety/Social media usage/Loneliness) ⟶ Multiple graphs ⟶ By variables with groups in separate panels (select Gender) ⟶ click OK.

Kendall's measure of concordance (Kendall's Tau-b) and Goodman and Kruskal's Gamma were calculated from Minitab as follows –

Stat ⟶ Tables ⟶ Cross tabulation and Chi- Square

Select the rows and columns. Click on Other Stats to select the various measures and then click OK.

Ordinal logistic regression was done using the following steps –

Stat ⟶ Regression ⟶ Ordinal logistic regression

Then we select the response as Anxiety for the first time and loneliness for the next. For both Model and Categorical predictors we select Social media usage. Then click on OK.

Questionnaire –

Gender:

How many hours of the day do you use your social media accounts? :

How often did you use social media in the 15 minutes before you go to sleep?

- Not one day
- One day
- Two days
- Three days
- Four days

- Five days
- Six days
- Everyday

How often did you use social media in the 15 minutes after you wake up?

- Not one day
- One day
- Two days
- Three days
- Four days
- Five days
- Six days
- Everyday

How often did you use social media when eating breakfast?

- Not one day
- One day
- Two days
- Three days
- Four days
- Five days
- Six days
- Everyday

How often did you use social media when eating lunch?

- Not one day
- One day
- Two days
- Three days
- Four days

- Five days
- Six days
- Everyday

How often did you use social media when eating supper?

- Not one day
- One day
- Two days
- Three days
- Four days
- Five days
- Six days
- Everyday

How often do you feel that you lack companionship?

- Hardly ever
- Some of the time
- Often

How often do you feel left out?

- Hardly ever
- Some of the time
- Often

How often do you feel isolated from others?

- Hardly ever
- Some of the time
- Often

Feeling nervous, anxious, or on edge.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Not being able to stop or control worrying.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Worrying too much about different things.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Trouble relaxing.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Being so restless that it’s hard to sit still.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Becoming easily annoyed or irritable.

- Not at all
- Several days
- Over half the days
- Nearly everyday

Feeling afraid as if something awful might happen.

- Not at all
- Several days
- Over half the days
- Nearly everyday