



Internet Addiction's Impact on Depression, Anxiety and Stress: A Comprehensive Statistical Analysis

Jahanara Akter Keya^{1,*}, Md. Ashraful Islam²

¹Department of Statistics, University of Chittagong, Chattogram, Bangladesh

²Department of Natural Science, Port City International University, Chattogram, Bangladesh

Email address:

jkeya6898.stat@cu.ac.bd (Jahanara Akter Keya), ashraful.ns@portcity.edu.bd (Md. Ashraful Islam)

*Corresponding author

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Abstract: This study aimed to explore the relationships between internet addiction on Depression, Anxiety and Stress of 154 students from various universities in the Chittagong regions. The primary data was collected through Google Forms and Cronbach's Alpha was used to evaluate the reliability of four key constructs: internet addiction, depression, anxiety, and stress. The results showed a positive relationship between the severity of internet addiction and elevated levels of depression, anxiety, and stress. The study also revealed deviations from normality in anxiety scores across different groups, particularly within those with complete control over their internet usage. Further investigation is to understand the complexities contributing to this non-normal distribution. Anxiety scores were analyzed using the Kruskal-Wallis's test, but no significant differences were found in subcategories A2 and A19. The study also used the Kruskal-Wallis H statistic to analyze depression, anxiety, and stress scores across different categories of Internet Addiction Test (IAT) scores. A Structural Equation Modeling (SEM) analysis was used to assess the model's fit, revealing an outstanding CFI and commendable NFI, GFI, and AGFI indices. The model effectively explained a substantial portion of the variation in anxiety, stress, and depression, indicating the underlying relationships. The study provides valuable insights into the profound relationship between internet addiction and psychological constraints, emphasizing the need for targeted interventions to mitigate the detrimental impact of internet addiction on mental health. According to study findings, it's significant to inform students about the harmful effects of the internet and encourage responsible internet use, even though it's impossible to entirely prevent it.

Keywords: Internet Addiction, Depression, Anxiety and Stress

1. Introduction

The Internet has brought the world into our hands and made life easier. This progression and the availability of the internet to the younger generation have made their lives lethargic. In the competition to make life more attractive and luxurious, the use of the internet has rapidly increased. Extreme use of the internet in teaching and learning is quite concerning and threatens to diminish the thinking capability of the students. A great portion of the day, the youth are engaged by the internet, and they have no interest in thinking that the overuse of the internet kills their valuable time. The students are interested in passing their time on the internet instead of concentrating on academic benefits. Use of smartphone in the classroom is very

common in our real-life classroom situation. Consequently, an unfriendly situation arises in the classroom: the students are busy browsing the internet instead of giving attention to their academic activities. A study reveals that there is a significant negative correlation found in thinking control, academic interest and socialism on use of media multitasking among young adults. Students' professional concerns are diverted as a result of their excessive usage of the internet [28]. As a result, they become more frustrated to see the scenario of their future. A significant relationship is established between depression and social media use among young adults [29]. Extreme use of social media and activeness throughout the day by sharing updates about their lives is considered a sign of smartness and becoming more familiar with society, which has a detrimental effect on their mental health. Another study shows that it is

more likely to cause depression among young adults with excessive use of social media [19]. Another study also determines that spending more time in the internet is more likely to increase vulnerability to depression, anxiety, and stress [1]. A brief analysis on indications of ADHD (Attention Deficit and Hyperactivity Disorder), depression, and hostility can be used as an indicator of internet addiction [33]. A study on internet addiction among students reveal that spending a lot of time in online is a signal of ignorance of doing daily routine work accurately, suffer from insomnia, and continue a monotonous life without the internet [23].

The internet is a popular place for young people to spend their time, which diminishes cognitive function and normal brain activity. Such people thus experience depression and increase their level of life anxiety. Some research suggest that increased usage of numerous social media platforms was found to be highly and independently correlated with both depressive and anxious symptoms [25]. Social media addiction has a positive relationship with depression, and depression is an important determinant of social media addiction [10]. Recently, there has been a high incidence of suicide among Bangladeshi students. It is terribly regrettable that in 2022, about 600 students committed suicide [21]. University students are the group most at risk for suicide among them [26]. A huge number of younger adults between the ages of 18 and 25 also have severe depressive disorders [13]. There is a significant relationship between suicidal ideation and mental health issues among university students in Bangladesh [4]. A comparative analysis found that Mymensingh division has the highest rate of suicide thoughts, followed by Dhaka and Chittagong [4]. It is essential to understand the mental health (depression, anxiety, and stress) of university students.

Depression commonly starts during adolescence and early adulthood [6]. Also, there is evidence that suggests social media use can have a negative effect on the mental health of underage individuals [8]. In our country, a significant number of university students carry family obligations, and once they graduate, they must take on full responsibility for their families. Given this situation, they are particularly concerned about their future. If they experience depression for any reason, their prospects become grim because they become a liability rather than a valuable contribution to their family. A depth estimation suggests that there is a correlation between increased internet use and decreased life satisfaction and self-worth [18]. Therefore, it is essential to understand the mental well-being of students during this crucial phase of their responsible lives. According to a study on younger individuals are more susceptible to experiencing depression compared to older individuals due to their difficulties in adapting to various circumstances [10].

There is no denying that the internet is an indispensable resource for learning, and students need to have access to it in order to study and get ready for this competitive world. But using the internet excessively can harm both physical and mental health. The purpose of this study is to find out how the relationship between internet addiction and depression,

anxiety, and stress among students attending several universities in the Chittagong divisions relates to one another.

2. Materials and Methods

In our investigation 154 students from various universities in the Chittagong divisions made up the study's sample. A convenience sampling is used to collect data since respondents were reluctant to complete a lengthy questionnaire. During a course assignment, the data were gathered from the students using Google Form. The research has four variables, internet addiction and depression, anxiety and stress. The Internet Addiction Test developed by Dr. Kimberly Young (Young, 1998) was used to determine Internet addiction. Furthermore, the YIAT20 (Young's Internet addiction test) is a widely used tool to assess internet addiction in college students, particularly in Asia [7]. The YIAT20 consists of 20 questions with 5 point Likert scale (0 = Not Applicable 1 = Rarely 2 = Occasionally 3 = Frequently 4 = Often 5 = Always) questions. According to a research study a typical online user who has complete control over their usage has a score between 20 and 39 points. A score of 40–69 indicates frequent problems caused by internet use, whereas a score of 70–100 indicates significant problems [32].

The three dimensions of mental disorders (depression, anxiety, and stress) are measured using the DASS 21 scale. The DASS 21 is a self-reported survey used to assess levels of stress, anxiety, and depression [8]. Lovibond and Lovibond developed it in 1995 to measure depression, anxiety, and stress, and Anthony et al. (1998) rated the internal consistency of these measures as well to excellent. The components from each scale are allegedly regularly associated to represent their respective scales [24]. The scales were made up of 21 questions using a 4-point Likert scale, with a '0' indicates did not apply me at all- NEVER, '1' indicates applied to me to some degree, or some of the time- SOMETIMES, '2' indicates applied to me a considerable degree, or a good part of time- OFTEN, and '3' indicates applied to me very much, or most of the time- ALMOST ALWAYS. Given that DASS 21 is a condensed version of DASS 42, each score should be multiplied by 2. The following table lists the cutoff scores for evaluating stress, anxiety, and depression.

Table 1. Severity measures by DASS.

Severity	Depression	Anxiety	Stress
Normal	0-9	0-7	0-14
Mild	10-13	8-9	15-18
Moderate	14-20	10-14	19-25
Severe	21-27	15-19	26-33
Extremely Severe	28+	20+	34+

The internal consistency of the scales is evaluated using Cronbach's Alpha. Whether a parametric or non-parametric test is appropriate, the normality test is frequently used. To investigate the mean score of opinions regarding the various criteria for the Internet Addiction Test (IAT) score, descriptive statistics were used. In order to determine the percentage distribution of the items according to the various IAT score

categories, descriptive statistics employing cross tabulations were used. Finally, nonparametric tests like Kruskal-Wallis's were employed to determine the degree of difference between the various groups of IAT score because we accurately collected the data using the convenience sampling approach and the sample size was too small. A structural equation model generated through AMOS was used to test the relationship. The model fit was assessed using different indices. The value of $CMIN/DF \leq 3$ suggests the model fit is acceptable and the value of $CMIN/DF \leq 5$ suggests that the model is reasonably fit [12, 16]. The root means square error of approximation (RMSEA) less than 0.05 indicates close fit, while $0.05 < RMSEA < 0.08$ indicates good fit [5, 6]. The values of goodness of fit index (GFI), adjusted goodness of fit index (AGFI), Tucker and Lewis index (TLI), confirmatory fit index (CFI), norm fit index (NFI) ranges from 0 to 1, while 1 indicates perfect fit and the values 0.90 is considered good fit and the value between 0.80 to 0.90 is often stated to as marginal fit [30, 15]. The chi square model is fit well if the p value is greater than 0.05 and the standardized root mean square residual (RMR) is less than 0.08 indicate better fit the model [17]. Composite reliability is calculated to measure the internal consistency of the constructs and convergent validity also computed to assess the average value explained from the standardized factor loadings. The value of composite reliability ranges from 0 to 1, and the acceptability level of reliability is between 0.60 and 0.70 and the lowest acceptance level of average variance extracted is 0.50 based on Hair et al., 2014. IBM Statistics SPSS 26 and AMOS 22 version are used for statistical analysis.

3. Results and Discussions

The primary goal of this research is to establish a link between internet addiction and mental health issues among university students, with a focus on three domains of mental disorders: depression, anxiety, and stress.

3.1. Reliability

The study used Cronbach's Alpha (α) to assess the internal consistency of constructs such as internet addiction, depression, anxiety, and stress. According to Hair, a construct is regarded as credible if the Alpha (α) value is higher than 0.70 [12].

Table 2. Measures of reliability of internet addiction and different categories of DASS 21.

Constructs	No. of items	Alpha (α)
Internet Addiction	20	0.875
Depression	7	0.785
Anxiety	7	0.805
Stress	7	0.798

The Internet Addiction construct, consisting of 20 items, achieved a Cronbach's Alpha value of 0.875, indicating its high reliability. The Depression scale, with 7 items, obtained a Cronbach's Alpha of 0.785, slightly below the recommended threshold of 0.70, but still moderately reliable. The Anxiety scale, with 7 items, yielded a Cronbach's Alpha of 0.805,

above the recommended values near of 0.70, indicating its reliability in assessing anxiety. The Stress scale, with 7 items, achieved a Cronbach's Alpha of 0.798, close to 0.80, indicating its reliability in measuring stress. The study concluded that the 20-item scale used to measure internet addiction is highly reliable, demonstrating consistent capture of the construct. The Depression scale, with a slightly below-recommended value of 0.785, demonstrates moderate reliability in measuring depression. Further refinement or additional items could improve its reliability. The Anxiety and Stress scales, with Cronbach's Alpha values of 0.805 and 0.798, respectively, are considered reliable for measuring anxiety and stress, as both values exceed the recommended values near of 0.70. In our study's measures for internet addiction, anxiety, and stress have achieved good to high levels of reliability, with the depression scale potentially needing improvement for better consistency.

3.2. Statistical Analysis

3.2.1. Descriptive Statistics

Descriptive statistics are shown in the table for four variables, which are based on a sample of 154 students from different universities in the Chittagong divisions: Internet Addiction Test Score (IAT Score), Depression Score, Anxiety Score, and Stress Score.

Table 3. Descriptive statistics of IAT score and three levels of DASS 21.

	IAT Score	Depression score	Anxiety score	Stress score
N	154	154	154	154
Mean	50.338	14.9870	13.9740	15.9740
Minimum	21.0	.00	.00	.00
Maximum	100.0	42.00	42.00	42.00
Std. Deviation	15.2646	8.85983	8.80875	8.89146

Descriptive statistics are shown in the table for four variables, which are based on a sample of 154 students from different universities in the Chittagong divisions: Internet Addiction Test Score (IAT Score), Depression Score, Anxiety Score, and Stress Score. With an average IAT score of almost 50.34, moderate internet addiction is generally suggested. With a lowest score of 21.0 and the highest IAT score ever recorded is 100.0. The average depression score is 14.99, which suggests that the person generally has a low to moderate level of depression. With a standard deviation of roughly 8.86, the depression score indicates moderate variability within the sample. With an average anxiety score of 13.97, it can be concluded that the person generally has low to moderate anxiety. The lowest possible Anxiety Score is 0.00, and the highest possible score is 42.00. The average level of stress is comparatively low to moderate, as indicated by the Stress Score's standard deviation of 15.97. An overview of each variable's central tendency, variability, and range of scores is given by the descriptive statistics. The students appear to have moderate levels of stress, anxiety, depression, and internet addiction on average. Nonetheless, the standard deviations show that there is a significant amount of variability within the sample. The large range of scores, particularly in the IAT Score

variable, indicates that students' responses varied, which can be helpful in examining the connections between internet addiction and indicators of mental health in more detail.

Table 4. Frequency distribution of IAT score.

	Frequency	Percent
Average online user who has complete control over his/her usage	41	26.6
Frequent problem due to internet usage	97	63.0
Internet is causing significant problem	16	10.4
Total	154	100.0

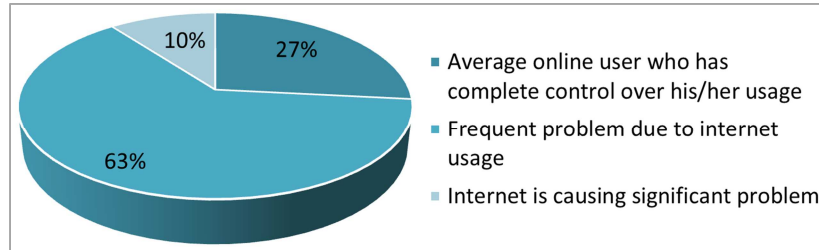


Figure 1. Percentage distribution of IAT score.

The pie chart is divided into three sectors, labeled with the respective category and percentage, providing a visual representation of the percentage distribution of IAT scores within the sample.

Table 5. Percentage distribution of Depression score, Anxiety Score and Stress Score.

	Depression score	Anxiety Score	Stress Score
Normal	44 (28.6)	30 (19.5)	69 (44.8)
Mild	26 (16.9)	26 (16.9)	33 (21.4)
Moderate	48 (31.2)	39 (25.3)	29 (18.8)
Severe	19 (12.3)	20 (13.0)	18 (11.7)
Extremely severe	17 (11.0)	39 (25.3)	5 (3.2)
Total	154 (100.0)	154 (100.0)	154 (100.0)

The table presents the distribution of scores for depression, anxiety, and stress among 154 participants. Depression scores

The Internet Addiction Test (IAT) scores are presented in a pie chart, dividing the data into three categories: "average online user who has complete control over usage", "frequent problem due to internet usage", and "Internet is causing a significant problem".

The percentage of each category relative to the total frequency is calculated, resulting in a percentage of 26.6% for the average online user who has complete control over their usage, 63.0% for frequent problems due to internet usage, and 10.4% for significant problems.

are categorized into "Normal" and "Moderate" levels, with the "Severe" and "Extremely severe" categories having fewer participants. Anxiety scores have a more varied distribution, with "Normal" and "Moderate" categories having significant representation.

The "Extremely severe" category stands out, with 25.3% of participants experiencing extreme anxiety. Stress scores are the most prevalent, with 44.8% of participants experiencing normal stress levels. The "Mild," "Moderate," and "Severe" categories have relatively balanced percentages. The "Extremely severe" category has the smallest representation, with only 3.2% reporting extremely severe stress. The table highlights the prevalence of normal or moderate scores in these constructs but also indicates a substantial portion of the sample experiences severe or extremely severe symptoms, particularly in anxiety.

Table 6. Descriptive statistics of Depression score, Anxiety score and Stress Score by different categories of IAT score.

IAT Score		Depression score	Anxiety score	Stress score
Average online user who has complete control over his/her usage	Mean	10.3415	10.7805	11.8049
	Std. Deviation	7.30620	8.07314	8.97558
	Std. Error of Mean	1.14104	1.26081	1.40175
Frequent problem due to internet usage	Mean	15.7526	14.2474	17.0515
	Std. Deviation	8.45211	8.28280	7.93249
	Std. Error of Mean	.85818	.84099	.80542
Internet is causing significant problem	Mean	22.2500	20.5000	20.1250
	Std. Deviation	9.05907	10.23719	10.74477
	Std. Error of Mean	2.26477	2.55930	2.68619
Total	Mean	14.9870	13.9740	15.9740
	Std. Deviation	8.85983	8.80875	8.89146
	Std. Error of Mean	.71395	.70983	.71649

The table presents descriptive statistics for Depression, Anxiety, and Stress scores categorized by different levels of Internet Addiction Test (IAT) Scores. These categories provide insights into how psychological variables vary based on the degree of internet addiction. The average online user with complete control over their internet usage has relatively

low levels of depression, anxiety, and stress.

This group seems to have better psychological well-being, with lower levels of depression, anxiety, and stress. Frequent problems due to internet usage have higher mean scores for Depression (15.75), Anxiety (14.25), and Stress (17.05), indicating a moderate level of psychological distress in this

group. Individuals who consider the internet as a significant problem have higher levels of depression, anxiety, and stress. This category exhibits the highest levels of psychological distress, suggesting a strong correlation between significant internet-related problems and poor psychological well-being. The overall mean scores for Depression (14.99), Anxiety (13.97), and Stress (15.97) across all categories provide a summary of the average psychological well-being of the entire sample. The findings emphasize the importance of addressing internet addiction as it appears to have a significant impact on individuals' psychological well-being. Further statistical analysis and research may be warranted to better understand

the causality and develop targeted interventions for those experiencing internet-related problems.

3.2.2. Test of Normality

The Shapiro-Wilk test is used to determine whether the data are normal. In order to calculate values that increased the sample size from 50 to 2,000, Royston developed this approach of calculating the coefficients vector. The following table represents that almost all the variables are statistically significant. So that non parametric test is applied to measure is there any difference of mental health issues of different categories of internet addiction.

Table 7. Results of the normality tests performed using several subgroups of IAT Scores on various DASS-21 categories.

Merged IAT score	Depression	Shapiro-Wilk			Anxiety	Shapiro-Wilk			Stress	Shapiro-Wilk		
		Statistic	df	Sig.		Statistic	df	Sig.		Statistic	df	Sig.
Average online user who has complete control over his/her usage	I couldn't seem to experience any positive feeling at all (D3)	0.815	41	0.000	I was aware of dryness of my mouth (A2)	0.804	41	0.000	I found it hard to wind down (S1)	0.778	41	0.000
Frequent problem due to internet usage		0.866	97	0.000		0.858	97	0.000		0.825	97	0.000
Internet is causing significant problem		0.886	16	0.049		0.888	16	0.051		0.845	16	0.011
Average online user who has complete control over his/her usage	I found it difficult to work up the initiative to do things (D5)	0.791	41	0.000	I experienced breathing difficulty (e.g., excessively rapid breathing, breathlessness in the absence of physical exertion) (A4)	0.698	41	0.000	I tended to over-react to situations (S6)	0.831	41	0.000
Frequent problem due to internet usage		0.854	97	0.000		0.809	97	0.000		0.864	97	0.000
Internet is causing significant problem		0.819	16	0.005		0.894	16	0.064		0.878	16	0.036
Average online user who has complete control over his/her usage	I felt that I had nothing to look forward to (D10)	0.785	41	0.000	I experienced trembling (e.g., in the hands) (A7)	0.723	41	0.000	I felt that I was using a lot of nervous energy (S8)	0.831	41	0.000
Frequent problem due to internet usage		0.870	97	0.000		0.838	97	0.000		0.867	97	0.000
Internet is causing significant problem		0.862	16	0.020		0.846	16	0.012		0.870	16	0.027
Average online user who has complete control over his/her usage	I felt down-hearte d and blue (D13)	0.727	41	0.000	I was worried about situations in which I might panic and make a fool of myself (A9)	0.770	41	0.000	I found myself getting agitated (S11)	0.800	41	0.000
Frequent problem due to internet usage		0.844	97	0.000		0.830	97	0.000		0.850	97	0.000
Internet is causing significant problem		0.894	16	0.065		0.868	16	0.025		0.892	16	0.061
Average online user who has complete control over his/her usage	I was unable to become enthusiastic about anything (D16)	0.770	41	0.000	I felt I was close to panic (A15)	0.785	41	0.000	I found it difficult to relax (S12)	0.823	41	0.000
Frequent problem due to internet usage		0.863	97	0.000		0.849	97	0.000		0.871	97	0.000
Internet is causing significant problem		0.887	16	0.050		0.886	16	0.049		0.887	16	0.050
Average online user who has complete control over his/her usage	I felt I wasn't worth much as a person (D17)	0.771	41	0.000	I was aware of the action of my heart in the absence of physical exertion (e.g., sense of heart rate increase, heart missing a beat) (A19)	0.826	41	0.000	I was intolerant of anything that kept me from getting on with what I was doing (S14)	0.805	41	0.000
Frequent problem due to internet usage		0.850	97	0.000		0.837	97	0.000		0.871	97	0.000
Internet is causing significant problem		0.858	16	0.018		0.831	16	0.007		0.886	16	0.049

Merged IAT score	Depression	Shapiro-Wilk Statistic	df	Sig.	Anxiety	Shapiro-Wilk Statistic	df	Sig.	Stress	Shapiro-Wilk Statistic	df	Sig.
Average online user who has complete control over his/her usage	I felt that life was meaningless (D21)	0.741	41	0.000	I felt scared without any good reason (A20)	0.765	41	0.000	I felt that I was rather touchy (S18)	0.784	41	0.000
Frequent problem due to internet usage		0.815	97	0.000		0.856	97	0.000		0.854	97	0.000
Internet is causing significant problem		0.859	16	0.019		0.871	16	0.028		0.872	16	0.029

The table presents the results of Shapiro-Wilk tests on various subgroups of Internet Addiction Test (IAT) scores in relation to the Depression, Anxiety, and Stress Scale (DASS-21) categories. These tests assess whether the data in each subgroup follows a normal distribution, which is crucial for statistical analyses. The table is organized into three main sections, corresponding to the three categories of IAT scores: Average online user who has complete control over their usage, frequent problem due to internet usage, and Internet is causing a significant problem. The table provides information about the Shapiro-Wilk Statistic, Degrees of Freedom, and Sig. (Significance), which are used to determine whether a dataset follows a normal distribution. A small p-value (typically less than 0.05) indicates that the data significantly deviate from a normal distribution, while a larger p-value suggests that the data follow a normal distribution. The results indicate that in

many cases, the data do not follow a normal distribution, particularly in the "Average online user who has complete control over his/her usage" subgroup for all three DASS-21 categories. In contrast, the "Frequent problem due to internet usage" and "Internet is causing significant problem" subgroups sometimes have p-values greater than 0.05, suggesting that some data in these subgroups are more likely to follow a normal distribution.

3.2.3. Test of Association

Overall, these results suggest that the assumption of normality may not hold in many cases, especially for subgroups associated with individuals who report having complete control over their internet usage. Non-normal data can affect the choice of statistical tests and should be considered when conducting data analysis.

Table 8. Result of Kruskal-Wallis test of Depression score.

Test Statistic	D3	D5	D10	D13	D16	D17	D21
Kruskal-Wallis H	3.485	17.216	13.919	11.977	10.100	9.669	9.606
df	2	2	2	2	2	2	2
Asymp. Sig.	.175	.000	.001	.003	.006	.008	.008

The Kruskal-Wallis's test is a non-parametric statistical method used to determine significant differences among three or more independent groups. In this case, the groups are labeled as D3, D5, D10, D13, D16, D17, and D21. The table presents the results of these tests for different subcategories or groups. The Kruskal-Wallis H statistic measures the statistically significant differences in Depression scores among the different groups. Higher values of H suggest greater variation and increase the likelihood of rejecting the null hypothesis. The degrees of freedom (df) represent the degrees of freedom associated with the Kruskal-Wallis's test. The Asymp. Sig. (Asymptotic Significance) indicates whether the observed differences among the groups are statistically

significant. For the subcategory labeled "D5", the Kruskal-Wallis H statistic is 17.216, and the p-value (Asymp. Sig.) is 0.000, suggesting significant differences in Depression scores among the groups represented by D5. For the other subcategories, the tests reveal statistically significant differences with p-values of 0.001, 0.003, 0.006, 0.008, and 0.008, respectively. However, for the group labeled "D3," the p-value is 0.175, which is greater than the typical significance level of 0.05, indicating no statistically significant differences among its subcategories. The Kruskal-Wallis's test has identified variations in Depression scores across these subcategories, highlighting that specific subcategories have significantly different levels of depression.

Table 9. Result of Kruskal-Wallis test of Anxiety score.

Test Statistic	A2	A4	A7	A9	A15	A19	A20
Kruskal-Wallis H	4.785	15.135	11.253	6.481	8.610	.351	12.358
df	2	2	2	2	2	2	2
Asymp. Sig.	.091	.001	.004	.039	.013	.839	.002

The Kruskal-Wallis tests were used to analyze anxiety scores across different groups, represented by variables A2, A4, A7, A9, A15, A19, and A20. These tests measure the statistically significant differences in Anxiety scores among these subcategories. Higher values of H suggest greater variation and

increase the likelihood of rejecting the null hypothesis. The estimated results showed that there are statistically significant differences in Anxiety scores among several subcategories, namely A4, A7, A9, A15, and A20. This implies that there are variations in Anxiety scores among these subcategories, and

further investigation may be needed to understand the factors contributing to these differences. However, subcategories A2 and A19 do not exhibit statistically significant differences in Anxiety scores, indicating that these subcategories do not significantly differ in terms of Anxiety scores. we can conclude

that these subcategories do not significantly differ in terms of Anxiety scores. The Kruskal-Wallis tests have revealed differences in Anxiety scores among certain subcategories, underscoring the importance of considering these differences when analyzing and interpreting the data.

Table 10. Result of Kruskal-Walli test of Stress score.

Test Statistic	S1	S6	S8	S11	S12	S14	S18
Kruskal-Wallis H	5.876	2.623	7.302	6.225	12.279	10.218	6.623
df	2	2	2	2	2	2	2
Asymp. Sig.	.053	.269	.026	.044	.002	.006	.036

The Kruskal-Wallis tests were used to analyze stress scores across different subcategories or groups, representing variables S1, S6, S8, S11, S12, S14, and S18. These tests measure the statistically significant differences in stress scores among these groups. The results showed that there are statistically significant differences in stress scores among subcategories S8, S12, and S18, indicating variations in stress scores among these subcategories. However, for subcategories S1, S6, and S11, there are no statistically significant differences in stress scores, meaning they do not significantly differ in terms of stress scores. The p-values associated with

the Kruskal-Wallis's test statistic indicate whether the observed differences among the groups are statistically significant. A small p-value (typically less than 0.05) suggests significant differences, while a larger p-value suggests that the groups are not significantly different. The Kruskal-Wallis tests have highlighted variations in stress scores among certain subcategories, underscoring the importance of considering these differences when analyzing and interpreting the data. Higher values of H suggest greater variation and increase the likelihood of rejecting the null hypothesis.

Table 11. Kruskal – Wallis H statistics of Depression score, Anxiety score and Stress score.

	Merged IAT score	Mean Rank	Kruskal-Walli's H statistic	df	Asymp. Sig.
Depression score	Average online user who has complete control over his/her usage	51.71	24.667	2	0.000
	Frequent problem due to internet usage	82.74			
	Internet is causing significant problem	111.84			
Anxiety score	Average online user who has complete control over his/her usage	58.20	15.537	2	0.000
	Frequent problem due to internet usage	80.71			
	Internet is causing significant problem	107.50			
Stress Score	Average online user who has complete control over his/her usage	55.21	15.058	2	0.000
	Frequent problem due to internet usage	83.88			
	Internet is causing significant problem	95.94			

The Kruskal-Wallis H statistics were used to analyze the psychological constructs of Depression, Anxiety, and Stress scores across different categories of Merged Internet Access (IAT) scores. The results showed that participants with a significant problem with internet usage had higher Depression scores, followed by those with frequent problems and average online users with complete control over their usage. The mean ranks for Anxiety scores were also significantly different among the categories of IAT scores. Respondents with a significant problem with internet usage had higher Anxiety scores, followed by those with a frequent problem and then average online users with complete control over their usage. Stress scores were also significantly different among the categories of IAT scores. Participants who reported a significant problem with internet usage had higher scores for Depression, Anxiety, and Stress compared to those with a frequent problem or those who considered themselves average online users with complete control over their internet usage. These Kruskal-Wallis tests provide strong evidence that the levels of Depression, Anxiety, and Stress scores significantly differ among the three categories of Merged IAT scores. These findings suggest a clear association between the level of internet addiction and psychological distress, emphasizing the

importance of addressing internet addiction in managing mental health.

Table 12. Correlations of estimated Variables.

Correlated Variables	Estimate
Depression ↔ Stress	0.756
Stress ↔ Internet addiction	0.369
Depression ↔ Anxiety	0.872
Anxiety ↔ Internet addiction	0.427
Depression ↔ Internet addiction	0.420
Anxiety ↔ Stress	0.629

The relationships between a person's stress levels, anxiety, depression, and internet addiction are examined in our study. The correlations show a strong positive link between depression and stress, with higher scores corresponding to higher levels of stress and lower scores corresponding to lower levels of stress. Stress and a growth in internet addiction are moderately correlated, despite the strong positive correlation that exists between anxiety and sadness. Higher anxiety scores indicate a tendency toward addiction. Anxiety scores also show a moderately favorable link with internet addiction. These two domains show the largest links between stress and anxiety and depression; internet addiction

shows favorable associations.

3.2.4. Structural Equation Model Analysis

To determine the link between the variables, bootstrap structural equation modeling is used because the majority of the variables are non-normal (Arbuckle, 1997). To improve model fit, a structural equation model is applied step-by-step, eliminating variables with lower factor loadings. The maximum likelihood estimation method was utilized in structural equation modeling (SEM) to investigate the proposed model. Initially, we used twenty variables for internet addiction: seven variables related to depression, stress, and anxiety, each. For a better fitting model, we reduced several variables to satisfy the conditions. Finally, the fitted model used includes eight variables related to internet addiction, two variables related to depression, three variables related to stress, and three variables related to anxiety. The value of CMIN/DF is 1.017 represents acceptable fit of the model. The default model has a low RMR (0.071), good GFI (0.926), AGFI (0.897) indicates model fits the data perfectly. Additionally, the default model exhibits a strong fit, as indicated by RMSEA values of 0.010, where a lower value is

associated with a better fit.

Moreover, the default model strikes a favorable balance between fit and parsimony, with a PRATIO of 0.817, PNFI of 0.703, and PCFI of 0.814. The NFI (0.861) metric is employed to gauge how well the model aligns with the data in comparison to the null model. The values of TLI and CFI is 0.997 serve as measures to assess the good fit of the default model when compared to the null model.

Furthermore, the model's probability of close fit (PCLOSE) stands at 0.981, signifying a high likelihood of the model effectively fitting the data. In assessing the model's stability and adequacy, the Bollen-Stine Bootstrap method is employed, with a calculated p-value of 0.755. This p-value suggests that the model is likely a good representation of the data. We estimated the association between internet addiction, depression, stress, and anxiety using structural equation modeling (SEM) and the maximum likelihood estimation approach. The calculated model suited well, explaining 46.29% anxiety, 68% stress, and 65.77% depression, with reliability scores of 81.54% for internet addiction, 70.83% for depression, 64.21% for anxiety, and 67.08% for stress.

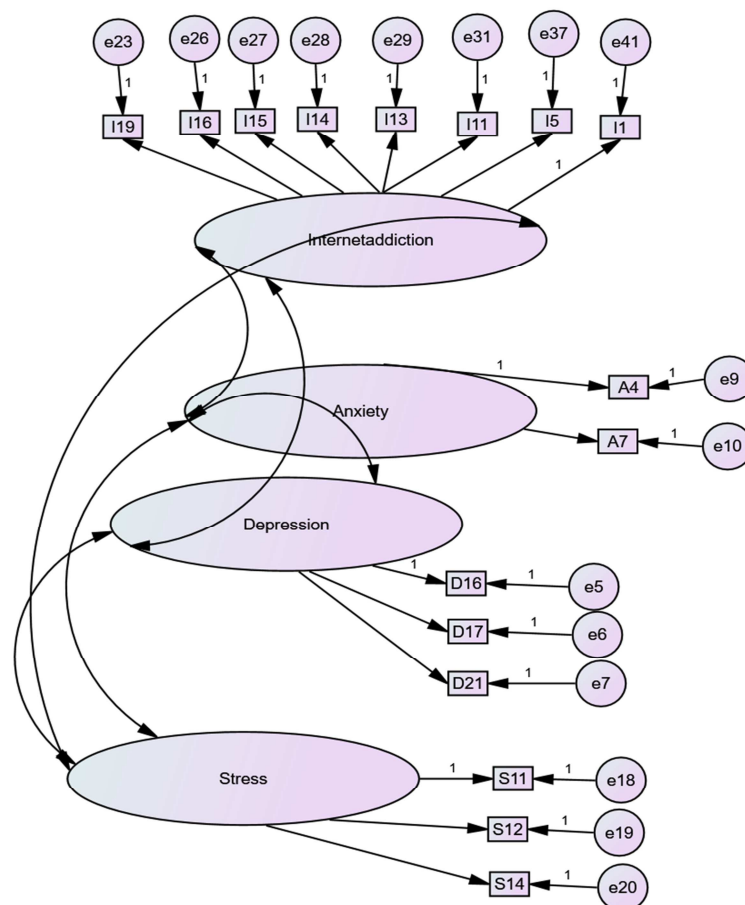


Figure 2. Structural equation modeling.

4. Conclusion

This study indicates the relationships between internet

addiction and its profound impact on the three psychological constraints of 154 students from several universities in the Chittagong regions. The findings the links between the severity of internet addiction and heightened levels of depression, anxiety,

and stress. These results illuminate the critical need for proactive measures to address internet addiction as a pressing concern in safeguarding the psychological well-being of students and, by extension, the broader population. The study used Cronbach's Alpha to evaluate the reliability of internet addiction, depression, anxiety, and stress constructs. The Internet Addiction construct had a Cronbach's Alpha value of 0.875, indicating high reliability. The Depression scale had a Cronbach's Alpha of 0.785, slightly below the 0.70, but still moderately reliable. The Anxiety scale had a Cronbach's Alpha of 0.805, above the recommended values near 0.70, indicating its reliability in assessing anxiety. The Stress scale had a Cronbach's Alpha of 0.798, close to 0.80, indicating its reliability in measuring stress. The study found that the Internet Addiction Test, Depression Score, Anxiety Score, and Stress Score have good to high levels of reliability. The study reveals a clear association between the severity of internet addiction and higher levels of depression, anxiety, and stress, emphasizing the importance of addressing internet addiction as it can significantly impact psychological well-being. The table presents descriptive statistics for Depression score, Anxiety score, and Stress score across different categories of Internet Addiction Test (IAT) scores. The Shapiro-Wilk tests on IAT scores in relation to the Depression, Anxiety, and Stress Scale (DASS-21) categories indicate that the assumption of normality may not hold in many cases, especially for subgroups associated with individuals who report having complete control over their internet usage. The Kruskal-Wallis's test was used to analyze anxiety scores across different groups, revealing differences in scores among several subcategories. However, subcategories A2 and A19 did not exhibit statistically significant differences in Anxiety scores, indicating that further investigation may be needed to understand the factors contributing to these differences. The Kruskal-Wallis H statistics were used to analyze the psychological constructs of Depression, Anxiety, and Stress scores across different categories of Merged Internet Access (IAT) scores. The study used SEM analysis to analyze a model involving numerous variables related to internet addiction, depression, stress, and anxiety. The model was assessed using chi-square statistics, RMR, CFI, NFI, GFI, and AGFI indices. The CFI was excellent, and the NFI, GFI, and AGFI indices indicated good fit. The model explained a significant portion of the variance in anxiety, stress, and depression, indicating the variables effectively captured the underlying relationships. We also find a moderately positive relationship between anxiety and depression, as well as a moderately positive relationship between anxiety and internet addiction, which may indicate mental health problems. It also finds a strong positive correlation between stress and depression, with higher levels of depression causing increased stress. From this research, we can draw the conclusion that it is impossible to completely stay away from the internet, but we need to make the students aware of the bad effects of excessive use of the internet. It is needed to motivate them to make proper use of the internet and avoid unnecessary browsing to lead a healthy life. A couple of the limitations of our study are the cross-sectional design and the participants' subjective opinions regarding the impact of internet addiction on mental health. Clinical evaluations, structured interviews, varied

samples, longitudinal designs, and quantifiable indicators should all be used in future studies.

Conflicts of Interest

The authors declare no conflicts of interest.

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