# Internet Addiction: A Multiple Regression Analysis of Its Predictive Factors and Its Relation to Depression and Anxiety

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**Abstract**: Internet usage is particularly significant in the population of adolescents and youngsters. Besides numerous benefits, internet usage may also bring certain risks of addictive behaviour. Thus, the purpose of this study was to determine the factors influencing internet addiction among youngsters. The relationship of internet addiction with depression and anxiety was also investigated in the study. Simple random sampling was executed, and 357 students had taken part in the study. Internet addiction Test (IAT) and Depression Anxiety Stress Scales 21 which were the tool to assess internet addiction, anxiety and depression were employed. Descriptive analysis, a frequency table, was used to summarise the demographic profile as well as to describe the level of internet addiction, anxiety, and depression among the students. Multiple Linear Regression was used to examine the influence of gender, mode of online, purpose of online, duration of daily internet usage and frequency of internet use per week on the internet addiction while Chi-square test and Fisher's Exact test were implemented to investigate the relationship of internet addiction with depression and anxiety. The findings indicated that only gender (p-value = 0.000) had significant influence on internet addiction. Chi-Square test was used to identify the relationship between internet addiction and depression. The results show that there is a significant relationship between internet addiction and depression (p-value = 0.000) since the p-value was less than 0.05. Finally, Fisher's Exact test was used to identify the relationship between internet addiction and anxiety because the assumption of Chi-Square test was not met. Similarly, the results show a significant relationship between internet addiction and anxiety (p-value = 0.000).

**Keywords**: Anxiety, Depression, Internet Addiction

## 1 Introduction

In the 1990s, the internet began to spread globally. When cell phones became more widely available in the early 2010s, internet usage had become even more widespread, and it started to give significant impact on the users. Despite providing many benefits for the users, internet also fosters new types of hazardous behaviours among people, particularly college students. College students frequently struggle with internet addiction, which has a detrimental effect on cognitive function, leads to subpar academic performance and involvement in risky behaviours, and may even end in anxiety and depression.

A survey done by the Malaysian Communications and Multimedia Commission (MCMC) in 2017 has revealed that 89% of the 725 participants who were involved in the survey were identified to be internet addicts. Additionally, 76.1% of the heavy internet users were young people between 20 to 49 years old. In a different study, Anderson et al. [1] have also discovered that concerns related to internet

behavioural disorders were especially pertinent to young people since they used the internet more often than any other age groups and were more likely to overuse it.

Internet addiction has also been proven to be correlated to anxiety and depression in previous research [2]. The study revealed that, internet abuse and the consequent overexposure were associated to anxiety and depression. Meanwhile, the MCMC survey reported that 32% of respondents experienced major depression while 60% of respondents showed high levels of anxiety. The relationship between internet addiction, anxiety and depression had also been studied by Chung [3] and Batigun and Kilic [4] who found significant relationships between internet addiction and anxiety as well as between internet addiction and depression.

Numerous studies have been conducted on the factors that contribute to internet addiction among young people. Shahnaz and Karim [5] conducted a study to investigate gender differences in internet addiction and they found that men were more likely to develop internet addiction than women since they spent more time using the internet. Barmola [6], in another study, indicated that there was a significant internet addiction gap between genders which had proven that gender is a significant factor for internet addiction.

The duration of daily internet usage also plays an important role in contributing to the internet addiction. This has been proven by Xi [7] who reported that internet users who spent five to seven hours per day on the internet had strong tendency to experience internet addiction. Other factors that were found to significantly contributed to internet addiction included mode of online [8-9], purpose of online [10-11] and frequency of internet use per week [12-13].

Considering all these facts, this study was conducted to identify the factors associated to internet addiction and investigate its relation to anxiety and depression among students at a public university.

## 2  Methodology

This section describes the research methodology and statistical analyses employed in the study.

### A  Study Design

A cross sectional study was employed with a population of 5294 students from a public university in Malaysia. Based on Krejcie and Morgan [14], a total of 357 sample students were selected by using the simple random sampling technique. The sampling frame was obtained from the Academic Affairs Division. Random numbers were used to select the samples from the sampling frame. The selected samples were then contacted via WhatsApp, Telegram, or email to fill in an online questionnaire. A period of three weeks was allocated for data collection process which started from 17 October 2022 until 7 November 2022.

### B  Research Instrument

An online questionnaire was used as a tool for data collection. The questionnaire was arranged in four sections. The first section collects information on the demographic profile of the students. The second section measures internet addiction among the students. For this purpose, the Internet Addiction Test (IAT) which was proposed by Dr. Kimberly Young in 1998 [15] was adopted. It includes 20 five-point Likert Scale statements that require the students to select their level of agreement. The level of agreement was categorized as 'rarely', 'occasionally', 'frequently', 'often' and 'always'. The IAT is claimed to have great internal consistency with a Cronbach's alpha of 0.90 [16].

The third section measures the duration and frequency of internet usage. As for the duration of daily internet usage, students need to state the number of times (in minutes or hours) that they spend on the

internet. Meanwhile, the frequency of internet usage recorded the number of times (3 times, more than 6 times and so on) they use the internet in a week. Finally, the fourth section measures anxiety and depression. This section consists of 21 items (seven for anxiety, seven for depression and seven for stress) adopted from the Depression, Anxiety and Stress Scale (DASS) which was proposed by Lovibond and Lovibond in 1995 [17].

## C   Item Scoring

The IAT total score is the sum of the students' assessments for the 20 items. Each item is scored on a 5-point scale ranging from 0 to 5. The maximum possible score is 100 points. Different score ranges represented various types of internet users. The higher the score, the more critical is the internet addiction. The IAT total score can be used to classify the students as shown in Table 1 [14].

Table 1: Level of Internet Addiction

| Total Score | Internet Addiction Level |
|---|---|
| 0 – 30 | Normal |
| 31 – 49 | Mild |
| 50 – 79 | Moderate |
| 80 – 100 | Severe |

Similarly, for DASS, the total score is the sum of the students' assessments for the 21 items. Each item was graded on a Likert scale with four options ranging from 0 to 3, resulting in a score ranging from 0 to 21 for each subscale (anxiety, depression, and stress). The total score on the three subscales can be summarized as in Table 2. However, this study focused only on anxiety and depression. Therefore, the stress subscale was dropped out from the study.

Table 2: Summary of Total Scores of DASS

| Anxiety, Depression and Stress Level | Total Score | | |
|---|---|---|---|
| | Anxiety | Depression | Stress |
| Normal | 0 – 7 | 0 – 9 | 0 – 14 |
| Mild | 8 – 9 | 10 – 13 | 15 – 18 |
| Moderate | 10 – 14 | 14 – 20 | 19 – 25 |
| Severe | 15 – 19 | 21 – 27 | 26 – 33 |
| Extremely severe | 20+ | 28+ | 34+ |

## D   Statistical Analysis

Several statistical analyses were performed to accomplish the objectives of the study. Descriptive analysis, specifically the frequency table, was used to describe the current state of internet addiction, anxiety, and depression of the students. Chi-Square Test and Fisher's Exact Test were used to investigate the association of internet addiction with anxiety and depression whereas Multiple Linear Regression (MLR) analysis was performed to identify the factors associated with internet addiction.

### i.   Descriptive Analysis

Frequency tables were employed in the study to describe the distribution of the students by their demographic profile. On top of that, the frequency table was also used to describe the level of internet addiction, depression, and anxiety to understand the current state of internet addiction, depression, and anxiety of the students.

## ii. Fisher's Exact Test

For the association between internet addiction level and anxiety level, Fisher's Exact test was used to identify whether there is a significant association between the two variables since the assumption of Chi Square test was not met. The null and alternative hypothesis for the test were:

$H_0$: Internet addiction level and anxiety level are not associated.
$H_1$: Internet addiction level and anxiety level are associated.

$H_0$ is rejected when p-value is less than the significance value, $\alpha$ .

## iii. Chi-Square Test

The Chi-square test of independence was used to determine the association between internet addiction level and depression level among students. The null and alternative hypothesis for the test were:

$H_0$: Internet addiction level and depression level are not associated.
$H_1$: Internet addiction level and depression level are associated.

$H_0$ is rejected when p-value is less than the significance value, $\alpha$ .

## iv. Multiple Linear Regression (MLR) Analysis

MLR analysis was employed to identify the factors related to internet addiction. The following model was estimated to identify the significant factors.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \varepsilon \tag{1}$$

where   $Y$    = internet addiction score
$\beta's$  = regression coefficients
$X_1$   = Dummy for gender (Male)
$X_2$   = Dummy for mode of online (Hybrid)
$X_3$   = Dummy for purpose of online (Education)
$X_4$   = Dummy for purpose of online (Work from home)
$X_5$   = Dummy for purpose of online (Playing games)
$X_6$   = Duration of daily internet usage
$X_7$   = Frequency of internet usage per week
$\varepsilon$    = error term.

## 3   Results and Discussion

### A   *Demographic Profile of the Respondents*

Demographic profiles of the students were presented in Table 3. Out of the 357 students involved in the study, 204 (57.14%) were between 22 to 25 years old. Female students made up more than half (62.75%) of the sample whereas male students made up only 37.25%. Majority of the sample students (75.91%) had bachelor's degree as their highest level of education. The remaining students had a diploma, master's degree, and other qualification as their highest level of education. Furthermore, students with moderate academic performance (CGPA between 3.01 to 3.49) made up half of the sample (50.14%), followed by students with good performance (CGPA between 3.50 to 4.00) (33.89%) and students with poor performance (CGPA less than 3.00) (15.97%).

Table 3: Demographic Profile of the Students

| Demographic Profile | Frequency (%) |
|---|---|
| Age | |
|    18 – 21 years old | 147 (41.18) |
|    22 – 25 years old | 204 (57.14) |
|    26 – 29 years old | 3 (0.84) |
|    30 years old or more | 3 (0.84) |
| Gender | |
|    Male | 133 (37.25) |
|    Female | 224 (62.75) |
| Education | |
|    Diploma | 81 (22.69) |
|    Bachelor's degree | 271 (75.91) |
|    Master's degree | 4 (1.12) |
|    Others | 1 (0.28) |
| CGPA | |
|    < 2.40 | 5 (1.40) |
|    2.41 – 3.00 | 52 (14.57) |
|    3.01 – 3.49 | 179 (50.14) |
|    3.50 – 4.00 | 121 (33.89) |

## B    *Current State of Internet Addiction, Anxiety and Depression of the Students*

Table 4 shows the total number of students based on the level of internet addiction, anxiety, and depression. Based on the table, 43% of the students were moderately addicted to the internet while only 17.8% were severely addicted to the internet. Unfortunately, majority of the students were having moderate to extremely severe anxiety with a percentage of 19.3%, 10.6% and 21.2%, respectively. Only 41.4% of the students were not having anxiety. On top of that, the results revealed that 34.6% of the students had extremely severe depression.

Table 4: Distribution of Students by Internet Addiction Level,
Anxiety Level and Depression Level

| Level | Frequency (%) |
|---|---|
| Internet Addiction | |
|    Normal | 15 (4.7) |
|    Mild | 111 (34.6) |
|    Moderate | 138 (43.0) |
|    Severe | 57 (17.8) |
| Anxiety | |
|    Normal | 132 (41.1) |
|    Mild | 25 (7.8) |
|    Moderate | 62 (19.3) |
|    Severe | 34 (10.6) |
|    Extremely severe | 68 (21.2) |
| Depression | |
|    Normal | 98 (30.5) |
|    Mild | 20 (6.2) |
|    Moderate | 63 (19.6) |
|    Severe | 29 (9.0) |
|    Extremely severe | 111 (34.6) |

The descriptive analysis pictures the current state of the sample students involved in the study. Apparently, most of the students were having mild to extremely severe internet addiction as well as anxiety and depression. Therefore, further analysis was performed to further confirm the association of internet addiction with anxiety and depression. Moreover, factors contributing to internet addiction were identified next.

## C  Association of Internet Addiction with Anxiety and Depression

The results of Fisher's Exact test for testing the association between internet addiction and anxiety as well as Chi-Square test for testing the association between internet addiction and depression were shown in Table 5.

Table 5: P-values of Fisher's Exact Test and Chi-Square Test

| | p-value | |
|---|---|---|
| | Anxiety | Depression |
| Internet Addiction | 0.000 | 0.000 |

The Fisher's Exact test indicates that there is a significant association between internet addiction and anxiety (p-value=.000). Similarly, the Chi-Square Test also revealed that there is a significant association between internet addiction and depression (p-value=.000).

## D  Factors Contributing to Internet Addiction

The results of MLR to identify the factors that contribute significantly to internet addiction were shown in Table 6. Figure 1 depicts that the normality assumption of errors is satisfied since almost all points lie approximately on the straight line. The homogeneity of error variance is also fulfilled as no obvious systematic pattern can be observed in Figure 2.
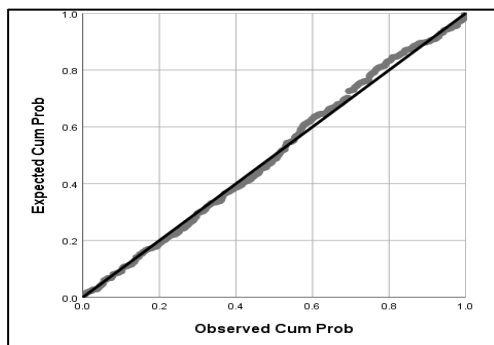


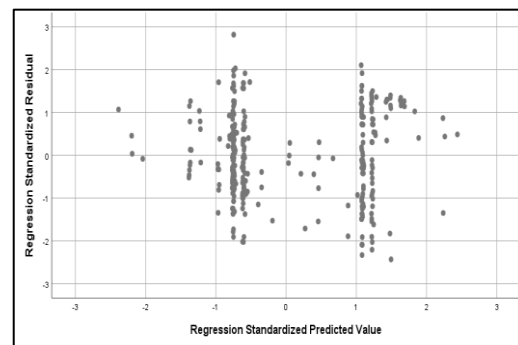Figure 1: Normal Probability Plot of the Residuals    Figure 2: Plot of Residuals Versus Predicted Values

Based on the ANOVA F statistic, the MLR model fits the data very well (p=0.000). The $R^2$ indicates that 13.7% of the total variation in the total internet addiction score was explained by all independent variables included into the model. The value of the $R^2$ is quite low. However, this does not mean the model is not good for the data. The size of $R^2$ does not matter if the objective is to examine the effectiveness of a factor [18]. Low $R^2$ values can be contributed by inaccurate measurement of the dependent or some of the independent variables. Failure to include potential factor into the model may also cause low $R^2$ value [18].

Table 6: Summary of MLR Results

| Variable | Parameter Estimate | t-statistic | p-value | VIF | TOL |
|---|---|---|---|---|---|
| Male | 12.706 | 6.392 | 0.000 | 0.941 | 1.062 |
| Hybrid | -0.612 | -0.303 | 0.762 | 0.986 | 1.014 |
| Education | -1.364 | -0.678 | 0.499 | 0.970 | 1.030 |
| Playing Games | 4.516 | 0.524 | 0.601 | 0.978 | 1.022 |
| Duration of Daily Internet Usage | -0.001 | -0.002 | 0.998 | 0.949 | 1.054 |
| Frequency of Internet Usage per Week | -0.357 | -1.829 | 0.068 | 0.989 | 1.011 |
| $R^2$ = 0.137 ANOVA F statistic = 8.306 (p=0.000) | | | | | |

The MLR results also reveal that Male (p=0.000) is the only significant factor that contribute to the differences in the internet addiction score. The VIF values of less than 10 and TOL values of more than 0.20 indicates that the multicollinearity problem does not exist.

## 4 Conclusion

In conclusion, three statistical analyses were performed to accomplish all research objectives. To describe the current state of the students based on internet addiction, anxiety and depression, the data obtained from the study were summarized in a frequency table. The results revealed that majority of the students were at least moderately addicted to the internet. This result was not surprising as young people were known to be attached more to the mobile phones and internet. On top of that, they were found to have at least moderate anxiety and depression.

In finding the association of internet addiction with anxiety and depression, the Chi-Square test and Fisher's Exact test showed that there was an association between internet addiction and anxiety as well as depression. Both tests produce significant results with p-values of less than 0.05.

For the last objective, which was to identify significant factors contributing to internet addiction, a multiple linear regression analysis was performed. The results showed that the only factor that was found to be significant was gender (Male).

Even though all the objectives of the study were accomplished, there were some aspects of the study that could be improved in the future. For instance, the results of the study could be improved by considering more factors that contribute to internet addiction. Moreover, future researchers should consider using a more recent instrument in measuring the internet addiction, anxiety and depression.

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