

Quantitative Analysis of Factors Influencing Cyberbullying among Tertiary Students Using Multiple Linear Regression

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Abstract: Cyberbullying is a serious issue that affects not only young victims but also perpetrators, victims' families, and witnesses. This study aims to examine the factors influencing the perception of cyberbullying among UiTM Kota Bharu students. A total of 309 students were selected as the sample using a proportionate stratified sampling technique, and the questionnaires were distributed via Google Forms. Factors considered include internet addiction, self-esteem, and parent-child interaction. The study's objectives are to identify the factors that influence perceptions of cyberbullying among university students. The findings from multiple linear regression analysis indicate that internet addiction, self-esteem, and parent-child interaction significantly influence (p -value = 0.000) perceptions of cyberbullying among university students. Furthermore, the correlation coefficient between internet addiction and the perception of cyberbullying is 0.746, suggesting a strong positive linear relationship. In contrast, there is a weak positive linear relationship between self-esteem and the perception of cyberbullying ($r = 0.455$). Additionally, a moderate positive linear relationship exists between parent-child interaction and perception of cyberbullying ($r = 0.643$). Understanding how internet addiction, self-esteem, and parent-child interaction contribute to perceptions of cyberbullying can help universities and policymakers develop better strategies to address this issue.

Keywords: cyberbullying, internet addiction, parent-child interaction, self-esteem

1 Introduction

The way that information and communication technology is being widely adopted, especially by younger generations, has had a significant effect on how our society consumes information and thus, how we interact and communicate with each other. Although there are undoubtedly certain benefits, certain issues have also recently come out as a result of this cutting-edge technology being used irresponsibly. Petrosyan [1] stated that there were 5.3 billion internet users in the world in 2023, which is more than 65.7% of the global population, making the internet one of the globe's most significant and commonly used mediums of communication.

The increasing affordability and accessibility of internet access through smartphones, tablets, and computers has led to a global concern regarding cyberbullying among teenagers. In the 21st century, children and adolescents are growing up with constant access to the internet. According to Rosli [3], Malaysia ranked 6th out of 28 countries and second in Asia for cyberbullying. Cyberbullying has harmful impacts on the physical health, mental well-being, and social interactions of both the aggressor and the victim. Its effects on teenagers can be observed in lower school attendance and performance, as

well as increased stress and anxiety. This issue affects not only the young victims but also the aggressors, the families of the victims, and anyone who witnesses the bullying.

There are many factors that contribute to the perceptions of cyberbullying. One of them is internet addiction. Teenagers are often influenced by what they consume on social media. When teenagers browse the internet without any restrictions from their parents, it is difficult to predict what content they may be exposed to. As teenagers, they are easily influenced by social media trends. Self-esteem is another important factor that may potentially contribute to cyberbullying behaviour. People who frequently use social media often feel insecure about themselves. This insecurity can also affect bullies, who may put others down to boost their own self-esteem, leading to instances of cyberbullying. Another factor is parent-child interaction.

Nickerson [2] found that research on adolescent attachment indicates that teens who maintain a secure attachment to their parents generally experience fewer emotional issues, are less prone to drug abuse or criminal behaviour, and tend to have more positive relationships with their peers. However, parent-child conflict is common during adolescence, as youths strive for more independence and adult-like roles, which can strain the parent-child relationship. One of the primary causes of cyberbullying is a lack of proper communication with parents. Those who have fewer interactions with their parents tend to be more problematic since they often make decisions independently without considering others' opinions.

Moreover, cyberbullying can occur anonymously, leaving victims with no clear way to report the perpetrators to authorities. With the widespread use of social media platforms, bullying incidents can be quickly exposed to hundreds or even thousands of people, intensifying the distress for the victims. If this issue is not addressed with the necessary attention, there is a risk that cases of cyberbullying in Malaysia will continue to rise and become increasingly difficult to manage. Before addressing solutions to the problem of cyberbullying, it is essential to understand how it is perceived among students. Therefore, this study aims to determine the factors influencing the perception of cyberbullying among university students, with the goal of contributing to more effective solutions in the future.

2 Literature Review

A Perception of Bullying

Cyberbullying is defined as the act of bullying through digital platforms, including email, messaging apps, websites, chat rooms, video games, and text messages, as detailed by Kowalski et al. [4]. Lodge and Frydenberg [5] highlight the particularly invasive nature of cyberbullying, which makes it difficult for victims to escape, as the harassment can follow them into private spaces through digital devices. Many victims experience increased stress, anxiety, and other mental health issues. In extreme cases, the psychological impact of persistent cyberbullying has even led some victims to take their own lives. Ozden and Icellioglu's [6] study reveals that a significant proportion of college students have been affected by cyberbullying, with 19.7% admitting to engaging in it and 54.4% reporting having been victims at some point.

Satalina [7] categorises these forms, starting with "flaming", where aggressive and confrontational messages are exchanged, capturing the intensity of the interactions. Harassment involves the continuous sending of disturbing and threatening messages, creating a persistent environment of fear for the victims. Cyberstalking is a more severe form, where perpetrators closely monitor their target's online activities, aiming to instil deep fear and anxiety. Denigration, yet another form, involves spreading false and harmful information to damage victims' reputation. Impersonation and outing/trickery are also significant aspects of cyberbullying. Impersonation entails pretending to be someone else to send harmful messages or make damaging posts, while outing refers to exposing someone's private information without consent. Trickery involves deceiving someone into revealing their secrets or personal information, which is then used against them.

Satalina [7] notes that university students often have a strong awareness of the nature and impact of cyberbullying, as many have encountered it in their own experiences. Akrim and Sulasmi [8] further explore this awareness through surveys, studying how university students perceive the issue of cyberbullying.

B Relationship between Internet Addiction and the Perception of Bullying

According to Albikawi [9], more than 59% of the global population uses the Internet, making it one of the most prevalent and crucial communication mediums. In developed countries, this figure can reach up to 95%. Huang et al. [10] report that 99.2% of university students access the Internet, and 24.8% show signs of online addiction. Technology greatly simplifies the process for students to demonstrate their knowledge, understanding, and skills, leading to the widespread use of the Internet among Korean students. This digital connectivity has become a regular aspect of their academic lives, providing numerous benefits. For instance, students can efficiently complete their assignments, stay updated with class information, and communicate with both classmates and teachers through various online platforms. Despite these significant advantages, there are also notable challenges associated with Internet use, such as the risk of developing internet addiction and engaging in inappropriate online behavior. According to Rahman et al. [11], internet addiction is described as the inability of an individual to regulate their internet usage, which can result in heightened addictive behaviours, functional impairments, and, in some cases, additional psychological conditions.

Internet addiction has been found to be closely related to cyberbullying, with victims of cyberbullying having significantly higher rates of internet addiction. Additionally, internet addiction can negatively impact physical and mental health, and it has been identified as a potential path through which cyberbullying can lead to impairments in these areas. Peled's [12] study revealed that individuals who experienced cyberbullying exhibited notably higher rates of internet addiction and reported poorer physical and mental health. Moreover, these victims were three times more likely to show signs of depression and problematic internet behaviour. Another study found that 82.2% of participants had mild to moderate addiction to the internet and that internet addiction was positively associated with cyber-victimisation and cyber-aggression. A study conducted in Turkey discovered that while adolescents generally had low scores for internet addiction, cyber-victimisation, and cyberbullying, both cyber-victimisation and cyberbullying were linked to certain patterns of internet use and levels of internet addiction.

These studies highlight the importance of addressing internet addiction in individuals who have been victims of cyberbullying, as it can help disrupt the harmful cycle between addiction and bullying, potentially reducing the risk of adverse mental and physical health effects. Additionally, gaining insight into how internet addiction interacts with cyberbullying can help health service workers develop specifically targeted interventions to better support victims of cyberbullying. The survey that asked university students about factors affecting their perceptions of internet addiction towards cyberbullying was abstracted from the results by Escario et al. [13].

C Relationship between Self Esteem and Perception of Bullying

Self-esteem refers to an individual's personal belief or perception of their value and recognition within their social environment, as described by Palermi et al. [14]. The findings from this study show that victims of cyberbullying often have diminished self-esteem. Individuals with low self-esteem are more susceptible to cyberbullying risks. Self-esteem reflects one's personal belief or perception of their value and recognition in their social sphere. Typically, individuals with high self-esteem are assertive, confident, and self-respecting, while those with low self-esteem tend to be anxious, lacking in confidence, and self-critical. Patchin and Hinduja [15] examined how an adolescent's experience with cyberbullying correlates with their self-esteem levels and found that cyberbullying victims generally exhibit lower self-esteem compared to their peers.

High trait self-esteem is often thought to shield individuals from the adverse effects of negative experiences like failure, whereas low trait self-esteem is more likely to lead to negative emotions and mental health issues, as cited by Zeigler-Hill et al. [16]. Research by Tsaousis [17] has shown that being a victim of cyberbullying can adversely affect one's self-esteem. In this context, experiencing cyberbullying can contribute to lower self-esteem in individuals and subsequently heighten their risk of developing social anxiety. According to Islam et al. [18], victims may face various mental health issues, including depression, diminished self-esteem, anxiety, anger, and thoughts of suicide. They might also suffer from psychosomatic symptoms such as insomnia, headaches, digestive issues, and dizziness. Social challenges may include feelings of loneliness and powerlessness, while risky behaviours such as smoking, substance abuse, and suicidal actions can also be observed.

D Relationship between Parent-Child Interaction and Perception of Cyberbullying

Makri-Botsari and Karagianni [19] noted that different parenting styles can significantly impact the nature and quality of the parent-child relationship, profoundly influencing the development of children's character, identity, and peer interactions. According to Cohen [20], parents must provide both physical and emotional support, and in return, children seek validation and guidance from their parents. Emotional availability from parents involves being actively present in their children's lives – helping with homework, picking them up from school, preparing meals, and occasionally taking time off to spend together. Hoover-Dempsey [21] highlighted that such parental engagement and attitudes can also affect children's sense of personal competence, self-perception of ability, and academic self-concept.

A systematic literature review by Castro and Priegue [22] proved that family variables, including parent-child communication, parental support, warmth, cohesion, closeness, care, and attachment, were significant factors in predicting cyberbullying perpetration and victimisation. Another study by Aljasir and Alsebaei [23] explored how adolescents perceive various parental mediation approaches in the context of cyberbullying and discovered that active, restrictive, internet safety, and monitoring techniques were linked to higher rates of cyberbullying. Conversely, technical mediation strategies showed a positive correlation with reduced rates of cyberbullying.

3 Methodology

A total of 309 students from UiTM Kelantan Campus, Kota Bharu Branch, were selected using a stratified sampling technique. The population was stratified by gender, with 23% male and 77% female students responding to the questionnaire. Among the selected sample, 69.2% of the respondents were representatives from the College of Computing, Informatics, and Mathematics (KPPIM), while 30.8% were from the Faculty of Business Management (FPP).

A self-administered questionnaire method was used to collect the data via Google Forms. The study adapted questionnaires from previous studies for this research, utilising a 7-point Likert scale (1-strongly disagree to 7-strongly agree). The questionnaire, related to the perception of cyberbullying among university students, was adapted from the findings of Akrim and Emilda [8]. Additionally, the questions on internet addiction and its relation to cyberbullying were adapted from the results of Escario et al. [13]. The questions, focusing on elements influencing university students' self-esteem, were taken from the survey results by Rosenberg [24]. Lastly, the questions addressing parent-child interactions regarding cyberbullying were taken from the survey results of Nguyen et al [25].

The questionnaire's reliability was tested using a reliability test. To assess reliability, Cronbach's Alpha was employed in this study using SPSS software. According to Adadan and Savasci [26], if the Cronbach's Alpha value is greater than 0.7, the item is considered reliable and acceptable. Items in the questionnaire were discarded if the Cronbach's Alpha value was less than 0.7.

The study utilised Pearson's Correlation Coefficient to explore the correlation between internet addiction, self-esteem, parent-child interaction, and the perception of cyberbullying. A positive

correlation indicates that one variable tends to increase when the other does, and vice versa. A correlation coefficient close to +1 or -1 indicates a strong correlation, while one close to 0 indicates a weaker correlation. To test the alternative hypothesis of correlation, the p-value must be less than the significance level.

Multiple linear regression extends the concept of simple linear regression, allowing for the prediction of a variable's value based on two or more other variables. Essentially, it serves to forecast the outcomes of a response variable using a model that features a single dependent variable and multiple independent variables. In the context of this study, multiple linear regression will be applied to identify the factors – namely, internet addiction, self-esteem, and parent-child interactions – that influence university students' perceptions of cyberbullying. According to Taylor [27], the general multiple linear regression model is determined by the Eq. (1):

$$Y_i = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \beta_3 X_{i3} + \varepsilon_i \quad (1)$$

where, for $i=n$ observations:

Y = Perception towards cyberbullying

β_i are the coefficients for each explanatory variable

X_1 is Internet addiction

X_2 is Self-esteem

X_3 is Parent-child interaction

ε is error term

The multiple regression model is built on several important assumptions to ensure its validity and reliability. First, it assumes a linear relationship between the dependent variable and the independent variables. This means that changes in the independent variables should produce proportional changes in the dependent variable, allowing the model to accurately capture and predict the relationship between them.

Second, the model assumes that the independent variables are not excessively correlated with each other. This is crucial because if the independent variables are highly correlated, it can lead to multicollinearity, which may distort the regression coefficients and make it difficult to determine the individual effect of each variable.

Third, the observations of the dependent variable should be selected independently and randomly from the population. This ensures that each observation is representative of the population and that the results are generalisable. Random sampling helps minimise biases and inaccuracies in the model's predictions.

Lastly, the residuals, which are the differences between the observed and predicted values, should follow a normal distribution with a mean of 0 and a constant variance, σ^2 .

4 Analysis and Findings

A total of 309 students participated in this study. The questionnaire was completed by 71 (22.9%) male students and 238 (77.1%) female students. Approximately 93 (30.1%) of the respondents were aged between 19 and 20 years. For those aged between 21 and 23 years, there were 189 (61.2%) respondents. Additionally, 27 (8.7%) respondents were aged between 24 and 26 years.

Before the analysis was conducted, the questionnaire's reliability was tested using a reliability test. The reliability analysis results for the pilot study indicate that the values of Cronbach's alpha range from 0.786 to 0.915. The Cronbach's alpha values for all the variables were above 0.7, which is acceptable since, according to Adadan and Savasci (2012), if the Cronbach's alpha value is greater than

0.7, the items are considered reliable and acceptable. Since the values were acceptable, it can be stated that the questionnaire is reliable, and the main study was carried out.

Table 1: Pearson's Correlation value

Variable	Correlation	Significant Value
Internet Addiction	0.746	<0.001
Self Esteem	0.455	<0.001
Parent-child Interaction	0.643	<0.001

Table 1 shows the correlation between independent variables (internet addiction, self-esteem, and parent-child interaction) and the dependent variable (perception of cyberbullying). Based on the correlation analysis, there exists a significant linear relationship between the factors (internet addiction, self-esteem, parent-child interaction) and students' perception of cyberbullying, as the p-value was 0.000, which is less than 0.05. Moreover, there was a strong positive correlation coefficient between the perception of cyberbullying and internet addiction, which was $r=0.746$. Meanwhile, there was a weak positive correlation coefficient between self-esteem and the perception of cyberbullying, since $r=0.455$. Additionally, there was a moderate positive correlation coefficient between parent-child interaction and the perception of cyberbullying, since $r=0.643$.

Model adequacy checking was conducted before proceeding with multiple linear regression to identify the significant factors influencing students' perceptions of cyberbullying.

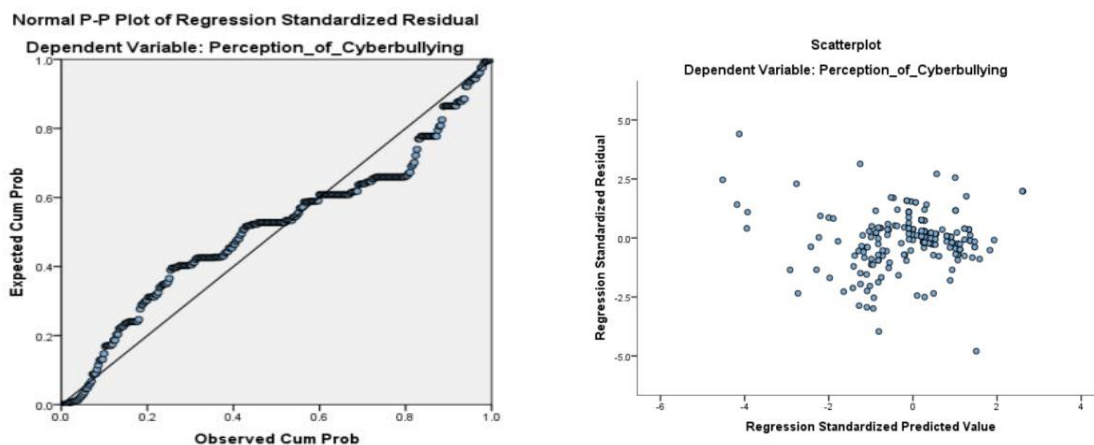


Figure 1: Normality Plot and Residual Plot

The normality probability plot in Figure 1 shows that the points mostly lie approximately along the straight line. Thus, the normality assumption is fulfilled, indicating that the errors are normally distributed. Meanwhile, the scatter plot of residuals against predicted values does not show any obvious pattern. Therefore, the residuals exhibit constant variance, fulfilling the homoscedasticity assumption.

The coefficient of determination, R^2 of the model was found to be 0.848. The high value of R^2 indicates that the model can explain a significant portion of the variability in how students perceive cyberbullying. This suggests that the independent variables (such as internet addiction, self-esteem, and parent-child interaction) are strongly related to and influence students' perceptions.

The analysis of the full model yielded an F-value of 565.469, with a corresponding p-value of 0.000. Since the p-value was less than the alpha value of 0.05, this indicates that the model is statistically significant in predicting the perception of cyberbullying among students. This significance suggests that the independent variables (internet addiction, self-esteem, and parent-child interaction) play a crucial role in influencing students' perceptions of cyberbullying.

Table 2: Parameter Estimates

Variables	Unstandardised Coefficients	t-value	Significant Value
Internet Addiction	0.085	23.904	<0.001
Self Esteem	0.035	9.527	<0.001
Parent-Child Interaction	0.066	19.132	<0.001

Table 2 shows that all of the variables are significant, as their p-values were less than 0.05. The variables – internet addiction, self-esteem, and parent-child interaction – have a p-value of 0.000 each, which is below the threshold of 0.05. This indicates that internet addiction, self-esteem, and parent-child interaction have significant effects on the perception of cyberbullying. Therefore, these three variables play an important role in explaining students' perception of cyberbullying.

5 Conclusion

The study reveals significant linear relationships between the factors (internet addiction, self-esteem, and parent-child interaction) and students' perceptions of cyberbullying, as indicated by p-values of 0.000, which are less than the alpha value of 0.05. The analysis shows a strong positive linear association between internet addiction and the perception of cyberbullying, with a correlation coefficient of $r=0.746$. In contrast, there is a weak positive linear association between self-esteem and the perception of cyberbullying ($r=0.455$), and a moderate positive linear association between parent-child interaction and the perception of cyberbullying ($r=0.643$).

Multiple regression analysis was used to determine the overall significance of the model. The analysis showed that the full model is significant, with a p-value of 0.000, which is less than the alpha value of 0.05. This result indicates that the model effectively explains students' perceptions of cyberbullying. The findings suggest that internet addiction, self-esteem, and parent-child interaction are influential factors shaping how university students perceive cyberbullying. These results highlight the complex interplay between technological behaviour, individual psychological traits, and family connections in understanding cyberbullying.

Internet addiction plays a critical role, as students who spend excessive time online may either become numb to the impact of cyberbullying or the constant exposure to digital environments can normalise certain behaviours, leading to an undermined perception of the severity of cyberbullying.

Self-esteem also emerges as a key factor, influencing how students perceive and react to cyberbullying. Those with lower self-esteem may be more vulnerable to victimisation and perceive cyberbullying as more threatening, while students with higher self-esteem might downplay its impact or avoid engagement in such activities.

Parent-child interaction further underscores the importance of supportive and communicative family relationships in shaping students' perceptions. Positive interactions with parents can foster resilience, helping students recognise and address cyberbullying more effectively. Conversely, strained parent-child relationships may leave students feeling isolated and more affected by cyberbullying experiences.

Overall, the findings emphasise the need for targeted interventions addressing internet usage habits, self-esteem development, and family interactions to lessen the impact of cyberbullying among university students.

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