ORIGINAL ARTICLE

Prevalence of Cyberbullying and Its Associated Factors Among High School Students in Klang District Malaysia

Muhammad Zulhilmie Saruddin[1], Ahmad Zaid Fattah Azman[1], Nor Afiah Mohd Zulkefli[1], Mohamad Rodi Isa[2]

[1] Department of Community Health, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400, Serdang, Selangor, Malaysia
[2] Department of Public Health Medicine, Faculty of Medicine, Universiti Teknologi MARA, 47000, Sungai Buloh, Selangor, Malaysia

ABSTRACT

Introduction: Adolescents in Malaysia face concerning rates of cyberbullying, with nearly half reporting victimization. This study investigated the prevalence and predictors of cyberbullying among adolescent in Selangor, Malaysia. **Materials and methods:** This cross-sectional study was conducted among 606 students from April to May 2023 by using a validated self-administered questionnaire to assess cyberbullying behaviours and its predictors via multistage sampling method. Data was analysed using SPSS software version 28.0. Multivariate logistic regression was used to identify predictors of cyberbullying. **Results:** Prevalence of cybervictimization were of 79.5% and 21.1% were cyber-perpetrator. High trait of conscientiousness (23.9%) was associated with cyber-perpetrator (p=0.027), while ethnicity, gender and academic performance emerged as significant predictors. Male were more likely to be perpetrators (AOR = 1.790, 95% CI: 1.189-2.693), and non-Malay students were less likely to be both victims and perpetrator, (AOR = 0.239, 95% CI: 0.139-0.413) and (AOR = 0.267, 95% CI: 0.139-0.413) respectively. Students with lower academic performance were also more susceptible to victimization (AOR = 1.912, 95% CI: 1.261-2.900). **Conclusion:** The prevalence rate shows cyberbullying is profoundly high among high school students. This study identified low academic performance, non-Malay ethnicities (Chinese/Indian), male gender as significant predictors of both cybervictimization and cyber-perpetration. This study highlights the need for further research in diverse populations to inform effective prevention strategies for cyberbullying among adolescents.
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Corresponding Author:
Ahmad Zaid Fattah Azman, MD
Email: azfa@upm.edu.my
Tel : +603-97692943

INTRODUCTION

Cyberbullying is an ongoing phenomenon that has become a global public health concern. It is a persistent, intentional act of aggression committed by a person or group against a helpless victim using electronic communication methods (1). Known as a new form of bullying, cyberbullying occur through electronic communication technologies such as e-mail, instant messaging, picture messaging, social media, online gaming, video clip or digital messages. Traditional bullying typically occurs within educational settings and generally cease once students leave the school premises. However, cyberbullying transcends these physical boundaries, allowing perpetrators to harass their victims at any time of day. This type of bullying can involve posting malicious comments, sharing inappropriate image or videos, and spreading false information on social networking sites (2), making it harder to control. This is particularly alarming, as it is estimated by UNICEF in 2017 that one in three internet users globally are children and adolescents under 18 years of age. Social networking sites (SNS) like YouTube, Facebook, Instagram, and TikTok are popular among adolescents, serving as platforms for connecting with others, sharing information, and fostering positive identity development and peer engagement (3).

Over the past decade, the use of SNS has surged, with 95% of U.S. adolescents engaging in some form of SNS (4). A similar trend is observed among Malaysian adolescents, with 76.2% reported to be active on SNS, making them more susceptible to cyberbullying (5). The prevalence of cyberbullying varies among countries. An evaluation of 63 studies showed that cybervictimization and perpetration rates among adolescent and children ranged from 10% to 60% and 6% to 32%, respectively (6).

In Malaysia, the prevalence of cyberbullying has shown an upward trend among adolescent, ranging from 25% to 52.2% (7). Although there was a slight drop to 30% in 2019, the rates progressively increased to 31.6% in 2020 and 38.9% in 2023 (8-10). Furthermore, Malaysia was ranked second in Asia in 2020 and sixth globally in terms of cyberbullying prevalence, as measured by the youth engagement tool U-Report (8). Cyberbullying is also associated with negative effects on well-being. Study has shown that young people who experience cyberbullying often have a much lower quality of life (QOL) (11). A lower QOL reflects overall poor well-being, which can lead to negative health outcomes. These concerning prevalent and health impacts highlight the urgent need to address cyberbullying in order to safeguard the well-being of our future generations. While numerous studies have explored cyberbullying, there is limited knowledge regarding the patterns of SNS use and personality traits among Malaysian adolescents. Most existing research focuses on White adolescents in Western countries, where cultural and geographical factors differ significantly from those in Malaysia (2). Given Malaysia's diverse multiracial and multi-ethnic society, these past findings may not fully apply. Due to the scarcity of studies on cyberbullying in this Southeast Asian region (12), the present study aims to investigate the prevalence and predictors of cyberbullying among adolescents in Selangor, considering the unique cultural context of Malaysia.

MATERIALS AND METHODS

Study design and area

A population-based cross-sectional study was conducted among adolescent in a national high school in Klang district Selangor, Malaysia from April to May 2023. Klang, a district located to the West in Selangor, is among the most densely populated districts, with approximately 1.09 million residents within 632 km2. The estimation of adolescent population in Klang district is 153,300 (13). Klang district was chosen due to its higher rates of school bullying compared to other district in Selangor (14). Since cyberbullying is an extension of traditional school bullying, examining its presence in Klang is crucial for understanding its impact in this high-risk area.

Study population and sample size determination

The study population consisted of national high school students in Klang district. The inclusion criteria for this study are students aged between 13 to 16 years old, studying in national high school and able to understand the Malay language. The exclusion criteria for schools included those with Form Six classes, non-coeducational school, boarding school, private school and religious school. Students who were absent on the day of data collection and student in special education class were also excluded from the study. The sample size of this study was determined by using two population proportions formula by Lemeshow and Lwanga (1990) on SNS usage variable from previous study, considering P1 = 0.39, the proportion of cyberbullying among adolescent's SNS usage, and P2 = 0.22, the proportion of cyberbullying among adolescent not using SNS, with an alpha value of 0.05 and a power of 80% (15). Hence, the computed sample size was 550 participants after adjusting for a 20% non-response rate and design effect of two to allow for clustering effect (16).

Sampling techniques

The study was carried out using a multistage sampling approach in two stages. In Klang district, there are 40 national high schools registered under the Selangor State Education Department. Out of 40 national high schools, 25 schools remained after the inclusion and exclusion criteria for schools. The number of required schools was determined using minimum cluster sampling estimation, resulting in the simple random selection of five out of 25 schools using an online random number generator on calculatorsoup.com. In the first stage, the population of each selected school was stratified by academic year (Form 1 to Form 4). In the second stage, within each stratum, individual classes (clusters) were assigned a number, and one class (cluster) was randomly selected from each stratum, yielding four clusters per school. A total of 20 clusters were obtained (with an estimated average of 30 students in each cluster) to achieved sample size of 550 required for this study. A paper-form questionnaire was distributed to all eligible students in the selected clusters who agreed to participate in the study during the sample recruitment.

Study instruments

The research instrument for this study was a printed self-administered questionnaire. All the questions were adopted and adapted from previous research (17-23) in Malay language. The questionnaire was divided into five sections.

Section A (sociodemographic). This part consists of five items on sociodemographic characteristic such as age, gender, ethnicity, academic year and academic performance. Item "age" requires a numeric answer. The remaining four items are selected response items that require one correct answer. For items "ethnicity", participants that ticked "others" column were required to write the details. While for items "academic performance", participant was self-reporting their average academic achievement from the past year according to group; excellence (grade A and B), good (grade C and D) and poor (grade E and F).

Section B (pattern usage of SNS). On pattern usage of SNS, the Social Network Usage questionnaire (SNUQ) developed by Gupta & Bashir (2018) was adapted using the translated Malay version SNUQ (18). It consists of 19 items that were factored into four domains (academic, socialization, entertainment and informativeness). The

respondents will be asked to rate SNUQ items on a five items Likert scale. The mean score was calculated for each dimension and higher values indicate greater social network usage.

Section C (personality trait). Big five personality trait will be measured through BFI-10 developed by Rammstedt & John (2007). This present study adapted the translated Malay version of BFI-10 by Kadir (2014) to measure personality trait. Each item rated on a five items Likert scale, that measure the five domains of personality traits consist of openness, conscientiousness, extraversion, agreeableness and neuroticism. The minimum score is two and maximum score is 10 for each domain. The domain score range between two to six indicate low level for the trait and domain score range between seven to ten indicate high level of the trait (20).

Section D (cyberbullying scale). Cyberbullying Scale (CBS) was developed by Stewart et al. (2014). The Cyberbullying Scale-Malay version (CBS-M) was adapted to evaluate cyberbullying experienced by asking the respondents regarding their life in the past few months (21). It consists of 16 items including two general questions and 14 items. The first two items were assessed through which electronic medium cybervictimization and cyber-perpetration take place. The next 14 items were measured how often participant had experience different forms of cyberbullying using a five items Likert scale. The total score ranges from 14 to 70. A score of 14 indicates that the person has never been cyberbullied, while a higher score of 70 indicates higher degree of cyberbullying (24).

Section E (WHO Quality of life). The last section is the health-related quality of life, which was measured using WHO Quality of Life Questionnaire: Brief version in Bahasa Malaysia (WHOQOL-BREF) adapted from previous study to assess respondents quality of life (23). It consists of 26 items in which there are two items that were examined separately. The rest of 24 items are evaluate in four domains (physical, psychological, social relationship and environment). The four domain scores denote an individual perception of quality of life in each particular domain. Each item was rated from one to five, with a higher score indicating higher quality of life. Three items were reverse coded. The mean score of items within each domain will be used to calculate the domain score. The domain score was multiplied by 4 to create the domain score ranging from 4 to 20, which is comparable to WHOQOL-100. In addition, the two items measuring overall QOL and general health were averaged to represent overall health-related quality of life.

Quality control

The reliability test was conducted among 33 students of national high school in Selangor, which obtained good reliability (Cronbach's alpha:0.70-0.92).

Operational definition

The outcome variable of this study is cyberbullying. Cyberbullying is categorized into two categories: cybervictimization and cyber-perpetration. Cybervictimization is defined as respondent who scored more than 14 in cyberbullying scale (CBS-M) (24), whereas cyber-perpetration is defined as respondents who responded to the second item in cyberbullying scale (CBS-M) (16). WHOQOL is a health-related quality of life (HRQOL) is other outcome of interest to evaluate health of the sampling population. HRQOL is this study is a perception of QOL according to WHOQOL-BREF based on 4 domains (physical health, psychological, social relationship and environment). The mean score of items is to calculate domain score. Domain score will be multiplied by 4 (range score from 4-20). Higher score indicate higher HRQOL (23). The independent variables for this study are sociodemographic characteristics (age, gender, ethnicity, academic performance), pattern usage of SNS (academic, socialization, entertainment and informativeness), personality traits (openness, conscientiousness, extraversion, agreeableness, neuroticism).

Data management and analysis

The data analysis for this study was conducted using the Statistical Package for Social Sciences System (SPSS) version 28.0 software. All the data were checked and cleaned prior to analysis. Descriptive statistic such as frequencies, percentages, means with standard deviations, medians and interquartile ranges were calculated to describe the distribution of variables. All the variables in this study demonstrated high reliability, with Cronbach alpha values of 0.7 and above. Specifically, the Cronbach's alpha for SNS usage patterns was 0.83, personality traits ranged from 0.70 to 0.77, the cyberbullying scale was 0.92, and the domains in HRQOL ranged from 0.77 to 0.87.

Descriptive statistic for age, gender, ethnicity, academic performance, cybervictimization, cyber-perpetration and HRQOL were summarized using frequencies and percentages for categorical data, while mean and standard deviation were used continuous data. The prevalence of cyberbullying among the school adolescents were presented in the form of frequencies and percentages. Subsequently, bivariate analysis was conducted to determine the association between cyberbullying (cybervictimization and cyber-perpetrator) and each independent variable. Chi-square tests and independent t-test were used to examine the association between cyberbullying and independent variables. In this study, a significance level of 0.05 ($p<0.05$) with a confidence interval of 95% was set.

Multiple logistic regression was performed to identify the predictors of both cybervictimization and cyber-perpetration. Factors with a p-value of 0.25 or less in the bivariate analysis were included in the multivariable

analysis. Multiple logistic regression analysis was done using three selection methods which were the "Enter" method, "Backward LR" method and "Forward LR" method. The "Forward LR" method was selected for the final model as it provided the most parsimonious fit for the data. The results of the analysis were expressed as adjusted odds ratios with a 95% confidence interval.

Ethical Clearance

Approval to carry out this study was obtained from the Ethics Committee for Research Involving Human Subjects of University Putra Malaysia (Reference no: JKEUPM-2023-173). Permission to conduct the study among high school students in Klang district within Ministry of Education (MOE) facilities was also obtained from the ministry as well as Selangor State Education Department.

RESULTS

Respondents' characteristic

A total of 720 questionnaires were distributed, and 606 students agreed to participate in the study, resulting in an overall response rate of 84.2%. The mean age of the respondents was 14.5 ± 1.11 years. Female respondents, 311 (51.3%) slightly outnumbered male respondents, 295 (48.7%). Most of the respondents were Malay, 236 (38.9%) and Indian, 227 (37.5%). The majority of respondents were in Form 3 (27.4%). In term of academic performance, most respondent in this population had good academic performance (56.4%).

Prevalence of cyberbullying, platform used and level of HRQOL

The prevalence of cybervictimization was 79.5% (95% CI: 0.763-0.827), with the remaining 20.5% reporting no experience of cyberbullied. The prevalence of cyber-perpetration was 21.1% (95% CI: 0.179-0.243). The Cyberbullying Scale (CBS-M) analysis revealed that 23.0% of the respondents experienced cybervictimization on a single platform, while 11.9% experienced it on multiple platforms. For cyber-perpetration, 75.8% occurred on a single platform, and 24.2% on a multiple platforms. Instant messaging was the most common platform for both cybervictimization (16.6%) and cyber-perpetration (42.2%), followed by text messaging (12.7% for cybervictimization and 28.9% for cyber-perpetration). Less common platforms included email for cybervictimization (1.0%) and a combination of email and message board for cyber-perpetration (2.3%). Social networking site were among the least used platforms for both cybervictimization (1.9%) and cyber-perpetration (6.3%). Regarding perception of HRQOL, respondents scored highest in environment domain (>50th percentile), while they reported lower scores in psychological and social relationship domain. More than 50% respondents rated their overall quality of life and general health positively, with mean scores above 50th percentile (Table I).

Table I: Distribution of respondent's characteristic and prevalence of cyberbullying (n=606)

Characteristic	Mean ± SD	n	(%)
Age (Years)	14.5 ±1.11		
Gender			
Male		295	(48.7)
Female		311	(51.3)
Ethnicity			
Malay		236	(38.9)
Chinese		123	(20.3)
Indian		227	(37.5)
Others		20	(3.3)
Academic Year			
Form 1		144	(23.8)
Form 2		141	(23.3)
Form 3		166	(27.4)
Form 4		155	(25.6)
Academic Performance			
Excellent		246	(40.6)
Good		342	(56.4)
Satisfactory		18	(3.0)
Cybervictimization			
Yes		482	(79.5)
No		124	(20.5)
Medium used for cybervictimization (n=482)			
Single platform		111	(23.0)
Multiple platforms (≥ 2)		57	(11.9)
Not specify		314	(65.1)
Cyber-perpetrator			
Yes		128	(21.1)
No		478	(78.9)

CONTINUE

Table I: Distribution of respondent's characteristic and prevalence of cyberbullying (n=606). (CONT.)

Characteristic	Mean ± SD	n	(%)
Medium used for cyberperpetration (n=128)			
Single platform		97	(75.8)
Multiple platforms (≥ 2)		31	(24.2)
Not specify		-	-
WHOQOL-BREF			**Percentile**
Physical health	15.43 ± 2.305		50^{th}
Psychological	14.62 ± 2.613		25^{th} - 50^{th}
Social relationship	15.82 ± 2.858		50^{th}
Environment	15.67 ± 2.308		50^{th} - 75^{th}
Overall QOL	3.30 ± 1.443		50^{th} - 75^{th}

SD = standard deviation. QOL = quality of life. Others =orang asli, bumiputera Sabah and Sarawak.

Factors associated with cybervictimization and cyber-perpetration

Table II shows the factors associated with both cybervictimization and cyber-perpetration. Ethnicity and academic performance were significantly associated with cybervictimization. Respondents with low academic performance reported a significantly higher percentage of cybervictimization (85.0%) compared to those with higher academic performance (71.5%). Malay ethnicity reported higher percentage of experiencing cybervictimization compared to non-Malay ethnicity (71.5%).

Table II: Factors associated with cyberbullying

Variables	Cybervictimization (n=482)		χ^2	df	p-value	Cyber-perpetration (n=128)		χ^2	df	p-value
	Yes n (%)	No n (%)				Yes n (%)	No n (%)			
Gender										
Male	239 (81.0)	56 (19.0)	0.773	1	0.379	77 (26.1)	218 (73.9)	8.555	1	0.003*
Female	243 (78.1)	68 (21.9)				51 (16.4)	260 (83.6)			
Ethnicity										
Malay	216 (91.5)	20 (8.5)	34.128	1	<0.001*	77 (32.6)	159 (67.4)	30.709	1	<0.001*
Non-Malay	266 (71.9)	104 (28.1)				51 (13.8)	319 (86.2)			
Academic Performance										
High	176 (71.5)	70 (28.5)	16.257	1	<0.001*	40 (16.3)	206 (83.7)	5.875	1	0.015*
Low	308 (85.0)	54 (15.0)				88 (24.4)	272 (75.6)			
Extraversion										
Low	226 (80.7)	54 (19.3)	0.443	1	0.506	53 (18.9)	227 (81.1)	1.503	1	0.220
High	256 (78.5)	70 (21.5)				75 (23.0)	251 (77.0)			
Agreeableness										
Low	116 (80.6)	48 (33.3)	0.120	1	0.729	33 (22.9)	111 (77.1)	0.365	1	0.546
High	366 (79.2)	96 (20.8)				95 (20.6)	367 (79.4)			
Conscientiousness										
Low	171 (77.4)	50 (22.6)	0.999	1	0.317	36 (16.3)	185 (83.7)	4.876	1	0.027*
High	311 (80.8)	74 (19.2)				92 (23.9)	293 (76.1)			
Neuroticism										
Low	380 (80.0)	95 (20.0)	0.288	1	0.591	100 (21.1)	375 (78.9)	0.006	1	0.936
High	102 (77.9)	29 (22.1)				28 (21.4)	103 (78.6)			
Openness										
Low	162 (80.2)	40 (19.8)	0.081	1	0.776	40 (19.8)	162 (80.2)	0.317	1	0.573
High	320 (79.2)	84 (20.8)				88 (21.8)	316 (78.2)			

*Statistical significance at p < 0.05. df = degree of freedom.

Cyber-perpetration was found to be significantly associated with gender, ethnicity and conscientiousness trait, as shown in Table II. Male respondents reported a higher percentage of being cyber-perpetrator (26.1%) compared to female respondents (16.4%). Malay ethnicity also reported a higher proportion of cyber-perpetration (32.6%) in contrast to non-Malay ethnicity (13.8%). Students with a high trait of consciousness were more likely to be cyber-perpetrators (23.9%) compared to those with a low trait of conscientiousness (16.3%).

There was no significant association between cybervictimization and age, gender, personality traits (extraversion, agreeableness, conscientiousness, neuroticism and openness), or pattern usage of SNS (academic, socialization, entertainment and informativeness). In the context of cyber-perpetration, no significant association were found between cyber-perpetration and age, extraversion, agreeableness, neuroticism and openness or any pattern of SNS usage. In terms of health-related quality of life (HRQOL)

outcomes, cybervictimization was significantly associated with psychological domain (t(213)=2.485, p=0.014). Cyber-perpetration revealed significant associations with all four domains of HRQOL, including physical health (t(604)=-2.955, p=0.003), psychological (t(604)=-3.258, p=0.001), social relationships (t(604)=-2.335, p=0.020), and environment (t(604)=-3.604, p < 0.001) as shown in Table III.

Table III: Cyberbullying and HRQOL (N=606)

Variable	Cybervictimization				Cyber-perpetrator			
	M	SD	t(604)	p-value	M	SD	t(604)	p-value
Physical health	15.38	2.333	1.124	0.262	15.96	2.091	-2.955	0.003*
Psychological	14.50	2.668	2.485	0.014*	15.28	2.588	-3.258	0.001*
Social relationship	15.71	2.923	1.839	0.066	16.34	2.841	-2.335	0.020*
Environment	15.60	2.365	1.372	0.127	16.31	2.060	-3.604	< 0.001*

M = mean. SD = standard deviation. * Statistical significance at p < 0.05

Predictors of cybervictimization

Multiple logistic regression analysis was employed to identify predictors of cybervictimization among high school students in Klang, Selangor. All variables with a p-value less than or equal to 0.25 were included in the analysis. Simple logistic regression analysis for cybervictimization revealed that four variables such as ethnicity, academic performance, entertainment, informativeness, were included in the preliminary model of multiple logistic regression at p- value less than or equal to 0.25. Table IV presents the predictors of cybervictimization among high school students in the final model. The analysis revealed that ethnicity and academic performance were the predictors of cybervictimization. The model showed no multicollinearity and no interactions between variables. The Hosmer and Lemeshow test indicated a good overall model fit (p=0.301), with the area under the curve at 69.3%. The Nagelkerke R2 indicates 12.1% of the variation in cybervictimization was explained by this logistic model.

Table IV: Predictors of cybervictimization

Variables	Simple Logistic Regression		P value	95% CI		Multiple Logistic Regression			95% CI	
	Coefficient	Crude OR		Lower bound	Upper bound	Coefficient	Adjusted OR	P value	Lower bound	Upper bound
Ethnicity										
Malay (Ref)										
Chinese	-1.292	0.275	**<0.001***	0.149	0.507	-1.262	0.283	**<0.001***	0.153	0.525
Indian	-1.551	0.212	**<0.001***	0.124	0.363	-1.430	0.239	**<0.001***	0.139	0.413
Others	-0.993	0.370	0.101	0.113	1.214	-1.050	0.350	0.086	0.106	0.158
Academic performance										
High (Ref)										
Low	0.813	2.254	**<0.001***	1.510	3.364	0.648	1.912	**0.002***	1.261	2.900
Entertainment	-0.043	0.958	0.128	0.906	1.012					
Informativeness	-0.044	0.957	0.246	0.887	1.031					
Constant						1.974	7.198	< 0.001*		

*Significant level p<0.05
Forward LR method was used for multiple logistic regression. No multicollinearity and interaction. Hosmer and Lemeshow test (p>0.05), Nagelkerke R square = 0.121; Area under curve: 69.3%, Overall percentage in classification table:79.5%

The equation of the logistic regression model derived from the analysis was as follows:
Log (Cybervictimization) = 1.974 - 1.262 (Chinese ethnic) - 1.430 (Indian ethnic) + 0.648 (Academic performance).

Based on the final model, the results showed that Chinese and Indian students are 71.1% and 76.1% less likely to experience cybervictimization compared to Malay student, respectively (AOR=0.283, 95% CI: 0.153, 0.525) and (AOR=0.239, 95% CI: 0.139, 0.413). Students with low academic performance are 1.912 times more likely to experience cybervictimization compared to those with high academic performance (AOR=1.912, 95% CI:1.261, 2.900).

Predictors of cyber-perpetration

To identify the predictors for cyber-perpetrator among high school students, similar analysis using Multiple Logistic Regression was carried out. Simple logistic regression analysis for cyber-perpetration revealed that six variables (gender, ethnicity, academic performance, entertainment, extraversion and conscientiousness) with a p-value less than or equal to 0.25 were included in

the preliminary model of multiple logistic regression analysis. Table V displays the final model's predictor of cyber-perpetration among high school students. The analysis identified gender and ethnicity as significant predictors. The model demonstrated no multicollinearity or interaction between variables. The Hosmer and Lemeshow test confirmed that overall model fit was good (p=0.998), and the area under the curve was 68.1%. The Nagelkerke R^2 revealed that 10.6% of the variation in cyber-perpetration was explained by this logistic model.

Table V: Predictors of cyber-perpetration

Variables	Simple Logistic Regression					Multiple Logistic Regression				
				95% CI					95% CI	
	Coefficient	Crude OR	P value	Lower bound	Upper bound	Coefficient	Adjusted OR	P value	Lower bound	Upper bound
Gender										
Female (Ref)										
Male	0.588	1.801	**0.004***	1.211	2.678	0.582	1.790	**0.005***	1.189	2.693
Ethnicity										
Malay (Ref)										
Chinese	-0.975	0.377	**<0.001***	0.216	0.660	-0.956	0.385	**<0.001***	0.219	0.675
Indian	-1.320	0.267	**<0.001***	0.164	0.436	-1.319	0.267	**<0.001***	0.163	0.438
Others	-0.122	0.885	0.810	0.327	2.392	-0.087	0.916	0.086	0.336	2.499
Academic performance										
High (Ref)										
Low	0.511	1.666	**0.016***	1.100	2.524					
Entertainment	-0.144	0.866	0.190	0.698	1.074					
Extraversion										
Low (Ref)										
High	0.247	1.280	0.221	0.862	1.899					
Conscientiousness										
Low (Ref)										
High	0.478	1.614	**0.028***	1.053	2.473					
Constant						-1.038	0.354	< 0.001*		

*Significant level p<0.05
Forward LR method was used for multiple logistic regression. No multicollinearity and interaction. Hosmer and Lemeshow test (p>0.05), Nagelkerke R square = 0.106; Area under curve: 68.1%, Overall percentage in classification table:78.9%

The logistic regression equation derived from the analysis is as follows:
Log (Cyber-perpetration) = -1.038 + 0.582 (male gender) - 0.956 (Chinese ethnic) - 1.319 (Indian ethnic).

According to the final model, male students are 1.790 times more likely to become cyber-perpetrators compared to female students (AOR=1.790, 95% CI: 1.189, 2.6930). Chinese and Indian students are 61.5% and 73.3% less likely to become cyber-perpetrator compared to Malay students (AOR=0.385, 95% CI: 0.219, 0.675) and (AOR=0.267, 95% CI: 0.163, 0.438), respectively.

DISCUSSION

This study found a notably higher prevalence of cybervictimization among Malaysian high school students compared to previous studies conducted in the country. Specifically, over three-quarters (79.5%) of students in this study reported experiencing cybervictimization as opposed to studies from 2017 and 2020, which found prevalence rates ranging from 25% to 52.2% among Malaysian adolescents (7, 10). Meanwhile, the prevalence of cyber-perpetration is 21.1%, which aligns with the previous studies and the latest national survey (10, 25). Several methodological and contextual factors could account for these differences, including changes in digital behaviour post-pandemic, variations in study design, and advancements in mobile device accessibility and internet coverage.

One major contextual factor is the surge in internet and smartphone use among adolescents following the COVID-19 pandemic. As remote learning became the norm, adolescents spent significantly more time online for educational purposes, which also likely increased their exposure to digital platforms for social interaction. Studies have shown that prolonged online engagement can increase opportunities for both cybervictimization and cyber-perpetration (26, 27). A national Internet User Survey (IUS) 2022 reported that internet usage among Malaysians aged group 15 to 19 rose from 7.6% in 2018 to 11% in 2022, with youth under 18 owning devices for the purpose of accessing the internet increased by 20.1% (from 56.3% in IUS 2020 to 76.4% in IUS 2022)(28). These developments suggest that the elevated cybervictimization rate found in the current study may partially reflect the broader increase in digital engagement among adolescents

during and after the pandemic. As previously stated in literature, an equitable comparison of cyberbullying data is challenging due to wide variability in reported prevalence as a result of differences in definition and measurement approaches. Nonetheless, the findings of this study suggest a potentially high prevalence of both cybervictimization and cyber-perpetration possibly due to the sensitivity of the measurement method employed. This study used a strong validated multi-item scale to measure cyberbullying, unlike past studies that relied on a single item, allowing for a more comprehensive capture of cyberbullying experiences. Previous study also showed that multi-items scale clearly out-perform single items in term of predictive validity and certain validated method may inflate prevalence rates (29).

While previous research linked increase SNS used to higher rates of cyberbullying, our findings suggest the opposite trend (30). Despite the high percentage of SNS users among adolescent (76.2%), our study observed relatively low engagement in cyberbullying behaviours through SNS, with reported rates of cybervictimization and cyber-perpetration at just 1.7% and 1.3%, respectively (5). This discrepancy may be attributed to the fact that most SNS platforms have a minimum age requirement of 13, which restricts access for younger adolescents and potentially limits their exposure to the risks associated with these platforms. Moreover, data from local study shows that active social media users are predominantly between the ages of 18 and 24 (34.5%), whereas adolescents aged 13 to 17 make up only 16.3% of this user base (5). This demographic trend suggests that younger adolescents may have limited engagement with SNS compared to older age groups, reducing their likelihood of encountering or participating in cyberbullying within these platforms. Additionally, our findings suggest that instant messaging and text messaging, rather than SNS platforms, are the preferred media for communication among adolescents. This aligns with studies showing that teens tend to favour direct messaging over social media for peer interactions (31). Given that adolescents send and receive an average of 30 messages per day through digital platforms, it is plausible that cyberbullying behaviors might be more concentrated in these personal, one-to-one communication channels (32). Peled (33) further supports this idea, observing that instant messaging is frequently the primary medium for cyberbullying among students, largely due to the anonymity it offers. It enables rapid exchanges with fewer oversight mechanism compared to public SNS. The convenience of these platforms encourages impulsive and retaliatory actions, as adolescents may feel less accountable compared to more public forums.

Studies have shown that a person's behaviour is influenced not only by their usage patterns but also by their personality type (32). This is supported by the general aggression model, which suggests that personality is an important factor in understanding the personal traits that influence aggressive or non-aggressive behaviour (34). Research typically associates conscientiousness trait with self-discipline, impulse control, and a general avoidance of harmful or rule-breaking behaviours. Therefore, the positive association between high conscientiousness and cyber-perpetration observed in this study may seem counterintuitive. However, certain situational factors and social pressures can influence conscientious individuals to act against their typical behavioral tendencies, particularly within the context of adolescence, where peer influence and social acceptance are often prioritized. Peer influence and the desire to fit in can pressure conscientious individuals to conform to group norms, even if it involves cyberbullying. Additionally, academic success is often seen among conscientious students, which may provoke envy or jealousy among peers. If they become targets of cyberbullying because of their achievements, they might respond by engaging in retaliatory behaviors to defend their social standing. According to the Social Comparison Theory, individuals often engage in comparison-driven behaviors, which can lead to aggression or retaliation when feeling targeted. Barlett and Coyne (35) emphasize that attitudes towards cyberbullying can be influenced by social comparison processes, leading to increased perpetration among individuals who feel threatened or inferior. As previously mentioned, conscientious individuals typically exhibit a strong moral compass, however, online settings can sometimes weaken the moral restraints. Therefore, making it easier for conscientious individuals to justify behaviors they might avoid in face-to-face settings. In this sense, conscientious adolescents might view their cyber-perpetration as justified under particular conditions, such as when defending themselves or their social group. These factors suggest that personality traits like conscientiousness can interact with social pressures and situational factors to influence cyberbullying behaviour in complex ways.

Health-related quality of life (HRQOL) is a comprehensive concept of well-being. In the context of cyberbullying, it has been shown that both victims and perpetrators score lower on all dimensions of HRQOL than uninvolved individual (11). Our results indicate that cyber-perpetrators are significantly associated with all four domains of HRQOL including physical health, psychological, social relationships, and environment. Cyber-perpetrators have higher mean scores on social relationship and environment domains, suggesting that they may have a supportive social environment but harbor negative intentions, thereby influencing cyberbullying behavior. Peers who encourage cyberbullying could serve as aggressive role models, thereby increasing cyber-perpetration. The high score in environmental domain may reflect a positive parental attitudes, providing adolescents with freedom and a sense of confidence, which contributes to their

engagement in cyberbullying. Physical health scores are good among cyber-perpetrators possibly due to their regular physical activity done, outside of cyberbullying activities. Contrary to expectations, cyber-perpetrators report low psychological scores. The lack of empathy can negatively impact psychological well-being, making it difficult for cyber-perpetrators to form lasting connections and experience positive emotions. The contradiction between their behaviours and their moral beliefs can lead to feelings of guilt, humiliation, and lower psychological well-being.

Ethnicity was found to be a significant predictor in the present study. Specifically, students of Indian ethnic origin were 65.2% less likely to experience cybervictimization compared to students from the majority Malay ethnic group. Ethnic differences in cyberbullying were evident by past studies indicating Malay students reporting higher rates of cybervictimization than their Indian and Chinese peers (36, 37). This differences may be rooted from perceived ethnic privilege and lower tolerance for cybervictimization within the Malay community. This is possibly due to their majority status, which might influence peer dynamics and group behaviours (38). Additionally, cultural differences in attitudes toward reporting incidents could affect these results, as some students may feel more comfortable reporting experiences than others based on community expectations and social stigma (39).

Interestingly, while Indian students are a minority within the overall population, they constituted 37.5% of this study's sample, suggesting a possible protective factor against both cybervictimization and cyber-perpetration that warrants further investigation. One reason for this may be the strong emphasis on the concept of "gang" within the Indian communities encouraging to engage in face-to-face interactions rather than online activities, thereby limiting their exposure to cyber risks. A study revealed that people often join gangs due to misconceptions about gangsterism, a desire for purpose in life, or as an escape from difficult upbringings and troubled family environments (40). For some Indian individuals in Malaysia, who are among the marginalized groups, adverse circumstances may have influenced their involvement in gangs and subsequent participation in gang-related activities. Additionally, the National Health and Morbidity Survey (NHMS) 2017 found that Indian adolescents are more often involved in offline or traditional forms of bullying than cyberbullying, suggesting that these behaviors may be shaped by cultural norms that value in-person interactions. Furthermore, Indian adolescents reported spending less time online (6.7 hours per week) than their Chinese (6.2 hours) and Malay (7.17 hours) counterparts, which could reduce their involvement in cyberbullying activities (41). This lower online presence may also stem from Indian family values that emphasize discipline and academic focus, which reduce screen time in favour of structured activities and study time (42). Study by Mofrad and Uba (43) also found that the Indian participants perceived their parents as authoritarian. Therefore, Indian students might face stricter parental oversight regarding internet use, further limiting opportunities for cyberbullying.

Chinese students also reported lower engagement in cyber-perpetration, possibly due to their low level of impulsivity and aggression. In Chinese culture, aggressive behaviour is generally discouraged and often actively suppressed both within the family and in wider social context, aligning with Confucian value that prioritize social harmony (44). These social norms emphasize respect, restraint, and peaceful conflict resolution, fostering a mindset that discourages behaviors which could harm others or bring dishonour to the family. Adolescents who internalize these values are therefore less likely to engage in impulsive or retaliatory actions, such as cyberbullying. Moreover, a study on life goals and values among Chinese Malaysians highlights a commitment to personal development and family values over social dominance, which may reduce the likelihood of engaging in hostile online behaviors like cyberbullying (45).

This study found that low academic performance was associated with a 1.5 times higher likelihood of cyberbullying involvement, consistent with findings from a meta-analysis showing a negative link between peer victimization and academic achievement (41). One possible explanation is that students who struggle academically may turn to online spaces for social interaction and support, which could make them more vulnerable to cybervictimization due to lower self-esteem and a tendency toward social isolation (46). Studies suggest that these students may experience increased stress and frustration from academic challenges, leading some to engage in riskier online behaviors as a coping mechanism (37).Additionally, students with lower academic performance may lack adequate knowledge of cyberbullying prevention and digital safety, as evidenced in research highlighting limited cyber-awareness among young adolescents (47). This limited understanding of online safety practices may expose them to higher risks of both becoming victims and unintentionally engaging in cyberbullying behaviors.

Numerous studies have demonstrated a significant gender difference in cyber-perpetration, consistently showing that males at higher risk than females (48-50). This trend is similarly observed by the present study where gender was found to be a significant predictor of cyber-perpetration. The findings are further supported by latest national youth survey indicating a higher prevalence of cyber-perpetration among males (22.7%) compared to females (13.9%) (25). Research suggests that male students often engage in cyber-perpetration through platforms like chat services, online games, and multimedia sharing, such as photos and videos (48).

Time spent gaming during the week is predictive of cyberbullying, and exposure to violent online gaming is associated with being a perpetrator (48, 49). Interestingly, while this study's results show a relatively low rate of cyber-perpetration related to online gaming (5.0%), instant messaging platforms like WhatsApp displayed a higher prevalence (8.9%). This trend aligns with findings from Korea, where instant messaging is also a prominent medium for cyber-perpetration among adolescents (50). This is possibly due to these platforms are more integrated into adolescents' daily communication, potentially making them more accessible for aggressive interactions compared to gaming, which may require specific settings and schedules. The findings highlight that while online gaming can contribute to cyber-perpetration, the pervasive nature of instant messaging may make it an even more prevalent medium for such behaviours among male students.

Limitation

The cross-sectional study design limits conclusions about causality. This study focused solely on adolescent in national schools, excluding those in private education and students in their examination year (Form 5). These limitations are due to time, resources and organizational restriction, which may affect the ability to generalize the findings to the broader student population. The self-reported data carries potential bias due to social stigma, but this was mitigated by the anonymity provided in the reporting process.

Recommendation

Given that 79.5% of the adolescents experienced cybervictimization, there is an urgent need to address this issue. Additionally, other factors such as parental strategies (ie: parental monitoring, control and styles) and environmental factors such as family, peers, school and technology should be studied. Replication studies using cross-sectional methods should be conducted in other populations to support our findings. It is also recommended to improve the study design and quality of the results by conducting prospective studies in the future to explore cause-and-effect relationship. Given the complexity of the SNS, this study propose for future researchers investigate this technology-mediated phenomenon and incorporate a socio-technical perspective into their studies. Furthermore, the preventive measures for this social behavior may necessitate the implementation of targeted health education programs, reinforcement of existing school health services, and the active engagement of various relevant stakeholders.

CONCLUSION

This study discovered a high prevalence of cyberbullying behaviour among adolescents. Despite the popularity of SNS, this study found that pattern of SNS usage was not associated with cyberbullying. Individuals with a high trait of conscientiousness were significantly associated with cyber-perpetration. The study identified the predictors of cybervictimization were low academic performance and non-Malay ethnicities (Chinese/Indian). The predictor of cyber-perpetration were male gender and non-Malay ethnicities (Chinese/Indian). Overall, this study sheds light on the concerning prevalence of cyberbullying among high school students in Klang District. However, the limitations highlight the need for further research with more robust methodologies and broader scope to inform the development of effective preventive and intervention strategies.

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