



Cluster profiles of high school students in cyber bullying, cyber victimization, aggression, and coping

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Citation: Muthukrishnan, P., Wan, P. M., Sidhu, G. K., Tanucan, J. C. M., & Wider, W. (2024). Cluster profiles of high school students in cyber bullying, cyber victimization, aggression, and coping. *Online Journal of Communication and Media Technologies*, 14(4), e202461. <https://doi.org/10.30935/ojcm/15610>

ARTICLE INFO

Received: 12 Jun 2024

Accepted: 15 Oct 2024

ABSTRACT

Cyberbullying has become a significant concern, particularly among teenagers, due to the advancement of digital technologies. This study aims to identify the cluster profiles as well as the role of gender, time spent on networking and age on these clusters. This study employed a self-administered survey to investigate cyberbullying among 812 adolescents attending public and private high schools in Selangor, Malaysia. The quantitative data was obtained using validated measures of cyberbullying and cybervictimization scale, coping strategies, and aggression. Data analysis used in this research were two-stage cluster analysis and chi-square statistics. The findings revealed that these teenagers can be categorized into three distinct cluster profiles namely highly cybervictimization, aggressive and depressive; low cyber victimization, aggression, depression and coping; and lower scores in cyber victimization, aggression, depression and higher scores in coping. Unlike previous studies, cluster profiles revealed no substantial correlation with gender. Instead, this study found that cluster patterns were linked to demographic factors, such as age groups. This study also highlights the correlation between cluster profiles and the utilization of social media in the dynamics of cyberbullying. Teens in Cluster 1, who devoted more than four hours per day to social media, experienced the greatest influence of cyberbullying, highlighting the significance of their online environment. This study sheds light on the issue of cyberbullying among Malaysian adolescents and highlights its intricate nature. To foster safer online environments for teenagers in the digital age, educational institutions, parents, and governments can develop specific efforts that identify cluster profiles and demographic factors.

Keywords: psychological harm, aggression, cluster profiles, coping, cyberbullying, cybervictimization, high school students

INTRODUCTION

In today's era of unprecedented technological advances, where artificial intelligence is nearing human capabilities, we cannot deny that technology has been embraced by every stratum of society in one way or another. Some have reaped success through the many advantages that technology offers, while others have either chosen or fallen victim to the dark web that rears its ugly side, exacerbating not only their lives but also negatively aggravating the lives of others.

In this technological age, Generation Z adolescents interact, learn and socialize in the world of social media surrounded by a variety of digital tools. Levy (2018), in decoding Generation Z, noted that most adolescents today do not even know their own phone numbers, feel their parents never understand them, consider Facebook lame, and live in a world where gamers are heroes, not geeks, and their first account is a public persona. Besides that, they move in parallel metaverse environments, communicating in a lingo beyond our comprehension, yet many are unaware of the many dangers lurking within its dark shadows.

In such online digital landscapes, cyberbullying and cybervictimization has emerged as pervasive issues affecting adolescents all around the globe with Malaysia being no exception (Ch'ng et al., 2021; Tajuddin et al., 2020). Today high school students are avid users of technology as they tread daily on social media platforms vulnerable to toxic people capable of cyberbullying and aggression leading to cybervictimization affecting victims to a range of psychological, social, and academic issues.

According to Pyżalski et al. (2022), cyberbullying today is a severe threat to the individual and social well-being of young people. They highlighted that cyberbullying is a behavior performed by individuals or groups that keep communicating hostile or aggressive messages via social media platforms with an intent to inflict harm or cause grief and discomfort onto others. Consequently, students may find themselves on the receiving end of cyberbullying, leading to cybervictimization wherein victims experience increased anxiety, depression, harassment, denigration, and exclusion. All these behaviors are exacerbated by the anonymity and broad reach of the internet (Machmutow et al., 2013) and by the reluctance of students to share their experiences with adults (Tajuddin et al., 2020).

On the other hand, aggression can be viewed either as a response to cyberbullying or as a characteristic of bullies. Whittaker and Kowalski (2020) note that individuals who engage in cyberbullying often exhibit higher levels of aggression while victims of cyberbullying may also develop aggressive tendencies as a defensive mechanism, perpetuating a cycle of violence and retaliation. Such a bidirectional relationship between aggression and cyberbullying leading to cybervictimization underscores the complexity of addressing these issues within the school environment. To complicate matters further, scholars have provided evidence that school students are also engaging in online bullying of teachers (Arantes, 2023). This behavior may originate from negative face-to-face interactions or the shift in power dynamics enabled by the online environment. As digital natives, students possess the skills to create and share memes, fabricate false profiles, manipulate photos, and record videos of teachers without their consent, amplifying their ability to target educators in cyberspace (Tomczyk et al., 2024). Hence, there is a critical call to address the dynamics of aggression and effective coping strategies in the context of cyberbullying and cybervictimization among high school students.

In a quest to better comprehend how high school students cope with cyberbullying and cybervictimization it is pertinent that one develops effective coping strategies. Varela et al. (2022) found that social support from family, friends, and school personnel plays a pivotal role in mitigating the adverse effects of cyberbullying.

These studies reveal the alarming prevalence and adverse impact of cyberbullying and cybervictimization, yet there is scant empirical evidence on this issue within the context of Malaysian high school students. Therefore, this study aimed to provide a comprehensive analysis of this issue among Malaysian high school students. It is hoped that by understanding the dynamics of cyberbullying and cybervictimization, educators, parents, and policymakers can better address the challenges posed and create safer and more supportive environments for adolescents.

LITERATURE REVIEW

With the ever-present digital landscape, adolescence – a time of inherent social and emotional volatility – becomes more complex. The significant transformations in self-concept, peer interactions, and emotional regulation that occur during this stage (Wider et al., 2023) create unique vulnerabilities for adolescents. Technology increases these difficulties even as it provides opportunities for connection and self-expression. The possibility of cyberattacks becomes a serious worry. This type of peer aggression is especially pernicious because of its anonymity and the constant accessibility provided by technology, reflecting larger societal concerns about youth violence (Moore et al., 2017; Varela et al., 2022). According to Tokunaga (2010) and Grigg (2010), cyberaggression is a serious relationship risk connected to internet use in which people use information and communication technologies (ICTs) to hurt their peers. This phenomenon is also prevalent among social media influencers, who often target and spread hate messages about their peers (Moffat, 2024).

One of the main concerns is the widespread nature of online abuse. According to a UNICEF (2019) report from 2019, which covered 30 countries, more than one-third of youth have been the victims of cyberbullying, and 20% of them have skipped school as a direct result of the abuse. Studies highlight how pervasive this phenomenon is, even though reported prevalence rates of cyberbullying vary widely. According to reviews from around the world, the average rates of cybervictimization range from 4% to 36%, while the rates of cyberaggression, or acting as the perpetrator, range from 16% to 18% (Patchin & Hinduja, 2012; Suzuki et al., 2012). This variability is supported by a meta-analysis by Modecki et al. (2014), which found that the prevalence of cyber aggressors ranged from 5% to 32% (mean: 16%) and that of cyberbullying victims from 2% to 56% (mean: 15%). The susceptibility of cyberspace to peer aggression raises significant concerns regarding the phenomenon of cyberbullying, with evidence suggesting it is more prevalent among women (Moffat, 2024).

The prevalence of ICTs and social media platforms has increased the likelihood that adolescents will either be victims of or engage in cyberbullying (González Sodis & Leiva Olivencia, 2022; Patchin & Hinduja, 2015). Cyberbullying, which is defined as persistent, deliberate, and hostile behavior on the internet directed at a person who has few options for protection (Amalina et al., 2022; Fu et al., 2022; Smith & Steffgen, 2013), is a serious worldwide issue that is worryingly common among children and adolescents. Research shows that 10% to 40% of minors are victims of cyberbullying (Kowalski et al., 2014), and 20% to 40% of adolescents have been victims of cyberbullying at least once (Aboujaoude et al., 2015). Notably, increased access to social media and the internet tends to raise this rate (Hamm et al., 2015). Research conducted globally reveals differences in the incidence of cyberbullying victims. According to Selkie et al. (2016), the proportion of impacted teenagers in the US varies from 3% to 72%, while a study conducted in Europe, among teenagers aged 14 to 17, the range was 13.3% to 37.3% (Athanasidou et al., 2018). The prevalence rates in Asian nations also vary in China, they range from 14% to 57% (Chan & Wong, 2020); in Taiwan, they range from 13% to 35%; in Hong Kong, they range from 12% to 72%, and in South Korea, they are roughly 14.6% (Lee & Shin, 2017).

Examining roles within this dynamic is necessary to comprehend the complexities of cyberbullying. According to Salmivalli (2010), harassers usually target victims, but the attacks are initiated by the aggressors. However, research shows that some victims might also participate in cyberbullying, making it harder to distinguish between the two groups (Schultze-Krumbholz et al., 2018). This alarming trend highlights the detrimental effects of cyberbullying on the psychological and social well-being of all parties involved (Celuch, 2022; Kowalski et al., 2014; Morin et al., 2018). Those who bear the brunt of the abuse directly – cyber victims – frequently experience the worst outcomes. Research has repeatedly shown that cyberbullying has long-lasting detrimental effects on a victim's mental and emotional health (Garaigordobil, 2011; Quintana & Rey, 2018; Varela et al., 2022). Additionally, there seems to be a reciprocal relationship: people who already struggle with internalizing issues like depression and anxiety may be more vulnerable to being victimized by cyberbullying (Fisher et al., 2016; Kowalski et al., 2014; Sampasa-Kanyinga et al., 2020; Wright & Wachs, 2019). Cyberbullying can also cause these pre-existing problems to become internalized.

People use a variety of coping strategies in reaction to cyberbullying incidents. According to Perren et al. (2012), these can be broadly divided into four categories:

- (1) direct responses (such as retaliation or constructive feedback),

- (2) disengagement (avoidance or inaction),
- (3) looking for outside support (from parents, friends, or teachers), and
- (4) using technological solutions (such as blocking senders).

Because of the particular difficulties posed by cyberbullying, victims have had to resort to a variety of coping mechanisms, including both conventional reactions and technological ones. A tried-and-true strategy is seeking social support, in which the victim asks friends, parents, or teachers for help and emotional support, among other reliable individuals. Studies show how effective this tactic is at reducing the harm caused by bullying, both online and offline (Mishna et al., 2009; Rothon et al., 2011; Yeung & Leadbeater, 2010). However, based on variables like age and gender, asking for social support can have different effects. According to Shelley and Craig (2010), girls are more likely than boys to employ this tactic. Additionally, younger victims are more likely than older ones to seek assistance (Skrzypiec et al., 2011). On the other hand, older male teenagers might prefer preventative actions like alerting instructors or adults (Chan & Wong, 2017).

Technological tools, in addition to social support, enable victims to deal with cyberbullying. In a study of teenagers in the Czech Republic, it was discovered that they preferred technical fixes (such as blocking offenders), avoidance, and support-seeking (Machackova et al., 2013). Another tactic is confrontation, but this is typically only advised in situations where the victim is aware of the bully's identity and means of communication (Aricak et al., 2008; Stacey, 2009). Retaliation is another coping strategy that has been linked to in studies (Bauman, 2010; Smith et al., 2008). Curiously, a study revealed that although 48% of participants supported retaliation, only 12% did so online, indicating that face-to-face conflict may occur more frequently offline (Juvonen & Gross, 2008). Lastly, some victims deal with cyberbullying by ignoring it and avoiding it. According to Bauman (2012), Holfeld and Grabe (2012), Smith et al. (2008), and other authors, these tactics can involve actively adopting preventative actions like blocking messages, blocking offenders, and altering personal contact information (e.g., email addresses and phone numbers). Furthermore, Kokkinos et al. (2015) observed that victims of cyberbullying frequently use passive avoidance coping techniques.

While many coping strategies are discussed here, more research is necessary due to the complexity of cyberbullying. Gaining an understanding of the subtle differences between strategies and how they work in different situations can help communities and individuals create more efficient support networks

Problem Statement

Previous studies have identified different cluster patterns generated for studies around cyberbullying and cybervictimization. There is a lack of consensus in the results on the identification of the number of cluster profiles and the characteristics of the groups differ due to the varied conceptualization of cyberbullying and the type of cluster analysis employed (Martínez-Monteagudo et al., 2020). Martínez-Monteagudo et al. (2020) identified three clusters: high, low and non-cyberbullying clusters among Spanish students. Aoyama et al. (2011) reported four cluster profiles among US students involving less involved as the majority of students and highly involved as bully as victim, more bully than victim, and more victim than bully. Similarly, Barboza (2015) reported four categories:

- (1) highly victimized by both bullying and cyberbullying behaviors,
- (2) victims of relational bullying, verbal bullying, and cyberbullying,
- (3) victims of relational bullying, verbal bullying, and physical bullying but were not cyberbullied, and
- (4) non-victims.

Hollá (2016) studied Slovakian adolescents and three groups of students as the 'uninvolved, victims, and victims-aggressors' group. Along these lines, Schultze-Krumbholz et al. (2015) studied large population youths from six European countries and reported classified youths into non-involved, bully/victim, and perpetrator with mild victimization. Schultze-Krumbholz et al. (2018) studied German students and determined five groups as prosocial defenders, aggressive defenders, communicating outsiders, bully-victims, and assistants.

To our knowledge, there is no empirical evidence on the identification of cluster patterns among the Malaysian secondary student population. Therefore, the objective of this study was to empirically identify the group profiles of adolescents involved in cyberbullying, cybervictimization, aggression, and coping using

latent class analysis. After identifying the cluster profiles, we analyzed the differences among the cluster patterns across the subsamples of secondary school students.

The current research will address the following research questions.

1. What are the cluster profiles considering cyberbullying, cybervictimization, aggression, and coping among secondary school students?
2. Are there significant differences among the sub-groups of the cluster profiles in terms of gender, time spent on networking, and age?

METHODOLOGY

Participants

Participants were 812 adolescents (386 females and 426 males) studying in grade 6 through grade 8, aged 13 to 18 years, from public and private high schools. The participants were selected from a number of high schools in Selangor, a state in Malaysia. The samples were selected using randomized cluster sampling in which schools were selected and the sample was drawn. The demographic profile of the adolescents showed 355 (41.3%) were Malays, 330 (40.6%) were Chinese, 104 (12.8%) were Indians and the remaining 43 (5.3%) belonged to other ethnic groups. Additionally, in terms of age groups, 64 (7.8%) were in the 13–14 years group, 457 of them (56%) were in the 15 to 16 years group and the remaining 291 (35.83%) were in the 17 to 18 years group. Data was collected using a self-administered survey which covers the cyberbullying and cybervictimization scale, coping strategies, and aggression.

Measures

Cyberbullying and cybervictimization scale

The present study adapted the cyberbullying and cybervictimization scale validated by Ang and Goh (2010) and Burton et al (2013). The modified scale consists of 11 items each for cyberbullying and cybervictimization. The CAV scale uses 5-point Likert scale in which participants were required to respond to items which are related to their cyber experiences. Five-point Likert scale is used to collect responses which measures the frequency of the experiences, with the options ranging from “has never happened” to “very often”. Higher scores refer to prevalence of cyberbullying and cybervictimization behaviors. The reliability of cyberbullying and cybervictimization were 0.83 and 0.88, respectively.

Aggression

To measure aggression of adolescents in experiencing cybervictimization, cyber-aggression typology questionnaire (CATQ) was employed (Runions et al., 2017). Aggression typology in CATQ constitute four distinct types of aggression: impulsive-aversive, controlled-aversive, impulsive-appetitive and controlled-appetitive. However, the exploratory factor analysis resulted in three distinct aggression types. Controlled-aversive was excluded from the aggression topology because of cross factor loadings and the smaller number of items. Therefore, the final questionnaire was designed to assess three aggression types: impulsive-aversive, controlled-aversive, impulsive-appetitive and controlled-appetitive (Runions et al., 2017). Participants were required to respond to the items indicating how frequently they experienced each symptom. Their responses were collected using a five-point Likert scale. Cronbach’s alpha for the sub-scales were computed which ranged from 0.75 to 0.87 for the sub-scales confirmed internal consistency of the instrument.

Coping strategies

Coping among adolescents is measured using a self-reporting questionnaire that permits identifying the coping strategies specific to the context of cyberbullying. The study used modified version of UCL-A, Utrecht coping list for adolescents (Bijlstra et al., 1994) which consists of 44 items under seven sub-scales of coping. UCL-A has been widely used and has shown consistent validity and reliability (Evers et al., 2000; Volink et al., 2013). Prior to data collection, the adopted items were reviewed and validated by the experts for content validity. To analyze the structure of item relations of the newly constructed questionnaire, principal component analysis with varimax rotation was performed. Factor analysis confirmed four factor structure of

the coping questionnaire: depressive coping, seeking social support, assertive coping and avoidance coping. The final questionnaire consists of a total of eighteen (18) items and the participants responded in a five-point Likert response format (1 = rarely and 5 = very often). In this study, the internal consistency values of the coping sub-scales were found to be adequate with the alpha coefficients above 0.83: depressive coping (items), seeking social support, assertive coping and avoidance coping.

Statistical Analysis

Statistical analysis was carried out using SPSS 24.0 (SPSS Incorporated, 2018). First, to ensure the reliability and validity of the instruments exploratory factor analysis and Cronbach's alpha tests were carried out. The alpha coefficients for all scales were set as 0.70 for acceptable internal consistency (Nunnally & Bernstein, 1994). Second, descriptive statistics were conducted to evaluate data distribution which include means, standard deviation, skewness and kurtosis. Skewness and kurtosis values were set within +1 and -1 (Field, 2013). Pearson's correlations were used to analyze correlations among the variables of study. Third, k-means clustering method was used to investigate the research objective 1, to identify and extract meaningful profiles of cybervictimization, aggression and coping.

Clustering analysis is a methodological statistical approach used to identify homogenous sub-groups or clusters within the sample, in which the members of each cluster share communalities within cluster while differing with other clusters in the defined constructs. Initially, the raw scores were transformed into standardized z-scores with a mean of zero and a standard deviation of 1. In the current study, cluster analysis procedure was employed in two stages as recommended by Henry et al. (2005), to derive clusters from the variables studied. The two-stage cluster analysis is a robust method in extracting the clusters and the combined method overcomes the weaknesses of the two methods. ANOVA and post-hoc were carried out to validate cluster solution. Finally, chi-square statistics were used to analyze the differences between the extracted profiles and gender, time spent on social media and age group.

RESULTS

The results are presented into two parts. First, the results of cluster analysis on study variables are presented. Second, differences between the cluster profiles and cyberbullying behaviors, gender, time spent on social networking and age group are reported.

Descriptive Statistics and Correlation

The descriptive statistics and intercorrelations among the variables are shown in **Table 1**. To ensure there is no issue of multicollinearity and whether the measured constructs are relatively independent, the correlation analysis was carried out (Nunnally, 1994). On examining the correlation coefficients, most correlations are low to moderate, positive and statistically significant, which confirmed that the variables are distinct.

Table 1. Variable correlations, means and standard deviations (N = 812)

Variables	1	2	3	4	5	6	7	8
CV	-							
Agg1	.596**	-						
Agg2	.416**	.516**	-					
Agg3	.414**	.469**	.509**	-				
Cop1	.418**	.392**	.190**	.165**	-			
Cop2	.312**	.219**	.160**	.211**	.390**	-		
Cop3	.081*	.172**	.125**	.033	.219**	.181**	-	
Cop4	.247**	.245**	.200**	.165**	.339**	.357**	.313**	-
Mean (standard deviation)	1.59 (.52)	1.54 (.58)	1.23 (.38)	1.25 (.43)	1.81 (.88)	1.96 (.95)	1.80 (.97)	2.20 (.90)

Notes. *p < 0.05; **p < 0.01; CV: Cybervictimization; Agg1: Impulsive-aversive; Agg2: Controlled-aversive; Agg3: Impulsive-appetitive; Agg4: Controlled-appetitive; Cop1: Depressive coping; Cop2: Seeking social support; Cop3: Assertive coping; Cop4: Avoidance coping

Cluster Analysis

K-means clustering is largely affected by outliers and therefore outliers were identified and discarded from the dataset (Hair et al., 1998). 12 outliers and extremes were identified, and these 12 participants were eliminated from the dataset. Cluster analysis was performed in two stages. First, hierarchical cluster analysis using Ward’s method with squared Euclidean distance was employed to identify the optimal number of clusters. Based on the hierarchical cluster dendrogram and the agglomeration schedule coefficients, the three-cluster solution were found to be appropriate. Subsequently, k-means clustering which is an iterative clustering technique was employed to confirm the number and cases of cluster profiles. The clusters were determined on maximizing the variances among the identified clusters and minimizes variances within each cluster (Aldenderfer & Blashfield, 1984). Therefore, the resulting clusters are homogenous within each cluster and heterogenous among the clusters (Bergman et al., 2003). The F ratio in cluster analysis is used for descriptive purposes to maximize the differences among the clusters. ANOVA results confirmed statistically significant differences. **Table 2** and **Figure 1** present descriptive statistics and ANOVA of the three clusters.

Table 2. Means (M), standard deviations (SD), z-scores (Z), and ANOVA across the three cluster profiles

Variables	Cluster 1 (n = 189)			Cluster 2 (n = 443)			Cluster 3 (n = 183)			F (2, 809)	p	η ²	Tukey HSD
	M	SD	Z	M	SD	Z	M	SD	Z				
CV	2.25	0.50	0.93	1.36	0.31	-0.50	1.54	0.39	-0.22	355.48 ^c	.000	0.47	3>2>1
Agg1	2.27	0.60	0.87	1.28	0.32	-0.51	1.47	0.46	-0.24	349.94 ^{**}	.000	0.46	3>2>1
Agg2	1.62	0.49	0.40	1.11	0.23	-0.39	1.15	0.29	-0.32	170.71 ^{**}	.000	0.30	1 >2,3
Agg3	1.72	0.53	0.51	1.12	0.26	-0.40	1.15	0.31	-0.35	205.41 ^{**}	.000	0.34	1 >2,3
Cop1	2.40	1.02	0.59	1.39	0.48	-0.51	2.26	0.92	0.43	164.76 ^{**}	.000	0.29	1,3 >2
Cop2	2.53	0.92	0.51	1.49	0.58	-0.54	2.56	1.04	0.53	183.24 ^{**}	.000	0.31	1,3 >2
Cop3	1.72	0.93	-0.10	1.36	0.54	-0.42	2.97	1.33	1.04	226.52 ^{**}	.000	0.36	3>2>1
Cop4	2.40	0.91	0.33	1.56	0.56	-0.54	2.78	0.91	0.73	208.99 ^{**}	.000	3.04	3>2>1

Note. *p < 0.05; **p < 0.01; CV: Cybervictimization; Agg1: Impulsive-aversive; Agg2: Controlled-aversive; Agg3: Impulsive-appetitive; Agg4: Controlled-appetitive; Cop1: Depressive coping; Cop2: Seeking social support; Cop3: Assertive coping; Cop4: Avoidance coping

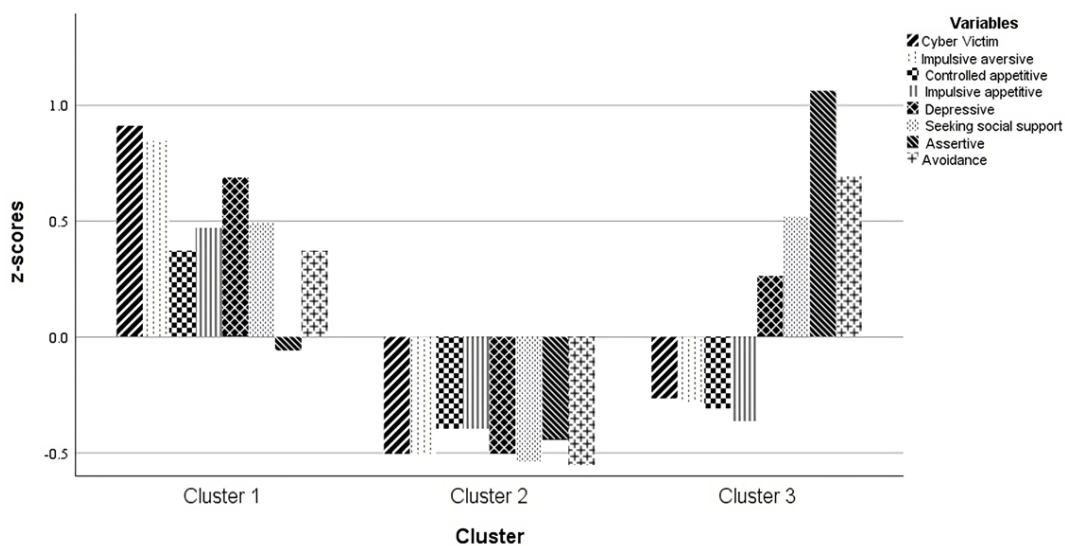


Figure 1. Cluster profiles of adolescents (Source: Authors)

Cluster description

The cluster profiles considering cyberbullying, cybervictimization, aggression, and coping among secondary school students result in the following three clusters. The first cluster was characterized by 189 (%) adolescents with highly cybervictimization, aggressive and depressive. The second cluster consisted of 443 adolescents characterized with low cyber victimization, aggression, depression and coping. The final cluster

accounted for 180 adolescents, distinctly displaying lower scores in cybervictimization, aggression, depression and higher scores in coping.

Differences in Cyberbullying Behavior Among Clusters

To answer the second research question, cluster differences in cyberbullying behaviors were analyzed. The ANOVA results showed that the three clusters differed significantly in cyberbullying [$F(2, 809) = 74.713, p < .001, \eta^2 = .0.16$]. Post-hoc test showed that adolescents in Cluster 1 (mean [M] = 1.4817) had significantly high cyberbullying behaviors compared with adolescents in Cluster 2 (M = 1.1538) and Cluster 3 (M = 1.1422).

Gender, Time Spent on Social Networking and Age Differences Across Clusters

To examine the cluster differences across gender and social networking usage, chi-square analysis was conducted. In terms of gender, the results revealed that there is no significant association of gender with three cluster profiles [$\chi^2(2) = 1.030, p = .001$].

With regard to cluster differences among adolescents in terms of their time spent on social networking, the results indicated significant association between clusters and time spent on social networking [$\chi^2(6) = 28.799, p < .001, \phi = 0.198$]. The phi coefficient showed moderate and significant association between clusters and time spent on social networking. On examining the standardized residuals of each cell in the chi-square table, it was confirmed that adolescents in Cluster 1 spending above 4 hours of time in social networking (n = 89, 47.1%, standardized residual = 2.99) resulted in standardized residual higher than 2, indicating that this group contributed to the significance of chi-square statistics. **Table 3** shows cluster composition across time spent on social networking. Further, the majority of the adolescents in Cluster 2 (34.3%) and Cluster 3 (34.4%) were spending 1 to 2 hours on social networking sites every day.

Table 3. Cluster differences across time spent on social networking

Cluster		Time spent on social networking every day				Total
		Less than 1 hour	1 to 2 hours	3 to 4 hours	Above 4 hours	
1	Frequency (percentage)	19 (10.1%)	52 (27.5%)	29 (15.3%)	89 (47.1%)	189 (100%)
	Expected count	31.7	61.9	30.5	64.9	189.0
	% within time spent	14.0%	19.5%	22.1%	31.9%	23.3%
	% Total	2.3%	6.4%	3.6%	11.0%	23.3%
2	Frequency (percentage)	91 (20.5%)	152 (34.3%)	62 (14.0%)	138 (31.2%)	443 (100%)
	Expected count	74.2	145.1	71.5	152.2	443.0
	% within time spent	19.1%	24.4%	27.5%	18.3%	54.6%
	% Total	11.2%	118.7%	7.61%	17.0%	54.61%
3	Frequency (percentage)	26 (14.4%)	62 (34.4%)	40 (22.2%)	52 (28.9%)	180 (100%)
	Expected count	30.1	59.0	29.0	61.8	180.0
	% within time spent	19.1%	23.3%	30.5%	18.62%	22.2%
	% Total	3.2%	7.6%	4.9%	6.4%	22.23%
Total	Frequency (percentage)	136 (16.7%)	266 (32.8%)	131 (16.1%)	279 (34.4%)	812 (100%)
	% within time spent	100%	100%	100%	100%	100%

In terms of age group, the chi-square statistics showed a significant association between age groups and clusters [$\chi^2(4) = 25.788, p < .001, \phi = 0.216$]. The value of phi is significant and indicates moderate strength of association between gender and cluster profiles. The standardized residuals of the cells confirmed that adolescents in Cluster 1 and in the age group of 13 to 14 years old (n = 50, 34.9%, standard residual = -2.55) and adolescents in Cluster 3 in the age group of 17 to 18 years old contributed to the significance of the chi-square statistics. The results indicated that majority of the adolescents in Cluster 1 (n = 112, 24.5%), Cluster 2 (n = 255, 55.8%) and Cluster 3 (n = 90, 19.7%) were in the age group between 14 to 15 years old (**Table 4**).

Table 4. Cluster differences across age group of adolescents

Cluster		Age group			Total
		13-14 years	15-16 years	17-18 years	
1	Frequency (percentage)	7 (10.9%)	116 (61.4%)	66 (34.9%)	189 (100%)
	Expected count	14.9	106.4	67.7	189
	% within age group	3.9%	62.2%	33.9%	23.3 %
	% Total	0.9%	14.3%	8.1%	23.3%
2	Frequency (percentage)	50 (11.3%)	253 (57.1%)	140 (31.6%)	443 (100%)
	Expected count	34.9	249.3	158.8	443.0
	% within age group	11.1%	56.8%	32.1%	54.6%
	% Total	6.2%	31.4%	17.7%	54.6%
3	Frequency (percentage)	7 (3.9%)	88 (48.9%)	85 (47.2%)	180 (100%)
	Expected count	14.2	101.3	64.5	180.0
	% within age group	3.8%	49.2%	47.0%	22.2%
	% Total	0.9%	11.1%	10.6%	22.2%
Total	Frequency (percentage)	64 (7.9%)	457 (56.3%)	291 (35.8%)	812 (100%)
	% within time spent	100%	100%	100%	100%

DISCUSSION

The study's findings demonstrate the diverse factors of cyberbullying in young people, exposing the unique characteristics of aggressors, victims, and people who use different coping techniques. Three distinct groups among the adolescents were found by the cluster analysis: Cluster 1 had high levels of aggression, depression, and cybervictimization; Cluster 2 had low levels of these factors; and Cluster 3 had lower levels of aggression and cybervictimization but better coping mechanisms. These accounts highlight the variety of experiences and psychological effects of cyberbullying, which is consistent with other research (Kowalski et al., 2014; Ngo et al., 2021; Schultze-Krumbholz et al., 2018) that highlights the heterogeneity of cyberbullying experiences. Adolescents in Cluster 1, who exhibit elevated levels of aggression, depression, and cybervictimization, are especially susceptible. Research repeatedly demonstrates that victims of cyberbullying endure severe psychological distress, such as low self-esteem, anxiety, and depression (Garaigordobil, 2011; Ho et al., 2022; Quintana & Rey, 2018). The high levels of aggression in this cluster also point to the possibility of victim-aggressors, or people who take revenge on others after experiencing victimization themselves (Francisco et al., 2022). These adolescents suffer severe psychological consequences, which frequently result in a vicious cycle of victimization and hostility that makes their emotional distress worse (Li et al., 2021; Morin et al., 2018).

The significant correlation found between clusters and the amount of time spent on social networking highlights the part that digital environments play in the dynamics of cyberbullying. The most impacted were the adolescents in Cluster 1, who used social media for more than four hours every day. This result confirms other research showing that using social media increases the likelihood of being the victim or the perpetrator of cyberbullying (Hamm et al., 2015; Patchin & Hinduja, 2015; Yokotani & Takano, 2021). Because technology is so widely used, bullies can always reach their victims, which increases the impact of cyberbullying (Varela et al., 2022). Furthermore, the anonymity provided by digital platforms frequently gives aggressors more confidence, which makes cyberbullying especially sneaky. This facet of cyberaggression reflects broader societal anxieties regarding adolescent violence and the difficulties associated with controlling behavior online (Bozzola et al., 2022).

Effective coping strategies play a protective role, as demonstrated by Cluster 3, which is characterized by lower levels of aggression and cybervictimization and higher levels of coping skills. Adolescents in this group probably use a variety of coping strategies, such as utilizing technology to block offenders or reaching out to friends for support (Perren et al., 2012). The study's conclusions are consistent with previous research indicating that proactive coping mechanisms can considerably lessen the negative impacts of cyberbullying. For example, it has been demonstrated that victims who seek social support can reduce their emotional distress and develop resilience (Arató et al., 2022).

It is interesting to note that, contrary to some literature suggesting girls are more likely to be victims of cyberbullying, the study found no significant association between gender and cluster profiles. On the other

hand, the strong correlation found between age groups and clusters suggests that younger adolescents (ages 13 to 14) are particularly susceptible to high levels of hostility and cybervictimization. The increased susceptibility of this age group may be explained by their developmental stage, which is marked by heightened sensitivity to peer feedback and a still-developing capacity for emotional regulation (Sahi et al., 2023). Older adolescents who demonstrated higher coping skills probably benefit from having a more developed support system and a higher emotional maturity. These things help them be more resilient to cyberbullying (Ngo et al., 2021).

Implications for Interventions

The study's conclusions have several ramifications for interventions meant to lessen cyberbullying and assist impacted adolescents. First, it is evident that high-risk groups, like those in Cluster 1, require focused interventions to meet their unique needs. Programs ought to emphasize helping participants build positive peer relationships, master emotional regulation, and have easy access to mental health resources (Simão et al., 2021; Stark et al., 2021; Tłuściak-Deliowska & Gubenko, 2020). It is also essential to support educational programs that encourage digital literacy and responsible online conduct (Azizah, 2023). These programs can equip adolescents with the skills they need to safely navigate the digital world, identify instances of cyberbullying, and use productive coping mechanisms. To establish safe spaces where adolescents feel comfortable reporting instances of cyberbullying and seeking assistance, schools and communities should work together (Elbedour et al., 2020). It is also crucial to include parents and other caregivers in initiatives to prevent cyberbullying. They can support their children more successfully if they are informed about the warning signs of cyberbullying and practical intervention techniques (Stuart et al., 2022).

CONCLUSION

This study emphasizes the varied aspects of cyberbullying in adolescents, exposing unique victimization, aggressive, and coping mechanisms. The results are consistent with previous research, highlighting the psychological effects of cyberbullying, the significance of social media, and the need for effective coping mechanisms. Through comprehension of these dynamics, interested parties can design focused interventions to assist impacted teenagers and establish more secure online spaces. Subsequent investigations ought to persist in probing the dynamic field of cyberbullying and enhance remediation strategies to cater to the requirements of contemporary adolescents. Although this study sheds light on the dynamics of cyberbullying among teenagers, more investigation is required to determine the long-term impacts of cyberbullying and the efficacy of different intervention techniques. Longitudinal research may provide insight into the ways that cyberbullying experiences affect adolescents' development over time and pinpoint the best times for interventions. The influence of new digital platforms and technologies on the development of cyberbullying behaviors should also be investigated in research. The techniques and environments of cyberbullying change along with technology, so prevention and intervention strategies must also change with time.

Author contributions: PM & PMW: conceptualized the study, collected data, conducted the analysis and contributed to the methodology and analysis sections; **GKS:** contributed the introduction and proofread the article; **JCMT & WW:** contributed the literature review, discussion, and conclusion. All authors approved the final version of the article.

Funding: This article was supported by SEGi University through the SEGi University Research Grant, titled 'Cyberbullying among adolescents in Klang Valley: Prevalence and predictors' (grant number: SEGIRF/2016-14/ADP-07/89).

Acknowledgments: The authors would like to thank the colleagues and previous co-researchers, Jaslina Tajuddin and Yew Wan Ping, for their invaluable contributions to the early stages of this study. Their insights and dedication greatly enriched the development of the research framework. The authors would also like to thank all the participants who generously shared their time and experiences, contributing invaluable data to this study as well as schoolteachers and counsellors who supported throughout the research project.

Ethics declaration: The authors declared that the study does not require ethics committee approval or other documentation since the study did not directly involve human or animal subjects related to physical or biological interventions; instead, humans were engaged in answering the surveys. The authors further declared that they have adhered to the highest ethical standards in academic publishing and written informed consents were obtained from the participants.

Declaration of interest: The authors declare no competing interest.

Data availability: Data generated or analyzed during this study are available from the authors on request.

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