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“I felt angry, but I couldn’t do anything about it”: a qualitative study of cyberbullying among Taiwanese high school students

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Abstract

Background: Cyberbullying is a growing public health concern threatening the well-being of adolescents in both developed and developing countries. In Taiwan, qualitative research exploring the experiences and perceptions of cyberbullying among Taiwanese young people is lacking.

Methods: We conducted in-depth interviews with a convenience sample of high school students (aged 16 to 18) from five schools in Taipei, Taiwan, without prior knowledge of their cyberbullying experiences. In total, 48 participants were interviewed.

Results: We found that the experience of cyberbullying is common, frequently occurs anonymously and publicly on unofficial school Facebook pages created by students themselves, and manifests in multiple ways, such as name-calling, uploading photos, and/or excluding victims from online groups of friends. Exclusion, which may be a type of cyberbullying unique to the Asian context, causes a sense of isolation, helplessness, or hopelessness, even producing mental health effects in the victims because people place the utmost importance on interpersonal harmony due to the Confucian values in collectivistic Asian societies. In addition, our study revealed reasons for cyberbullying that also potentially reflect the collectivistic values of Asian societies. These reasons included fun, discrimination, jealousy, revenge, and punishment of peers who broke school or social rules/norms, for example, by cheating others or being promiscuous.

Conclusions: Our findings reveal the pressing need for the Taiwanese school system to develop cyberbullying prevention programmes considering the nature and sociocultural characteristics of cyberbullying.

Keywords: Cyberbullying, Asian context, Social networking services, Qualitative research

Background

In recent years, with the rapid growth of information and communication technologies (ICTs), including the internet, social networking services (SNSs), and smartphones, a particular form of bullying referred to as *cyberbullying* has emerged. Past studies have documented the adverse health effects of traditional bullying on victims, including but not limited to psychosomatic problems [1], anxiety

and depression [2], and suicidal ideation and suicidal behaviours [3]. Cyberbullying is often characterized by anonymity and publicity [4–6] and may result in significantly more negative consequences than traditional bullying. Past studies have suggested that victims of cyberbullying experienced more distress and had a higher risk of suicide ideation and attempts than victims of traditional bullying at school [7–9].

Asia, with approximately 4.2 billion people, has the largest population in the world and has been experiencing exponential growth of ICT usage during the last few decades. One statistical report documented that internet usage in

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Asia has increased 1670% since 2000 [10]. In particular, the overall penetration of internet usage has exceeded 80% of the population in certain countries, such as Hong Kong (87.0%), Japan (93.3%), South Korea (92.6%), and Taiwan (87.9%) [11]. In this context, the pervasiveness of ICT usage is alarming considering the urgent and critical issue of cyberbullying in Asian countries [12]. Although this issue has received little attention, the phenomenon has been found to be pervasive among adolescents in Asia. Studies from Taiwan, China, South Korea, and Japan have shown prevalence rates ranging from 6.3 to 34.8% for cyberbullying perpetration and from 14.6 to 56.9% for cyberbullying victimization [13–16]. These studies suggest that factors such as gender [13–15], electronic media (instant messaging, chat rooms, websites and bulletin board systems, e-mail, cell phones, SNSs, etc.) [13, 14], academic achievement [14], internet usage time [14, 15], and prior traditional bullying experiences [14, 15] are associated with cyberbullying.

Many studies on cyberbullying have been conducted in Western countries [5, 7, 17–21] using both qualitative and quantitative approaches, whereas research on cyberbullying in Asian regions [13–15, 22], whether qualitative or quantitative, remains scarce. Furthermore, past studies on cyberbullying in Asia have predominately been conducted using a quantitative approach to analyse the prevalence and related factors regarding cyberbullying, yet adolescents' experiences and perceptions in the Asian context have not received much attention.

Cyberbullying is context-dependent, namely, influenced by the sociocultural environment [13]. Some studies have suggested that sociocultural factors should be considered to understand differences in the cyberbullying phenomenon between Asian and Western countries. For example, Shapka and Law (2013) found that ethnic differences between Canadian adolescents of East Asian and European descent were related to cyberbullying engagement [23]. Li (2008) found different patterns regarding cyberbullying experiences between Canadian and Chinese students, also suggesting that access to various ICTs may increase the risk of being involved in cyberbullying [24]. Furthermore, a short-term longitudinal study indicated cultural differences in cyberbullying between U.S. students and Japanese students [25].

A qualitative approach offers a useful means to explore the cyberbullying experiences of adolescents in the Asian social context in depth. This study employed a qualitative approach to explore the experiences and perceptions of cyberbullying among high school students in Taiwan.

Methods

Study design, participants, and setting

This is a qualitative study conducted between June and November 2016 using convenience sampling of high school students aged 16–18 from five high schools in

Taipei, Taiwan. Participants in this study were recruited without prior knowledge of their cyberbullying experiences either as victims or perpetrators owing to the difficulties of identifying the victims and perpetrators of cyberbullying as indicated in previous studies [5, 21]. Teachers announced the interview opportunity in class to help recruit student volunteers. Given the sensitive nature of the topic of cyberbullying, the teachers did not mention the word “bullying” in the announcement. They mentioned only that the researchers wanted to interview students about their internet usage experiences. Subsequently, potential student volunteers contacted the teachers privately to obtain more details about the interview (namely, that the interview would address their opinions, perceptions and experiences regarding cyberbullying) to decide whether to participate. If the students and their legal guardians both agreed, then the researchers arranged an interview time. This study relied on voluntary participation. All participants and their guardians received information about the study's purpose, its strict confidentiality, the voluntary nature of their participation, and their right to withdraw from the interview at any time. The participants and their guardians provided written informed consent prior to the interviews. Psychotherapy or mental health counselling was provided by the researcher during the study when requested by a participant. In addition, participants were referred to a hospital psychiatrist or clinical psychologist if they were found to be experiencing psychological distress or were identified as having severe suicidal ideation. We provided stationery and snacks to the students as tokens of appreciation for their time.

Data collection and analysis

Data were collected through in-depth interviews guided by a semi-structured questionnaire. All interviews were audio-recorded and conducted in Mandarin by the same researcher (first author), and each interview lasted 30 to 100 min. The interviews were conducted in a designated room at each school that was occupied only by the researcher and participant to ensure the participants' privacy and confidentiality. Prior to the interviews, the participants answered a short questionnaire including questions regarding sociodemographic characteristics (age, gender, etc.) and internet and ICT-related factors (internet usage time, tools to access the internet, etc.). The interviews explored the students' experiences and perceptions of cyberbullying. Table 1 displays the topics and items included in the in-depth interviews.

The interviews were transcribed verbatim and imported into QSR International's Nvivo10 software. To perform the analyses, we used investigator triangulation and thematic analysis, an approach that involves familiarization with the data through an iterative process of reading the

Table 1 Interview items to explore the experiences and perceptions of cyberbullying

Topic	Contents of questions
Notion of cyberbullying	• Have you ever heard about cyberbullying? • What is cyberbullying?
Cyberbullying experiences as a bystander	• Have you ever witnessed cyberbullying during your high school life? • Who cyberbullied who? Who was the victim? • When and where did cyberbullying happen? How? • What were the reasons for cyberbullying? • What behaviours do you consider cyberbullying? Why?
Cyberbullying experiences as a victim	• Have you ever been cyberbullied? • Who cyberbullied you? • When and where did cyberbullying happen to you? How? • What do think were the reasons for being cyberbullied? • How did you react to the cyberbullying?
Cyberbullying experiences as a perpetrator	• Have you ever cyberbullied someone? • When and where did cyberbullying happen? How? • What do you think were the reasons for cyberbullying?

transcripts, generating codes, and arranging them into larger categorical groups (subcategories, categories, and themes) until a saturated thematic map of the data is obtained [26]. We revised and refined the themes until we achieved a consensus.

Results

In total, 48 participants were interviewed [26 male students (54.2%) and 22 female students (45.8%)]. Most of the participants (77.1%) lived with both their parents, used a smartphone as a tool to access the internet (75.0%), and used the internet for at least 2 hours per day (66.7%) (Table 2).

Of the 48 participants, 12 students (25.0%) reported a personal history of being a victim of cyberbullying, and the majority of the victims [10 of 12 (83.3%)] also reported being witnesses. The remainder of the students (75.0%) reported witnessing cyberbullying by friends, classmates, or schoolmates; however, none of them reported ever being a perpetrator. We identified six main themes, which are presented below along with supporting quotes. In some instances, the quotes were slightly edited for fluency.

Theme 1: the sites of cyberbullying

Most participants [38 of 48 (79.2%)] reported that SNSs were the venues in which they were most likely to experience or witness cyberbullying, including unofficial school Facebook pages, personal Facebook pages, Instagram and Meteor (an SNS that is popular among Taiwanese high school students). In particular, they explained that

cyberbullying often emerged on unofficial school Facebook pages. These pages are unrestricted and are created by students themselves to anonymously express their feelings or complaints concerning someone or something related to their school. One of the victims stated:

"I saw that they verbally abused me on our unofficial school Facebook page, and many idiots (schoolmates) didn't know the truth, and then, they clicked the 'Like' button on that post. I felt angry that they agreed with the perpetrators. I couldn't do anything about it [angry face]." [16, M]

Some participants [10 of 48 (20.8%)] also reported instances of cyberbullying such as uploading photos without approval through instant messaging applications such as LINE (a popular app in Taiwan for instant communication). One participant said: *"She felt angry that her classmates downloaded her Facebook photos without permission and re-uploaded the photos without her approval to the LINE class group."* [17, F]

A few of the participants [4 of 48 (8.3%)], particularly boys, indicated that online gaming, specifically multiplayer or violent games, was another online context where they had witnessed or experienced cyberbullying. One victim said: *"They [the online game players] verbally abused me because my performance was poor. Then, they would command you to change the online game character. If you did not follow their requests, they would attack you repeatedly. I felt very uncomfortable when I played the game."* [17, M]

Theme 2: the features of cyberbullying

In the interviews, the participants reported some features of cyberbullying, including anonymity, publicity, and permanency, which result in negative feelings such as anger or sadness.

Anonymity

The majority of participants [32 of 48 (66.7%)] stated that cyberbullying was characterized by anonymity, indicating that perpetrators could attack victims but remain anonymous. According to the victims, nearly half of the victims [5 of 12 (41.7%)] stated that in their experience, they were cyberbullied anonymously. They mentioned that they felt powerless when being bullied online. This feeling was mostly related to the fact that the perpetrators were anonymous, precluding the victims from taking action to resolve the issue (for example, by removing inappropriate content from SNSs), as expressed in the following statements:

Table 2 Demographic characteristics of the participants

	Male (N = 26)	%	Female (N = 22)	%	Total (N = 48)	%
Age						
16	5	19.2	6	27.3	11	22.9
17	13	50.0	11	50.0	24	50.0
18	8	30.8	5	22.7	13	27.1
Family situation						
Living with both parents	21	80.8	16	72.7	37	77.1
Living with a single parent	4	15.4	5	22.7	9	18.8
Living with others	1	3.8	1	4.5	2	4.2
Device most frequently used to access the Internet						
Desktop computer	7	26.9	1	4.5	8	16.7
Laptop	2	7.7	2	9.1	4	8.3
Smartphone	17	65.4	19	86.4	36	75.0
Internet usage time						
School days (hours/per day)						
less than 0.5	2	7.7	1	4.5	3	6.3
0.5 to < 1	2	7.7	1	4.5	3	6.3
1 to < 2	6	23.1	4	18.2	10	20.8
2 to < 3	7	26.9	7	31.8	14	29.2
3 to < 4	5	19.2	4	18.2	9	18.8
4 to < 5	2	7.7	3	13.6	5	10.4
5 or more	2	7.7	2	9.1	4	8.3
Holidays (hours/per day)						
less than 0.5	2	7.7	0	0.0	2	4.2
0.5 to < 1	0	0.0	0	0.0	0	0.0
1 to < 2	5	19.2	1	4.5	6	12.5
2 to < 3	4	15.4	7	31.8	11	22.9
3 to < 4	7	26.9	4	18.2	11	22.9
4 to < 5	4	15.4	4	18.2	8	16.7
5 or more	4	15.4	6	27.3	10	20.8

Total percentages may differ from 100 due to rounding

“Someone attacked and verbally abused me online, and what he/she said was not the truth. It’s been hurtful to me. Things got worse, and some people believed what that person posted about me. I felt like I couldn’t defend myself, and whatever I said, people didn’t believe me.” [16, F]

“If the perpetrator is anonymous, you don’t know who he/she is, and you cannot ask him/her to delete the content [degrading photos or embarrassing videos].” [17, F]

In addition, some of the participants [11 of 48 (22.9%)] mentioned how the perpetrators remained anonymous on social media sites. For example, Crush Ninja was popular

among students for managing their own anonymous pages as well as public unofficial school Facebook pages to maintain anonymity or hide their IP addresses. One participant said: *“They [the perpetrators] verbally abused someone on our unofficial school Facebook page. However, their names were not shown on that page. They submitted their posts to the third-party platform (CrushNinja), and then the posts were submitted by the third-party platform without revealing their identities.” [18, M]*

This study found that an anonymous social media site called Meteor is highly popular among Taiwanese high school students. On this site, perpetrators can attack

victims without revealing their identities. One victim stated: *"Someone verbally abused me and my friend on Meteor. I felt very hurt. The post was anonymous and did not show who posted the message. I didn't know who attacked us."* [16, F]

Publicity

In addition, half of the participants [25 of 48 (52.1%)] frequently mentioned the public nature of cyberbullying, resulting in public exposure of the victims and easy engagement of other cyber bystanders as one of the participants described:

"Sometimes, they [the perpetrators] directly write your student number, and your classmates will recognize you through your student number and tag you [on Facebook]. Then, they would verbally abuse you jointly." [16, F]

Permanency

Some participants [12 of 48 (25.0%)] mentioned that they felt awful or hurt due to the permanency of cyberbullying on SNSs. From the victims' perspective, some victims [4 of 12 (33.3%)] felt angry that they could not remove demeaning or embarrassing content themselves. Additionally, a few participants [5 of 48 (10.4%)] felt terrified that once posted online, the content would remain there forever. The participants stated:

"I think our unofficial school Facebook page should be removed. Someone called me names on it. I felt very uncomfortable [angry face]." [18, F]

"The posts on our unofficial school Facebook page would remain online forever. Even if you later felt sorry about attacking the victims, you couldn't withdraw what you posted." [16, F]

"One of my classmates wanted to remove what she had posted on our unofficial school Facebook page. Although she contacted the manager of our unofficial school Facebook page, the manager did not remove the post." [16, F]

Theme 3: the types of cyberbullying

The participants reported that the most common type of cyberbullying was name-calling (gossiping) [38 of 48 (79.2%)], followed by posting photos [12 of 48 (25.0%)] and exclusion (isolation) [4 of 48 (8.3%)], as shown in the following statements:

Name-calling (gossiping)

"They [the perpetrators] created two accounts on Instagram. One was open to the public, and the other one was privately shared between a few good friends. They used the private account to gossip and call other classmates or schoolmates names." [17, F]

"She gossiped about me on her private Instagram account, and one of my classmates who followed her account took a screenshot of the malicious gossip and forwarded it to me." [16, F]

Posting photos

"I once witnessed someone intentionally posting a girl's photo using an anonymous account on our unofficial school Facebook page. He [or she] took the photo of the girl, uploaded it, and verbally abused her. I felt like s/he [the perpetrator] intentionally did it to hurt the girl." [17, F]

Exclusion (isolation)

The participants reported that to isolate them, perpetrators would exclude victims by creating a group on LINE that included all their classmates except for the victims. The participants stated:

"He is very bai-mu [a slang term in the local Taiwanese language used to describe an individual who does not understand a situation and then engages in inappropriate behaviour to annoy other people], so classmates dislike him, and he is not in our LINE class group; none of our classmates have included him in the group, although sometimes important class announcements are posted on the group [without informing him]." [17, F]

"Well, a girl was rude, so our classmates disliked her. They created a group (on LINE) to speak ill of her. All our classmates were included in that group except for her. I was also included in that group, although I didn't want to be. However, if I quit the group, it would be like I was on her side. So, I didn't know what to do." [17, F]

The overlap with traditional bullying

Although we did not explicitly ask about traditional bullying, we found an overlap between cyberbullying and traditional bullying. Some of the victims [4 of 12 (33.3%)] of cyberbullying also reported having experienced traditional bullying at school. They reported that they felt

sad for being bullied not only at school but also on the internet. One of the victims stated:

"When I was walking over, they [the classmates] called me bitch, and they often gossiped about me. I couldn't do anything because no one stood by my side [sad face]. If I fought back, they would attack me even more aggressively...Someone [publicly] insulted me [on Meteor, a highly popular SNS among Taiwanese high school students] and gossiped that I had sex with someone and called me a bitch." [16, F]

Theme 4: motivation for cyberbullying

The participants mentioned several reasons for cyberbullying, including fun, punishment, discrimination, jealousy, and revenge.

For fun

Nearly half of the participants [23 of 48 (47.9%)] reported that the most common reason for cyberbullying was "for entertainment or for fun." One participant stated:

"They felt that it was fun to post his [a classmate with emotional disorders] videos on the Facebook page." [18, M]

For punishment

Some participants [15 of 48 (31.3%)] reported that other schoolmates (or classmates) were annoyed because the victims did something wrong at school, such as cheating or being sexually promiscuous, or the victims were rude or *bai-mu*, which is why the victims were then bullied. The participants stated:

"A girl in our class was verbally abused on our unofficial school Facebook page because she cheated on an exam. She was depressed for a long time." [17, F]

"A girl was repeatedly attacked on our unofficial school Facebook page because she was hooking up with many guys at our school, and her real name was posted openly." [18, M]

"I saw that a schoolmate's name was posted and that he was verbally abused on our unofficial school Facebook page. I knew him because we were classmates in 10th grade. He is bai-mu and obnoxious. Many people hate him, including me." [18, M]

For revenge

Revenge as a reason for cyberbullying was mentioned by a few participants [5 of 48 (10.4%)]. For example, one of

the participants described an incident of cyberbullying that occurred in her class. A victim of traditional bullying could not tolerate his perpetrator's constant teasing of him in class, and the victim therefore took revenge on the perpetrator online. The participant stated:

"The boy thought that it was very funny to tease him [the victim]. In the beginning, I thought that it was funny, too. However, he made fun of him almost every class. It turned out that XXX [the victim's name] anonymously verbally abused the boy who always made fun of him on our unofficial school Facebook page." [16, F]

For discrimination

In a few instances [3 of 48 (6.3%)], minorities (sexual minorities and disabled students) at school were the targets of cyberbullying. Participants reported the following:

"I have been insulted [on Facebook Messenger] by my schoolmates because I'm homosexual. They called me the lady boy and told me that I'm disgusting." [17, F]

"We created a specific page for him [a student with emotional disorders] on Facebook to post his behaviours. [He (the victim)] cannot control his emotions... sometimes a video in which he was shouting was posted...." [18, M]

From jealousy

A few participants [2 of 48 (4.2%)] mentioned that some of the perpetrators were jealous of the victims' success in sports or academics as one of the participants described:

"Not only was he an athlete on the national team but his academic performance was also excellent. Some schoolmates felt that he was up on a high horse. So, they attacked him on our unofficial school Facebook page." [17, F]

Theme 5: ambiguity and context dependency

The notion of cyberbullying was not clear to many of the participants, which caused confusion regarding whether certain behaviours would be considered cyberbullying. Many participants [26 of 48 (54.2%)] found distinguishing between cyberbullying and "just having fun" on LINE or other SNSs difficult. This difficulty is illustrated in the following quotes:

"They posted my photo as the cover photo of our LINE class group, but I did not care because I thought they were just kidding." [17, M]

"He [an unfamiliar classmate] uploaded my photo, and I didn't like it. I'm not sure whether this behaviour could be called cyberbullying." [18, M]

In addition, the participants mentioned that whether a particular behaviour would be considered cyberbullying was based on the nature of the relationship of the involved students. They argued that between good friends, actions are interpreted as jokes, but these actions would be perceived as cyberbullying attacks if they came from unfamiliar people. For example, the participants explained: *"My sleeping photos have often been posted as the cover photos of our LINE class group since the 10th grade. However, I do not care. I know that they are kidding rather than trying to hurt me. Additionally, the classmates who always post my photos have a good relationship with me, so I feel that it's OK. If unfamiliar people [classmates or schoolmates] post my photos, I will demand that they remove the photos. It depends on the relationship with that person [to differentiate between jokes and cyberbullying]." [18, F]*

"They uploaded my photos on the LINE group. We were good friends, so I felt very amused. I thought they were just kidding." [16, M]

Theme 6: coping strategies of victims

Coping with cyberbullying seemed difficult; half of the victims [6 of 12 (50.0%)] reported that they ignored the bullying. However, some of the victims reported coping strategies, including talking with friends, expecting teachers to intervene, confrontation, and leaving the group.

Ignoring cyberbullying/taking no action

Half of the victims [6 of 12 (50.0%)] reported that they ignored cyberbullying or took no action when they experienced cyberbullying.

"They verbally abused me on our unofficial school Facebook page. I thought that they had nothing better to do and I just ignored it [cyberbullying]." [18, F]

"I felt angry, but I couldn't do anything about it [cyberbullying] since he/she remained anonymous. I could not figure out who attacked me." [17, F]

Talking with friends

Three of the 12 victims (25.0%) talked with friends to express their feelings. One victim said:

"I felt very angry, but I couldn't do anything about it. The one thing that I could do was talk to my friends.

My friends comforted me and told me not to take it so seriously." [18, F]

Expecting teachers to intervene

In a few instances [2 of 12 (16.7%)], the victims explained that responding to cyberbullying was difficult due to the anonymity of the perpetrators and expressed the hope that teachers could identify the perpetrators. However, they felt that teachers could not address cyberbullying since the perpetrators remained anonymous. One participant described the following:

"I think that the teachers should deal with cyberbullying. However, the teachers may not be able to find out who the perpetrator is due to anonymity." [18, F]

Confrontation

In a few cases [2 of 12 (16.7%)] where the victim knew the identity of the perpetrator, some victims felt angry or hurt and confronted the perpetrator(s) to demand the removal of demeaning content from SNSs. A victim stated:

"He [the classmate] uploaded my photo as his Facebook profile picture, but I demanded that he remove my photo." [18, M]

Leaving the group

Only one of the 12 victims (8.3%) mentioned she left a chat group in response to cyberbullying. She said:

"They [the schoolmates] were gossiping about me on the chat group on Facebook Messenger, but I didn't reply to the message and quit the chat group." [17, F]

Table 3 displays the percentage representations of the six themes.

Discussion

To our knowledge, this is the first qualitative study to explore cyberbullying among Taiwanese high school students. Most previous studies have used a quantitative approach [13, 22, 27]. However, due to the complexity and sensitivity of cyberbullying, quantitative studies may not fully capture the breadth and depth of the problem.

From the results, we found some similarities and differences between Asian and Western contexts. Regarding the sites of cyberbullying, similar to Western societies [28, 29], cyberbullying predominantly occurs through SNSs. However, our study highlighted that students consistently

mentioned cyberbullying experienced or witnessed on their unofficial school Facebook pages, which has rarely been reported in other studies. In Taiwan, many high school students have created unofficial school Facebook pages to express their feelings or complaints concerning someone or something at school. The anonymity and publicity [6, 30] of such sites were utilized to provide a cover for insults, humiliation, personal attacks, or assaults, allowing many cyber bystanders to attack victims jointly. The anonymity and publicity of cyberbullying, together with its permanency, create serious negative consequences that may cause long-term psychological effects for cyber victims.

With respect to the types of cyberbullying, name-calling (gossiping), posting photos, and an overlap with

traditional bullying have also been reported in the Western context [18, 31–34]. In this study, we found that students used SNSs (Instagram) to gossip or call other people names, implying that they may learn about name-calling (gossiping) via Instagram as victims or bystanders. We recommend that future studies should address this issue to clarify whether students are actively participating in cyberbullying.

In addition, we found that group exclusion was very common, as reported in other Asian societies [14, 35, 36]. This study found that students used group exclusion to isolate a victim, for example, by creating a LINE group including everyone except for the victim(s). Previous studies from China and Hong Kong have documented group

Table 3 Percentage of victims or participants indicating specific themes related to cyberbullying

Themes	N of participants or victims	% of participants or victims
The sites of cyberbullying		
SNSs	38	79.2
Instant messaging applications	10	20.8
Multiplayer online games	4	8.3
The features of cyberbullying		
Anonymity	32	66.7
Publicity	25	52.1
Permanency	12	25.0
The types of cyberbullying		
Name-calling (gossiping)	38	79.2
Posting photos	12	25.0
Exclusion (isolation)	4	8.3
Overlap with traditional bullying	4 (victims)	33.3 ^a
Motivation for cyberbullying		
For fun	23	47.9
For punishment	15	31.3
For revenge	5	10.4
For discrimination	3	6.3
From jealousy	2	4.2
Ambiguity and context dependency		
Difficulties in distinguishing between cyberbullying and having fun	26	54.2
Coping strategies of victims		
Ignoring/no action	6 (victims)	50.0 ^a
Talking with friends	3 (victims)	25.0 ^a
Expecting teachers to intervene	2 (victims)	16.7 ^a
Confrontation	2 (victims)	16.7 ^a
Leaving the group	1 (victim)	8.3 ^a

Some respondents (either victims or participants) responded more than once and therefore appear twice

^aPercentage of the victims

exclusion, including the use of online text to socially isolate victims [35] or kicking someone out of a chat room [14]. Such exclusion may cause feelings of isolation, helplessness, or hopelessness, producing mental health effects in victims of cyberbullying because people place the utmost importance on interpersonal harmony and a sense of belonging due to the Confucian values in collectivistic Asian societies [13, 37, 38].

Regarding the motivations for cyberbullying, fun [39], discrimination [40, 41], jealousy [42], and revenge [39, 41–43] were consistent with previous studies in Western societies. In addition, we found that punishment may be a significant motivation to cyberbully peers who break school rules, such as cheating, or social norms, such as traditional heterosexual roles [44] in Asian societies. In particular, group conformity is an important social rule in Asian society [38]; in this study, if students did something wrong or were different from others, as in the case of sexual minorities, they were easily targeted by other students.

In this study, we found that cyberbullying is ambiguous or highly context-dependent in Asian countries. Previous Western studies [20, 45] have mentioned “intention” as a critical criterion to distinguish cyberbullying from cyber jokes. However, our study showed that the distinction between cyberbullying and conventional jokes and pranks between friends was not clear to many students. Judgments regarding whether a particular act or behaviour could be considered cyberbullying were based on the closeness to or the nature of the relationship with the perpetrator. Therefore, most behaviours, however offensive, would be regarded as a joke or “*just for fun*” if they were performed by someone close because participants felt that such behaviours were not performed with the intent to hurt someone. This observation may explain why many high school students mentioned that cyberbullying was carried out for entertainment or fun. We suggest that in addition to the intention of the perpetrator, his or her relationship with peers can be used to define cyberbullying among adolescents in the Asian context. Additionally, power imbalance is an essential criterion for defining cyberbullying [45, 46]. Perpetrators may expose victims publicly, issuing psychological threats and causing the victims to feel powerless in the face of the potential cyber audience (based on the number of comments, likes, and shares) [47].

Regarding coping strategies, consistent with one study in China, most victims reported that they ignored the attacks [14]. This behaviour may indicate that passive coping strategies are predominantly adopted in Asian societies because these societies value interpersonal harmony and tolerance due to the social rules in relationships, again implying the core Confucian values in Asian contexts.

In contrast, active coping strategies, such as attempting to resolve problems or blocking a bully, have been commonly reported in Western countries [32, 48].

Although this study provided some insight into Taiwanese students’ experiences and perceptions of cyberbullying, we need to acknowledge some limitations. First, despite our efforts to ensure privacy during the interview, place participants at ease, and maintain strict confidentiality, students were reluctant to report being victims or perpetrators of cyberbullying (in the interviews, we found that a few participants initially spoke in the third person. However, they later spoke in the first person to disclose their stories). Due to the sensitive nature of the topic and the social desirability effect, we may have failed to capture some important aspects of cyberbullying in this study, especially the cyber perpetrators’ perspective. Second, voluntary participation may have introduced a self-selection bias.

Conclusions

The experience of cyberbullying appears to be common among high school students and occurs in multiple forms (name-calling, posting photos, exclusion from online groups, etc.) and on multiple platforms (Facebook and instant messaging applications). Our findings underscore the pressing need for the Taiwanese school system to take action to prevent and stop cyberbullying, including developing students’ and teachers’ skills and appropriate response strategies, considering the nature of cyberbullying and sociocultural characteristics in Taiwan.

Abbreviations

ICTs: Information and communication technologies; SNSs: Social networking services

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Author’s contributions

CW, MOK and MK conceived the study design. CW carried out the interviews. CW, MOK and MK discussed, revised and refined the themes. CW and PM drafted the manuscript, which was edited by TT, SS, MK and TN. MOK and CC helped supervise the whole process of the study. All authors read and approved the final manuscript.

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Availability of data and materials

This study is based on qualitative data, including observation field notes and interview transcripts. The participants did not consent to have their full transcripts shared publicly.

Ethics approval and consent to participate

This study was approved by the Kyoto University Graduate School and Faculty of Medicine Ethics Committee (R0537) and the Research Ethics Committee at National Taiwan University Hospital (201601074RIND). All participants and their guardians received information about the study purpose, its strict confidentiality and the voluntary nature of their participation as well as their right to withdraw from the interview at any

time. The participants and their guardians provided written informed consent prior to the interview.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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RESEARCH ARTICLE

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Overlap of traditional bullying and cyberbullying and correlates of bullying among Taiwanese adolescents: a cross-sectional study

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Abstract

Background: Due to the rapid development of information and communication technologies, cyberbullying has emerged as a threat to adolescents. This study aimed to investigate the prevalence and correlates among profiles of traditional bullying, cyberbullying, and combined bullying among Taiwanese high school students.

Methods: This cross-sectional study employed two-stage cluster sampling in Taipei City, Taiwan. In total, 2028 high school students completed an anonymous questionnaire between March and May 2018. Nominal logistic regression analysis was performed, adjusting for clustering, to examine the correlates of each type-role category of bullying.

Results: The prevalence rates of cyberbullying, traditional bullying, and combined bullying were 9.9, 13.3, and 9.4%, respectively, indicating that one-third of students were involved in one of these types of bullying; 48.7% of those involved in cyberbullying also experienced traditional bullying, and 41.5% of those involved in traditional bullying also experienced cyberbullying. In any type of bullying, not only being a victim but also being a bully/bully-victim was significantly associated with at least one mental health problem (serious psychological distress, self-harm, or suicidal ideation), except in the case of cyberbullying bullies/bully-victims. Internet abuse and alcohol use were more concentrated among bullies/bully-victims than victims for all types of bullying, and a similar trend was observed among types of schools and school climates, suggesting that specific behavioural circumstances or school backgrounds are associated with bullying perpetration.

Conclusions: Bullying is a prevalent and complex phenomenon among adolescents in Taiwan, where traditional bullying and cyberbullying frequently overlap and are likely to occur against specific backgrounds. These facts should be taken into account in future bullying prevention and support programmes in Taiwan.

Keywords: Traditional bullying, Cyberbullying, Combined bullying, Prevalence, Overlap, Risk factors

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Background

Bullying is a significant public health concern affecting the well-being of adolescents. Currently, as many as 246 million adolescents are estimated to suffer from school violence or bullying worldwide [1]. Bullying has a wide range of adverse health impacts for adolescents, such as depression [2], suicidal ideation, and suicidal behaviours [3].

With the rapid development and dissemination of information and communication technologies (ICTs), many adolescents use the internet and social networking services (SNSs) [4], which increases the opportunities for cyberbullying [5, 6]. Cyberbullying is defined as “bullying and harassment of others by means of new electronic technologies, primarily mobile phones and the internet” [7]. Compared with traditional bullying, cyberbullying has a unique nature with respect to publicity, anonymity, and the lack of supervision [8], which can lead to substantial psychological and psychiatric problems among victims [9, 10]. Furthermore, cyberbullying sometimes overlaps with traditional bullying and potentially leaves profound health impacts on victims. Previous studies have documented that adolescents exposed to two types of bullying are likely to suffer from higher levels of psychological distress than those involved in a single type of bullying [9, 11].

To date, most cyberbullying studies have been performed in Western societies and investigated cyberbullying's prevalence [12, 13], its overlap with traditional bullying [9, 14–19], and the risk factors associated with it [13, 20, 21]. However, the results are inconsistent regarding the extent of overlap between cyberbullying and traditional bullying: some studies [9, 14, 15, 19] indicated wide-ranging overlap, while others [17, 18, 22] reported a more limited overlap. Although cyberbullying is a complex social phenomenon, few studies have attempted to understand its correlates from an ecological point of view [21, 23].

Bullying is an issue of interpersonal relationships. Since Western and Asian societies differ in the nature of interpersonal relationships, as represented by individualism and collectivism, respectively, it is possible that the nature of cyberbullying may also differ between these two societies. However, cyberbullying studies have only recently started to be conducted in Asian countries, such as China [24], Hong Kong [25], and South Korea [26], and most are concentrated within the last five years. In Taiwan, only one up-to-date study on the relationship between cyberbullying and traditional bullying was conducted, in 2010 [27].

Given this background and the explosive expansion of SNS use among Taiwanese adolescents in the last decade, this study aims to update the information on cyberbullying among high school students in Taiwan. It pays

special attention to classifying bullying into traditional bullying, cyberbullying, or a combination of the two and comparing the correlate profiles from ecological points of view. These issues have never been explored in Asia, including Taiwan.

Methods

Study design, setting and participants

A cross-sectional study design was adopted. The target population consisted of high school students currently enrolled in grades 10 and 11 in Taipei City, Taiwan. Two-stage cluster sampling was performed. In the first stage, 30 high schools were randomly selected from a list of 67 high schools, and 22 schools (73.3%) decided to participate. Non-participation reasons were no responses and time constraints.

In the second stage, 2 classes were randomly selected from grades 10 and 11 of each school, and 3270 students were eligible to participate in this study. The number of attending participants between March and May in 2018 determined the sample size.

Data collection

An anonymous paper-based questionnaire was used for data collection. Because of the sensitivity of the research topic, the participants were asked to complete the anonymous paper-based questionnaire at home to protect their privacy and avoid peer pressure. The structured questionnaire included the following variables: (1) bullying: traditional bullying and cyberbullying; (2) individual factors: demographic factors, academic level, internet usage time, internet addiction, substance use, and psychological and psychiatric factors; (3) family factors: living situation, parental internet supervision, and number of days eating dinner with family per week; and (4) school/social factors: type of school, school climate, and perceived social support. In this study, traditional and cyberbullying were dependent variables, and the remaining variables were independent variables.

Measures

Survey instrument

The questionnaire in this study was developed based on the results of our prior qualitative study in 2016 [28] as well as a careful review of the international literature that included Taiwan [12, 27, 29–36] (the detailed questionnaire please see Additional file 1). We conducted two pilot studies (unpublished works) to improve the reliability and face validity of the questionnaire. The first phase pilot study was conducted in two high schools with 58 student participants recruited through convenience sampling in June 2017. Since some questions showed poor reliability and were found to be difficult to understand, we modified the questionnaire and tested it

in the second phase of the pilot study with 89 students from two high schools recruited through convenience sampling from October to November 2017. This study showed that the test-retest reliability values (1-week interval) of the questionnaire measured by means of intraclass correlation coefficients (ICCs) were 0.48 and 0.75 for the victimisation and perpetration of traditional bullying, respectively, and 0.54 and 0.60 for the victimisation and perpetration of cyberbullying. In addition, other study variables showed Kappa coefficients between 0.51 and 1.00 for categorical variables and ICCs between 0.75 and 0.93 for continuous variables. These results demonstrated moderate to excellent reliability of the questionnaire [37, 38].

Traditional bullying

The revised Olweus Bully/Victim Questionnaire [29] was adopted to measure both victimisation and perpetration of traditional bullying. The participants were first asked how frequently they had experienced traditional victimisation in the previous 2 months. The following questions were included: “How often have other student(s) (1) called you mean names, made fun of you or teased you in a hurtful way; (2) excluded you from their group of friends or completely ignored you; (3) hit, kicked, pushed or shoved you; or (4) told lies or spread false rumours about you and tried to make others dislike you?” Then, the participants were asked how often they had perpetrated the above behaviours towards others. Each item was evaluated on a 5-point scale as follows: “hasn’t happened”, “once or twice”, “2–3 times a month”, “about once a week”, and “several times a week”. The participants who answered “once or twice” or more frequently to any of the items related to traditional victimisation were categorised as victims of traditional bullying. Similarly, the participants who answered “once or twice” or more frequently to any questions related to traditional bullying perpetration were categorised as bullies involved in traditional bullying. The participants who were simultaneously victims and bullies were categorised as bully-victims of traditional bullying. In this study, Cronbach’s alphas were 0.67 for victimisation and 0.71 for perpetration.

Cyberbullying

The questions related to cyberbullying were based on a previous study performed in Taiwan [27] and our qualitative study findings in 2016 [28]. The questionnaire included seven items related to cyberbullying victimisation and perpetration. The participants were asked how frequently they had experienced cyber victimisation in the previous 2 months: “How often has someone (1) made or posted rude comments to or about you online; (2) posted embarrassing pictures or videos of you online; (3)

spread rumours about you online; (4) posted your personal information online; (5) insulted you publicly online; (6) made threatening comments to hurt you online; or (7) excluded or ignored you online on purpose?” Subsequently, they were asked how often they had perpetrated the above seven behaviours towards others. Each item was evaluated on a 5-point scale as follows: “hasn’t happened”, “once or twice”, “2–3 times a month”, “about once a week”, and “several times a week”. The participants who answered “once or twice” or more frequently to any questions related to cyber victimisation were categorised as victims of cyberbullying. Similarly, the participants who answered “once or twice” or more frequently to any questions related to cyberbullying perpetration were categorised as cyberbullies. The participants who were simultaneously victims and bullies were categorised as bully-victims involved in cyberbullying. Cronbach’s alphas were 0.70 for victimisation and 0.66 for perpetration.

Individual factors

Demographic factors The participants were asked about their age and gender.

Academic level To measure academic level, the participants were asked, “How do you rate your academic performance in class?” The responses included “the top few”, “above average”, “around average”, “below average”, and “I don’t know”. The responses were recoded into “above average” and “average or below average” for analysis.

Internet usage time The participants were asked the following question: “On an average school day, how many hours do you play computer games or smartphone games or use a computer for something that is not school work? (Count time spent on devices such as an iPad or other tablet, a smartphone, texting apps, YouTube, Instagram, Facebook, LINE, WhatsApp, or other social media)” [30]. The responses included “0 hours per day”, “less than 1 hour per day”, “between 1 and 2 hours per day”, “between 2 and 3 hours per day”, “between 3 and 4 hours per day”, “between 4 and 5 hours per day”, and “more than 5 hours per day”. The responses were categorised as “less than 3 hours per day” or “3 hours or more per day” for the analysis.

Internet addiction Young’s Internet Addiction Diagnostic Questionnaire [31] was adopted to measure internet addiction. This scale contains eight items answered with “Yes” or “No” responses. The responses were recorded as “no addiction” (0–2 items) or “addiction” (3–8

items). Kuder-Richardson formula 20 was 0.69 in this study.

Substance use (smoking and alcohol use) The participants were asked the following questions: “During the past 30 days, on how many days did you smoke a cigarette?” [30] and “During the past 30 days, on how many days did you use alcohol?” The responses included “0 days”, “1 or 2 days”, “3 to 5 days”, “6 to 9 days”, “10 to 19 days”, “20 to 29 days”, and “All 30 days” [30]. The responses were recoded as “Yes” (other options) or “No” (0 days) for analysis.

Psychological and psychiatric factors—self-esteem, psychological distress, self-harm, and suicidal ideation Self-esteem was assessed by the Rosenberg Self-Esteem Scale [32], which contains ten items that measure individuals’ self-esteem (Cronbach’s alpha was 0.87 in this study). The short version of the Kessler Psychological Distress Scale (six items) [33] was used to assess the psychological distress of the participants (Cronbach’s alpha was 0.82 in this study). To measure self-harm and suicidal ideation, the participants were asked the following questions: “Have you ever self-harmed in the past 30 days?” and “Have you ever seriously considered attempting suicide in the past 30 days?”

Family factors

Living situation The participants were asked whether they lived with both parents. The responses included “Yes, living with both parents”, “No, living with a single parent”, or “No, living with others”.

Parental internet supervision The participants were asked whether their parents or guardians supervised their internet use. The responses included “Yes” and “No”.

Dinner days with family To examine how frequently they ate dinner with their parents, the participants were asked the following: “During an average week, how many days do you eat evening meals with your family (0 to 7 days)?” [34]. The responses were recorded as “0–4 times” or “5–7 times”.

School/social factors

Type of schools The participants were recruited from academic high schools and vocational high schools.

School climate The school climate was assessed using nine items from the California School Climate and

Safety Survey (CSCSS) [12, 35, 39, 40]. Each item was evaluated on a 5-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). The total scores ranged from 9 to 45, with higher scores indicating a perception of a positive school climate. In this study, Cronbach’s alpha was 0.89.

Perceived social support The Multidimensional Scale of Perceived Social Support (MSPSS) [36] was used in the current study. The MSPSS includes 12 items that measure perceived social support from family, friends, and a significant other. Each item was evaluated on a 7-point Likert scale ranging from “very strongly disagree” (1) to “very strongly agree” (7). The total scores were aggregated and then divided by 12. The scores ranged from 1 to 7, with higher scores indicating higher social support. Cronbach’s alpha was 0.91 in this study.

Data analyses

The data were statistically analysed using IBM SPSS Statistics software version 22 (PASW) for Windows (SPSS, Inc., Chicago, Illinois, USA). Univariate analysis was performed to examine the descriptive statistics (central tendency, dispersion, frequency distribution table, etc.) of all study variables.

Distribution of the participants by type of bullying and role in bullying

The participants were classified as bullies, victims, bully-victims, or uninvolved for cyberbullying and traditional bullying. Participants who had been involved in both types of bullying were grouped into the “combined bullying group”. The prevalence rates of cyberbullying, traditional bullying and their combination were assessed in this study.

Characteristics of participants by type of bullying and role in bullying

Since the characteristics of the bully-victims were much more similar to those of the bullies than those of the victims, bully-victims and bullies were collapsed into the category of “bullies/bully-victims”. The participants placed in the “involved group” represented students who had played any role in any type of bullying, as opposed to students who did not play any role in any type of bullying (uninvolved group). Bivariate analyses of the involved group and the uninvolved group were performed using the chi-square test.

Correlated profiles by the type of bullying and role in bullying

Multinomial logistic regressions were performed to examine the variables associated with bullying roles (with the uninvolved group as a reference). Considering

the effects of clustering by schools and classrooms, univariate and multinomial logistic regressions were performed using the SPSS Complex Samples module to correct the estimates of standard errors and significance tests on the regression. In this study, missing values for each variable were less than 2%, and listwise deletion was performed to address missing data.

The analysis was performed in the following steps to build a model for multinomial logistic regression. First, univariate logistic regression was performed as a pre-selection strategy to test all variables. Variables associated with bullying (P level less than 0.2) were considered candidates for inclusion in multinomial logistic regressions [41]. In this step, age, self-esteem, academic level, living situation, parental internet supervision, and perceived social support were not significant at the 0.2 level.

Second, the first multinomial logistic regression was performed using all variables the identified by the first step. According to this model, the variables were examined for significance using the P -value (< 0.05) determined by Wald statistics [41]. Internet usage time ($P = 0.265$), smoking ($P = 0.409$), suicidal ideation ($P = 0.086$), and family dinner days ($P = 0.165$) were not significant at the 0.05 level. Considering that suicidal ideation is epidemiologically important [3, 42] to bullying, it was not eliminated from the final model.

Based on these selective strategies, gender, internet addiction, alcohol use, self-harm, suicidal ideation, types of school and school climate were included as independent variables in the final model. In addition, collinearity diagnostics were assessed among independent variables to take into account multicollinearity in the final model. The variance inflation factor (VIF) values were under two for all variables, indicating that multicollinearity was not a concern in the final model.

Results

Of the 3270 eligible students, 2111 participated in the survey (response rate = 64.5%). Of the 2111 returned questionnaires, we excluded invalid questionnaires based on the following criteria: (1) response bias: the participants completed the questionnaires by filling in the same answer repeatedly or filling in answers according to a pattern; (2) incomplete questionnaires; and (3) missing values for the outcome variables: participants submitted questionnaires with incomplete information for the traditional bullying and cyberbullying items. Finally, 2028 questionnaires were analysed in this study, with an effective response rate of 62.0%.

Prevalence and overlap of cyberbullying and traditional bullying

Overall, 32.6% (661/2028) of the participants reported they had been involved in bullying. The prevalence rates

of cyberbullying and traditional bullying were 19.3% (392/2028) and 22.7% (460/2028), respectively. However, considering the overlap between the two types of bullying, the prevalence rates of cyberbullying, traditional bullying and combined bullying were 9.9% (201/2028), 13.3% (269/2028), and 9.4% (191/2028), respectively. In addition, 48.7% of the participants involved in cyberbullying had experienced traditional bullying, while 41.5% of those involved in traditional bullying had experienced cyberbullying.

Distribution of the participants by type of bullying and role in bullying

The distributions of cyberbullying, traditional bullying, and combined bullying by bullying roles are shown in Table 1. Of those who were involved in bullying, 40.7% were involved in traditional bullying, followed by cyberbullying (30.4%) and combined bullying (28.9%). Regarding the role in bullying, victims represented the largest population (47.9%), followed by bully-victims (34.6%) and bullies (17.5%). A similar pattern was observed for cyberbullying and traditional bullying; however, it was most prominent in cyberbullying, in which 67.7% (136/201) of the sample were victims. Similarly, of the participants involved in traditional bullying, 45.4% (122/269) were victims, followed by bully-victims (29.7%) and bullies (24.9%).

Characteristics of participants by type of bullying and role in bullying

Table 2 describes the characteristics of participants by type-role categories of bullying.

Individual factors

The age of the participants ranged from 14 to 20 years, with a mean age of 16.2 (SD 0.71). Gender distribution varied according to the type-role category of bullying: the roles of victims of cyberbullying and combined bullying were dominated by women (61.0 and 70.7%, respectively), while the roles of bullies/bully-victims of traditional bullying were dominated by men (68.7%). Self-reported academic level was not related to any type-role category of bullying.

The time of internet use was generally greater among the students involved in all type-role categories of

Table 1 Role distribution by type of bullying

Type of bullying	Bullying role			Total
	Victim	Bully	Bully-victim	
Cyberbullying	136 (20.6)	29 (4.4)	36 (5.4)	201 (30.4)
Traditional bullying	122 (18.5)	67 (10.1)	80 (12.1)	269 (40.7)
Combined bullying	58 (8.8)	20 (3.0)	113 (17.1)	191 (28.9)
Total	316 (47.9)	116 (17.5)	229 (34.6)	661 (100.0)

Table 2 Distribution of individual, familial and school/social factors by type-role categories of bullying

Variables	Total (N = 2028) n (%)	Traditional bullying		Cyberbullying		Combined bullying		Involved in any types of bullying (N = 661) n (%)	Uninvolved (N = 1367) n (%)	P- value ^a
		Victims (N = 122) n (%)	Bullies/bully-victims (N = 147) n (%)	Victims (N = 136) n (%)	Bullies/bully-victims (N = 65) n (%)	Victims (N = 58) n (%)	Bullies/bully-victims (N = 133) n (%)			
Individual factors										
Age										
14–16	1290 (63.6)	82 (67.2)	105 (71.4)	89 (65.4)	38 (58.5)	34 (58.6)	81 (60.9)	429 (64.9)	861 (63.0)	0.446
17–20	731 (36.0)	40 (32.8)	42 (28.6)	46 (33.8)	27 (41.5)	24 (41.4)	52 (39.1)	231 (34.9)	500 (36.6)	
Missing	7 (0.4)			1 (0.7)				1 (0.2)	6 (0.4)	
Gender										
Male	979 (48.3)	61 (50.0)	101 (68.7)	53 (39.0)	37 (56.9)	17 (29.3)	77 (57.9)	346 (52.3)	633 (46.3)	0.012
Female	1043 (51.4)	61 (50.0)	45 (30.6)	83 (61.0)	28 (43.1)	41 (70.7)	56 (42.1)	314 (47.5)	729 (53.3)	
Missing	6 (0.3)		1 (0.7)					1 (0.2)	5 (0.4)	
Academic level										
Above average	875 (43.1)	49 (40.2)	74 (50.3)	53 (39.0)	26 (40.0)	25 (43.1)	50 (37.6)	277 (41.9)	598 (43.7)	0.425
Average or below	1152 (56.8)	73 (59.8)	73 (49.7)	83 (61.0)	39 (60.0)	33 (56.9)	83 (62.4)	384 (58.1)	768 (56.2)	
Missing	1 (0.1)							1 (0.1)		
Internet usage time per day										
< 3 h	1135 (56.0)	66 (54.1)	79 (53.7)	72 (52.9)	28 (43.1)	34 (58.6)	57 (42.9)	336 (50.8)	799 (58.4)	0.001
≥ 3 h	882 (43.5)	55 (45.1)	68 (46.3)	64 (47.1)	37 (56.9)	24 (41.4)	75 (56.4)	323 (48.9)	559 (40.9)	
Missing	11 (0.5)	1 (0.8)					1 (0.8)	2 (0.3)	9 (0.7)	
Internet addiction										
No addiction	881 (43.4)	51 (41.8)	55 (37.4)	55 (40.4)	27 (41.5)	13 (22.4)	33 (24.8)	234 (35.4)	647 (47.3)	< 0.001
Addiction	1147 (56.6)	71 (58.2)	92 (62.6)	81 (59.6)	38 (58.5)	45 (77.6)	100 (75.2)	427 (64.6)	720 (52.7)	
Smoking (past 30 days)										
No	1939 (95.6)	117 (95.9)	135 (91.8)	133 (97.8)	59 (90.8)	57 (98.3)	113 (85.0)	614 (92.9)	1325 (96.9)	< 0.001
Yes	85 (4.2)	4 (3.3)	12 (8.2)	3 (2.2)	6 (9.2)	0 (0.0)	19 (14.3)	44 (6.7)	41 (3.0)	
Missing	4 (0.2)	1 (0.8)				1 (1.7)	1 (0.8)	3 (0.5)	1 (0.1)	
Alcohol use (past 30 days)										
No	1510 (74.5)	98 (80.3)	92 (62.6)	93 (68.4)	42 (64.6)	41 (70.7)	69 (51.9)	435 (65.8)	1075 (78.6)	< 0.001
Yes	513 (25.3)	23 (18.9)	55 (37.4)	43 (31.6)	23 (35.4)	17 (29.3)	64 (48.1)	225 (34.0)	288 (21.1)	
Missing	5 (0.3)	1 (0.8)						1 (0.2)	4 (0.3)	

Table 2 Distribution of individual, familial and school/social factors by type-role categories of bullying (Continued)

Variables	Total (N = 2028) n (%)	Traditional bullying		Cyberbullying		Combined bullying		Involved in any types of bullying (N = 661) n (%)	Uninvolved (N = 1367) n (%)	P- value ^a
		Bullies/bully-victims		Bullies/bully-victims		Bullies/bully-victims				
		Victims	n (%)	Victims	n (%)	Victims	n (%)			
Self-esteem										
Low (< 15)	1504 (74.2)	100 (82.0)	111 (75.5)	103 (75.7)	50 (76.9)	46 (79.3)	101 (75.9)	511 (77.3)	993 (72.6)	0.009
Moderate to high (≥15)	493 (24.3)	21 (17.2)	30 (20.4)	32 (23.5)	14 (21.5)	10 (17.2)	29 (21.8)	136 (20.6)	357 (26.1)	
Missing	31 (1.5)	1 (0.8)	6 (4.1)	1 (0.7)	1 (1.5)	2 (3.5)	3 (2.3)	14 (2.1)	17 (1.2)	
Psychological distress										
No serious distress (<13)	1400 (69.0)	73 (59.8)	84 (57.1)	78 (57.4)	44 (67.7)	32 (55.2)	67 (50.4)	378 (57.2)	1022 (74.8)	< 0.001
Yes (≥13)	628 (31.0)	49 (40.2)	63 (42.9)	58 (42.6)	21 (32.3)	26 (44.8)	66 (49.6)	283 (42.8)	345 (25.2)	
Self-harm										
No	1895 (93.4)	112 (91.8)	122 (83.0)	128 (94.1)	60 (92.3)	46 (79.3)	120 (90.2)	588 (89.0)	1307 (95.6)	< 0.001
Yes	132 (6.5)	10 (8.2)	25 (17.0)	8 (5.9)	5 (7.7)	12 (20.7)	13 (9.8)	73 (11.0)	59 (4.3)	
Missing	1 (0.1)								1 (0.1)	
Suicidal ideation										
No	1887 (93.0)	106 (86.9)	130 (88.4)	127 (93.4)	61 (93.8)	49 (84.5)	111 (83.5)	584 (88.4)	1303 (95.3)	< 0.001
Yes	141 (7.0)	16 (13.1)	17 (11.6)	9 (6.6)	4 (6.2)	9 (15.5)	22 (16.5)	77 (11.6)	64 (4.7)	
Family factors										
Living situation										
Both parents	1668 (82.2)	99 (81.1)	119 (81.0)	104 (76.5)	49 (75.4)	48 (82.8)	109 (82.0)	528 (79.9)	1140 (83.4)	0.092
Single parent	310 (15.3)	22 (18.0)	25 (17.0)	27 (19.9)	14 (21.5)	7 (12.1)	17 (12.8)	112 (16.9)	198 (14.5)	
With others	49 (2.4)	1 (0.8)	3 (2.0)	5 (3.7)	2 (3.1)	3 (5.2)	7 (5.3)	21 (3.2)	28 (2.1)	
Missing	1 (0.1)								1 (0.1)	
Parental internet supervision										
No	699 (34.5)	42 (34.4)	51 (34.7)	43 (31.6)	28 (43.1)	15 (25.9)	52 (39.1)	231 (34.9)	468 (34.2)	0.785
Yes	1319 (65.0)	79 (64.8)	96 (65.3)	93 (68.4)	37 (56.9)	43 (74.1)	80 (60.2)	428 (64.8)	891 (65.2)	
Missing	10 (0.5)	1 (0.8)					1 (0.8)	2 (0.3)	8 (0.6)	
Dinner days with family per week										
0–4 times	1078 (53.2)	65 (53.3)	84 (57.1)	78 (57.4)	42 (64.6)	35 (60.3)	91 (68.4)	395 (59.8)	683 (50.0)	< 0.001
5–7 times	938 (46.3)	56 (45.9)	62 (42.2)	58 (42.6)	23 (35.4)	23 (39.7)	40 (30.1)	262 (39.6)	676 (49.5)	
Missing	12 (0.6)	1 (0.8)	1 (0.7)				2 (1.5)	4 (0.6)	8 (0.6)	

Table 2 Distribution of individual, familial and school/social factors by type-role categories of bullying (Continued)

Variables	Total (N = 2028) n (%)	Traditional bullying		Cyberbullying		Combined bullying		Involved in any types of bullying (N = 661) n (%)	Uninvolved (N = 1367) n (%)	P- value ^a
		Victims (N = 122) n (%)	Bullies/bully-victims (N = 147) n (%)	Victims (N = 136) n (%)	Bullies/bully-victims (N = 65) n (%)	Victims (N = 58) n (%)	Bullies/bully-victims (N = 133) n (%)			
School/social factors										
Types of school										
Academic	1573 (77.6)	94 (77.0)	87 (59.2)	116 (85.3)	47 (72.3)	51 (87.9)	91 (68.4)	486 (73.5)	1087 (79.5)	0.002
Vocational	455 (22.4)	28 (23.0)	60 (40.8)	20 (14.7)	18 (27.7)	7 (12.1)	42 (31.6)	175 (26.5)	280 (20.5)	
School climate										
Positive (> 32)	1491 (73.5)	85 (69.7)	98 (66.7)	99 (72.8)	41 (63.1)	32 (55.2)	72 (54.1)	427 (64.6)	1064 (77.8)	< 0.001
Negative (≤32)	537 (26.5)	37 (30.3)	49 (33.3)	37 (27.2)	24 (36.9)	26 (44.8)	61 (45.9)	234 (35.4)	303 (22.2)	
Perceived social support										
Low (1–2.9)	35 (1.7)	4 (3.3)	5 (3.4)	1 (0.7)	1 (1.5)	1 (1.7)	2 (1.5)	14 (2.1)	21 (1.5)	0.009
Moderate (3–5)	840 (41.4)	53 (43.4)	64 (43.5)	57 (41.9)	34 (52.3)	32 (55.2)	63 (47.4)	303 (45.8)	537 (39.3)	
High (5.1–7)	1153 (56.9)	65 (53.3)	78 (53.1)	78 (57.4)	30 (46.2)	25 (43.1)	68 (51.1)	344 (52.0)	809 (59.2)	

The total percentages may differ from 100 due to rounding

^aP-values are from the chi-square test between the involved group and the uninvolved group

bullying compared to that of students who were uninvolved in bullying. The proportion of students using the internet 3 hours or more a day was significantly higher in the involved group (48.9%) than in the uninvolved group (40.9%). A similar pattern was observed for internet addiction, albeit with greater proportions (64.6% in the involved group vs. 52.7% in the uninvolved group).

Smoking was generally low among students (4.2% overall). However, there was a clear pattern showing that the proportion of students who smoked was higher (approximately 10%) in the bully/bully-victim groups for all types of bullying, while the proportion among victims ranged from 0 to 3.3%, close to or even lower than that of the uninvolved group (3.0%). Alcohol use was much more prevalent (25.3% overall) than smoking but showed a similar pattern of concentration, being more prevalent in the bully/bully-victim groups than in the victim groups.

Mental health problems were generally more prevalent in the involved group than in the uninvolved group. The proportions of students who experienced low self-esteem (below 15 points), serious psychological distress (13 points or more), self-harm, and suicidal ideation were all significantly greater in the involved group than the uninvolved group (77.3% vs. 72.6%, 42.8% vs. 25.2%, 11.0% vs. 4.3%, and 11.6% vs. 4.7%, respectively). Students with low self-esteem were most prevalent among the group of victims of traditional bullying, and serious psychological distress, self-harm, and suicidal ideation were most prevalent among the groups of combined bullying, except for self-harm in the bully/bully-victim group. Students experiencing self-harm and suicidal ideation were least prevalent among the cyberbullying groups of.

Family factors

With regard to living situations and parental internet supervision, no significant difference was observed between the involved and uninvolved groups. However, the proportion of the students who had dinner with their family four times or less per week was generally greater among all type-role categories of bullying, with the difference between involved and uninvolved groups being statistically significant.

School/social factors

Irrespective of the type of bullying, the proportion of vocational high school students in the bully/bully-victim group was at least twice as large as that in the victim group. On the other hand, negative school climate (32 points or less) was generally more prevalent in all type-role categories of bullying (35.4% overall) than in the uninvolved group (22.2%), with a particular concentration (approximately 45%) among subgroups of combined bullying. The number of students with a high level

of social support (5.1 points or more) was lower in all type-role categories of bullying (52.0% overall) than in the uninvolved group (59.2%).

Correlate profiles by the type and role of bullying

Table 3 shows the results of the multinomial logistic regression analysis using the Complex Samples module of SPSS with the uninvolved group as a reference. From this analysis, being a victim of traditional bullying was found to be significantly associated with serious psychological distress (OR 1.74) and suicidal ideation (OR 2.34), suggesting that this type of bullying has a potent mental health impact on victims that may lead even to suicide. Being a bully/bully-victim of traditional bullying was also associated with psychological distress (OR 1.91) and self-harm (OR 4.01) as well as being male (OR 2.80), being addicted to the internet (OR 1.46), engaging in alcohol use (OR 1.88), being a vocational school student (OR 2.43), and having a negative school climate (OR 1.55) with statistical significance. Such findings suggested that students with such demographic and behavioural backgrounds and educational environments were more likely to be bullies/bully-victims of traditional bullying.

In cyberbullying, being a victim was significantly associated with alcohol use (OR 1.68) and serious psychological distress (OR 1.98) but not with suicidal ideation, while being a bully/bully-victim was significantly associated with alcohol use (OR 1.87) and negative school climate (OR 1.95).

In combined bullying, being a victim was significantly associated with internet addiction (OR 2.60) and negative school climate (OR 2.69) and strongly associated with self-harm (OR 3.55), whereas being a bully/bully-victim showed, like traditional bullying, a broad correlate profile associated with psychological distress (OR 2.08) and suicidal ideation (OR 2.43) as well as with being male (OR 1.79), experiencing internet addiction (OR 2.61), using alcohol (OR 2.90), being a vocational school student (OR 1.83), and experiencing a negative school climate (OR 2.58). These findings suggest that the background/environmental factors of bullies/bully-victims are similar to those of traditional bullying, but that students in this role category likely have more serious mental health situations than those in the traditional bullying category.

Discussion

This study provides updated information on the current situation of cyberbullying, traditional bullying, and their overlap (combined bullying) among Taiwanese high school students in Taipei. We compared the correlate profiles across the type-role categories of bullying from

Table 3 Multivariate correlates by type-role category of bullying with uninvolved group as a reference

Variables	Traditional bullying				Cyberbullying				Combined bullying			
	Victims (N = 122)		Bullies/bully-victims (N = 147)		Victims (N = 136)		Bullies/bully-victims (N = 65)		Victims (N = 58)		Bullies/bully-victims (N = 133)	
	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value	AOR (95% CI)	P-value
Gender												
Female	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Male	1.28 (0.84,1.95)	0.244	2.80 (2.00,3.91)	< 0.001	0.83 (0.54,1.30)	0.405	1.49 (0.90,2.47)	0.115	0.62 (0.32,1.18)	0.138	1.79 (1.17,2.73)	0.010
Internet addiction												
No addiction	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Addiction	1.17 (0.84,1.63)	0.325	1.46 (1.02,2.08)	0.041	1.15 (0.74,1.78)	0.529	1.28 (0.78,2.11)	0.319	2.60 (1.36,4.97)	0.006	2.61 (1.63,4.20)	< 0.001
Alcohol use												
No	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Yes	0.79 (0.52,1.21)	0.257	1.88 (1.33,2.64)	0.001	1.68 (1.13,2.50)	0.012	1.87 (1.09,3.22)	0.026	1.47 (0.86,2.50)	0.151	2.90 (1.98,4.26)	< 0.001
Psychological distress												
No serious distress	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Yes	1.74 (1.16,2.61)	0.009	1.91 (1.27,2.88)	0.003	1.98 (1.36,2.87)	0.001	1.27 (0.74,2.20)	0.368	1.25 (0.66,2.37)	0.476	2.08 (1.33,3.24)	0.003
Self-harm												
No	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Yes	1.20 (0.57,2.54)	0.615	4.01 (2.31,6.94)	< 0.001	0.98 (0.46,2.09)	0.951	1.78 (0.60,5.24)	0.282	3.55 (1.74,7.27)	0.001	1.24 (0.62,2.49)	0.525
Suicidal ideation												
No	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Yes	2.34 (1.28,4.27)	0.008	1.32 (0.70,2.49)	0.377	0.96 (0.46,2.00)	0.913	0.94 (0.33,2.66)	0.905	1.46 (0.56,3.83)	0.420	2.43 (1.41,4.18)	0.003
Type of school												
Academic	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	
Vocational	1.18 (0.71,1.96)	0.502	2.43 (1.52,3.90)	0.001	0.74 (0.43,1.29)	0.277	1.43 (0.81,2.52)	0.204	0.68 (0.28,1.67)	0.381	1.83 (1.10,3.06)	0.023
School climate												
Negative	1.41 (0.80,2.46)	0.220	1.55 (1.04,2.29)	0.032	1.19 (0.80,1.76)	0.384	1.95 (1.17,3.23)	0.012	2.69 (1.37,5.27)	0.006	2.58 (1.68,3.96)	< 0.001
Positive	1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)		1 (ref)	

Notes: AOR adjusted odds ratio, CI confidence interval

an ecological perspective for the first time in Asia, specifically Taiwan.

Prevalence of cyberbullying and traditional bullying

Our study revealed that 9.9, 13.3, and 9.4% of the participants were involved in cyberbullying, traditional bullying, and combined bullying, respectively; that is, nearly one-third of all participants were involved in bullying. Additionally, when overlap (combined bullying) was considered, 19.3 and 22.7% of the participants experienced cyberbullying and traditional bullying, respectively. These prevalence rates and their relative predominance are similar to the results of a meta-analysis of 80 papers published between 2007 and 2013 [43], which showed that the prevalence rates were approximately 15 and 35% for cyberbullying and traditional bullying, respectively, for both perpetration and victimisation. In more recent studies conducted in East Asia, the pattern of relative predominance of traditional bullying over cyberbullying has also been reported in studies in China [44] and South Korea [45]. A study from China demonstrated that the prevalence rates of victimisation were 43.0 and 23.0% for traditional bullying and cyberbullying, respectively [44]. Furthermore, a Korean study showed that the prevalence rates of victimisation were 18.1, 12.8 and 3.5% for relational, verbal and physical bullying, respectively, and 5.6% for cyberbullying [45].

However, our results were not consistent with a previous study in Taipei in 2010 among 10th-grade high school students. That study reported that cyberbullying was more prevalent than traditional bullying (35.4% vs. 23.8%), though the prevalence of traditional bullying was similar to our data [27]. This discrepancy may be attributed to the difference in the years when the studies were conducted (2010 vs. 2018), the time frame of reference with regard to bullying experience (1 year vs. 2 months), the difference in response rates (80% vs. 62.0%), the partial difference in the question items about cyberbullying, or the decline in cyberbullying over time. The last possibility was suggested by a recent study in China that reported a decline in both cyberbullying and traditional bullying from 2016 to 2017 [44].

Overlap between traditional bullying and cyberbullying

To date, only a few studies have reported the extent of overlap between cyberbullying and traditional bullying. Our study showed that 48.7% of the students involved in cyberbullying were also involved in traditional bullying, and 41.5% of those involved in traditional bullying were also involved in cyberbullying. Previous studies in Western societies have reported such an overlap to different extents. In the United States, among youth involved in cyberbullying, 36–56% experienced traditional bullying, depending on the role [18, 46]. Another study among

high school students in the United States, albeit only among victims, showed that 59.7% of students involved in cyberbullying were also involved in traditional bullying, while 36.3% of students involved in traditional bullying were also involved in cyberbullying [9]. Other studies reported more pronounced overlap: over 80% of cyberbullied youth were also involved in traditional bullying in Norway and the United States [15, 19]. No information has been available about bullying overlap in East Asia to date, except for a study in Taiwan [27] that suggested the overlap only in the form of odds ratios. Possible reasons for the difference in the overlap rate may include socio-cultural differences in what people consider bullying. Whatever the reason, however, it is important to note that approximately half or more adolescents involved in bullying were involved in both types of bullying, which could lead to serious mental problems, as will be discussed later. The possibilities of such an overlap should be carefully examined when determining how to support adolescents involved in bullying.

Role distribution in bullying

Our study showed that role distribution differs by the type of bullying. Though the most common role in all types of bullying was the victim, followed by the bully-victim role and then the bully role, this pattern was most prominent in cyberbullying, where victims filled two-thirds of the roles. Our results related to cyberbullying are consistent with the findings of previous studies [17, 27], probably reflecting the fact that compared with traditional bullying, a limited number of perpetrators can harm many people simultaneously in cyberbullying [8, 47, 48]. Regarding the role in bullying, it is also important to note that among the students involved in cyberbullying or traditional bullying, approximately 20–30% are bully-victims; that is, they had experienced both being a bully and a victim. This may mean that bullying is a dynamic phenomenon in which the role of bullying and victims can change over time depending on changes in the relative balance of power, as previously suggested [49, 50].

Correlates of bullying

Though a direct comparison with previous studies is not possible because of the difference in the type and role classification of bullying, many of the major findings on the correlate profile of bullying are consistent with those of previous studies. For example, previous studies showed that traditional bullying victims were at high risk of suicidal ideation [51, 52], whereas cyberbullying victims were more likely to experience alcohol use [34] and psychological distress [53]. Regarding combined bullying victims, a region-wide study in the United States among high school students showed that they were at an

enhanced risk of self-harm compared with victims of either traditional bullying or cyberbullying alone [9]. Their study also showed that victims of combined bullying were at an elevated risk of suicidal ideation and attempts, which was not identified in our study. Our study showed that bullies/bully-victims of traditional bullying were more likely to be involved in alcohol use and to have psychiatric problems. These findings may be related to a previous observation that adolescents who used alcohol [54] and had psychiatric problems [55] were more likely to be bullying perpetrators.

Notably, being a bully/bully-victim was associated with more specific background or environment in cases of traditional and combined bullying than in cyberbullying. Bullies/bully-victims in traditional and combined bullying were more likely to be male, have an internet addiction, drink, be students at a vocational school, and experience a negative school climate. An increased risk of vocational school students becoming bullies and bully-victims has also been reported in a previous study in Taiwan [56], suggesting that the peer environments of vocational schools may predispose students to bullying perpetration.

From these comparisons of correlate profiles between traditional and combined bullying, it can be suggested that bullying perpetration is more likely to occur among students who have behavioural problems and/or are in a specific school environment. Additionally, the similarities in these backgrounds between combined and traditional bullying suggest that combined bullying is more likely traditional bullying superimposed by cyberbullying rather than vice versa.

Regarding bullies and bully-victims of cyberbullying, several risk factors were identified in previous studies, including lower self-esteem [57, 58], internet addiction [59], depression [27, 58], suicidal ideation [60], and a low sense of belonging to school [25]. The numbers of bullies/bully-victims with internet addiction and a history of self-harm did not reach statistical significance, probably due to the limited sample size. In Taiwan, studies with larger sample sizes are clearly needed to obtain a clear correlate profile of bullies and bully-victims of cyberbullying.

Finally, it is important to note that both victims and bullies/bully-victims were strongly associated with mental or psychological problems. This suggests the importance of designing and developing prevention and support programmes addressing not only victims but also bullies and bully-victims to solve the problem of bullying among adolescents.

Our study has several limitations. First, its cross-sectional nature does not allow causal inferences or conclusions regarding the temporal sequence of the events to be drawn [61]. Second, since the response rate was

only 62%, there could be selection bias between the students who participated and those who did not participate in the study. Third, as all data were self-reported by the students, social desirability bias and recall bias could not be avoided, though we made efforts to minimise them by making the questionnaire anonymous [62], allowing students to complete it at home to avoid peer pressure, and restricting the recall time frame to 2 months rather than 1 year. Fourth, and related to the response rate, the total sample size was not large enough to allow a sufficient sample size for subgroup analyses [17]. Fifth, although we developed a questionnaire based on our qualitative study and careful investigation of previous studies, our results were not directly comparable with those of other studies because of the difference in the items or time frame of questions on bullying. From these considerations, a standard questionnaire should be developed at least in the same country or within similar cultural settings. Additionally, a longitudinal study should be performed to make causal inferences and to clarify how bullying develops and overlaps over time with a large sample size that allows more precise subgroup analysis.

Conclusions

This study showed that bullying is prevalent among high school students to the extent that as many as one-third of all students participating in the study were involved in traditional bullying, cyberbullying, and combined bullying. Not only victims but also bullies/bully-victims were associated with serious mental and psychological problems. It also suggested that bullying perpetration in traditional and combined bullying is associated with specific behavioural backgrounds and school environment.

These results may inform public policy and future prevention or support programmes for bullying among Taiwanese adolescents. First, greater priority should be given to measures to address bullying since one-third of all students are involved in it. Second, support should be provided not only to victims but also to bullies/bully-victims since both are associated with serious mental or psychological problems. Third, it should be assumed that bullying is a complex phenomenon since almost half of the students who are involved in one type of bullying are also involved in another. Fourth, students' behavioural background and school environment should be taken into account for effective prevention of bullying.

Supplementary information

Supplementary information accompanies this paper at <https://doi.org/10.1186/s12889-019-8116-z>.

Additional file 1. Questionnaire. The questionnaire which was developed for this study.

Abbreviations

AOR: Adjusted odds ratio; CI: Confidence interval; ICCs: Intraclass correlation coefficients; ICTs: Information and communication technologies; SD: Standard deviation; SNSs: Social networking services; VIF: Variance inflation factor

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Authors' contributions

CW, MOK and MK conceived the study design. CW and CC carried out the study. CW and MK analysed the data. CW and PM drafted the manuscript, which was edited by TT, SS, YT, MK and TN. MOK and CC helped to supervise the entire process of the study. All authors read and approved the final manuscript.

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Availability of data and materials

The datasets generated and analysed during the current study are not publicly available because informed consent was not obtained for data sharing. Data are, however, available from the authors upon reasonable request.

Ethics approval and consent to participate

This study was approved by the Kyoto University Graduate School and Faculty of Medicine Ethics Committee (R1327–1) and the Research Ethics Committee of National Taiwan University Hospital (201601074RIND). Prior to the survey, eligible students were asked to grant written informed consent and provide written informed consent from their parents/guardians to participate in the survey. All participants and their guardians received information about the study purpose, its strict confidentiality and the voluntary nature of their participation.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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