

Psychosocial Risk Factors Associated With Cyberbullying Among Adolescents

A Population-Based Study

Andre Sourander, MD, PhD; Anat Brunstein Klomek, PhD; Maria Ikonen, MA; Jarna Lindroos, BA; Terhi Luntamo, MD; Merja Koskelainen, PhD; Terja Ristkari, MNSc; Hans Helenius, MSc

Context: To our knowledge, no population study examining psychosocial and psychiatric risk factors associated with cyberbullying among adolescents exists.

Objective: To study cross-sectional associations between cyberbullying and psychiatric and psychosomatic problems among adolescents.

Design: Population-based cross-sectional study.

Setting: Finland.

Participants: The sample consists of 2215 Finnish adolescents aged 13 to 16 years with complete information about cyberbullying and cybervictimization.

Main Outcome Measures: Self-reports of cyberbullying and cybervictimization during the past 6 months.

Results: In the total sample, 4.8% were cybervictims only, 7.4% were cyberbullies only, and 5.4% were cyberbully-

victims. Cybervictim-only status was associated with living in a family with other than 2 biological parents, perceived difficulties, emotional and peer problems, headache, recurrent abdominal pain, sleeping difficulties, and not feeling safe at school. Cyberbully-only status was associated with perceived difficulties, hyperactivity, conduct problems, low prosocial behavior, frequent smoking and drunkenness, headache, and not feeling safe at school. Cyberbully-victim status was associated with all of these risk factors. Among cybervictims, being cyberbullied by a same-sex or opposite-sex adult, by an unknown person, and by a group of people were associated with fear for safety, indicating possible trauma.

Conclusions: Both cyberbullying and cybervictimization are associated with psychiatric and psychosomatic problems. The most troubled are those who are both cyberbullies and cybervictims. This indicates the need for new strategies for cyberbullying prevention and intervention.

Arch Gen Psychiatry. 2010;67(7):720-728

Author Affiliations:

Departments of Child Psychiatry (Drs Sourander and Luntamo and Mss Ikonen, Lindroos, and Ristkari) and Biostatistics (Mr Helenius), Turku University, Turku, and Department of Child Psychiatry, Helsinki University Central Hospital, Helsinki (Dr Koskelainen), Finland; and Department of Child and Adolescent Psychiatry, Columbia University, New York, New York (Dr Brunstein Klomek).

THE TERM CYBERBULLYING CAN be defined as “an aggressive, intentional act carried out by a group or individual, using electronic forms of contact, repeatedly and over time against a victim who cannot easily defend him or herself.”¹ The phenomenon appeared only a few years ago as the use of electronic devices such as computers and mobile telephones by young people increased. Existing surveys on the prevalence of cyberbullying show that it is common among adolescents. Previous school or telephone surveys from the United States and the United Kingdom show that the rates of being a victim of cyberbullying and being a cyberbully are in the range of 5% to 20%.¹⁻⁴ In the US survey on Internet use among individuals aged 10 to 17 years, 12% reported being aggressive to someone online, 4% were targets of aggression, and 3% were both aggressors and targets.³ Many cybervictims are

also traditional victims, while many cyberbullies are also traditional bullies.³ There are discrepancies regarding sex differences in cyberbullying: some results show that girls are more likely to be cyberbullied, while other studies show no sex differences.^{1,5,6} While most self-report studies of being bullied in traditional ways show a decrease in prevalence after prepuberty, some studies suggest that older school-aged children are more often Internet aggressors.^{1,3} A substantial number of cybervictims report distress when they are the target of cyberaggression. Smith et al⁷ reported that picture or video clip bullying and telephone bullying were perceived as having a higher negative impact compared with traditional bullying. The UK study showed that cybervictims most often do not talk about being bullied, so adults may not be aware of it.¹

Traditional bullying is commonly divided into physical (eg, hitting, kicking), verbal (eg, teasing, threatening), and indi-

rect (eg, social exclusion, spreading rumors) bullying.⁸ There are several special features regarding cyberbullying when compared with traditional physical, verbal, or indirect bullying such as the difficulty of escaping from it, the breadth of the potential audience, and the anonymity of the perpetrator.¹ Cyberbullying can reach particularly large audiences in a peer group compared with the small groups who are the usual audience in traditional bullying. Compared with most traditional forms of bullying, the person carrying out cyberbullying may be less aware or even unaware of the consequences of his or her actions. Without such direct feedback, there may be fewer opportunities for empathy or remorse and there may also be less opportunity for bystander intervention. On the other hand, nasty text messages or e-mails can simply be deleted and future messages can be blocked. Furthermore, cyberbullying does not cause actual physical harm.

Research about cyberbullying is still in the early stage of investigation. Previous surveys are mostly descriptive, have examined only specific aspects of cyberbullying (eg, text messaging), have included a rather limited number of subjects, are not based on population-based samples, include only general questions about whether the student had been bullied (eg, by e-mails), or have been carried out as just one part of a larger research program. To our knowledge, no previous population-based study has examined associations between psychosocial, psychiatric, or psychosomatic problems and being a cyberbully or cybervictim. However, numerous cross-sectional and some longitudinal studies show associations between traditional bullying and victimization and psychiatric, psychosomatic, and physical health problems.⁹⁻¹⁶ The results of the Finnish 1981 birth cohort study show that frequent traditional bullying at age 8 years is associated with suicidality, psychiatric hospital treatment, psychopharmacological treatment, psychiatric disorders, and crime in late adolescence and early adulthood.¹⁷⁻²² Therefore, based on the findings from the studies on traditional bullying, it can be hypothesized that both cyberbullying and cybervictimization are associated with a wide range of psychiatric and psychosomatic problems. Furthermore, our hypothesis based on findings from studies examining traditional bullying is that those who are both bullies and victims, ie, cyberbully-victims, are at particular risk for psychiatric problems.

The aims of this study are the following: (1) to report the rates of cyberbullying and describe characteristics of being victimized by cyberbullying, and (2) to study cross-sectional associations between cyberbully, cybervictim, and cyberbully-victim status and a large number of possible associated factors based on previous studies on traditional bullying (age, sex, psychiatric symptoms, general functioning level, psychosomatic symptoms, substance use, traditional bullying and victimization, and school variables).

METHODS

STUDY SAMPLE AND PROCEDURE

The study was carried out in March and April 2008 in Finland (total population 5.3 million) in the cities of Salo (total population 25 825), situated in southern Finland, and Rovaniemi (total population 58 964), situated in northern Finland. The

study population (a total of 2438 pupils) consisted of all children attending the seventh grade (age range, 13-14 years) and the ninth grade (age range, 15-16 years) in those cities, with the exception of children attending classes for the physically or mentally disabled. The study design was approved by the school authorities and the questionnaires were distributed to the children through their teachers. The pupils completed the questionnaires anonymously during a school lesson and placed them in a sealed envelope. Each teacher collected the sealed envelopes, placed them in a larger envelope, sealed the envelope in front of the pupils, and sent it to the researchers.

Altogether, 2215 questionnaires (90.9% of the study population) were included in the statistical analysis and 223 questionnaires either were not returned (the pupils were absent on the day the questionnaires were distributed or did not complete the questionnaires) or were discarded because they were incompletely or inappropriately completed. The respondents included in the analysis were equally distributed between the sexes (50.0% girls and 50.0% boys) and the grades (51.6% seventh graders and 48.4% ninth graders). The mean (SD) ages were 14.4 (1.1) years for the boys, 14.4 (1.1) years for the girls, 13.4 (0.6) years for the seventh graders, and 15.4 (0.5) years for the ninth graders.

MEASURES OF CYBERBULLYING

The children were asked to answer the questions according to their own situation at that moment or during the past 6 months.

In the questionnaire based on previous work by Hinduja and Patchin,²³ the definition of cyberbullying was as follows: "cyberbullying is when someone repeatedly makes fun of another person online or repeatedly picks on another person through e-mail or text messages or when someone posts something online about another person that they don't like."²³ Two general questions about cyberbullying were asked: (1) during the past 6 months, how often have you been cyberbullied?, and (2) during the past 6 months, how often have you cyberbullied others? (with answers of 1 indicating never; 2, less than once a week; 3, more than once a week; or 4, almost every day; answers 2, 3, and 4 referred to bullying or being victimized at least sometimes). On the basis of these 2 questions, the sample was divided into 4 groups: (1) never a cyberbully or cybervictim; (2) cybervictim-only group (at least sometimes a cybervictim but never a cyberbully); (3) cyberbully-only group (at least sometimes a cyberbully but never a cybervictim); and (4) cyberbully-victim group (at least sometimes both a cybervictim and a cyberbully).

Other questions about cyberbullying included the following. (1) How often have you been cyberbullied in these ways: ignored, disrespected, called names, had rumors spread by others, threatened by others, e-mail bombed, picked on by others, or ridiculed (altogether 8 questions)? (2) What was the location of cyberbullying: a virtual chat room, instant messaging service, e-mail, text message on a mobile telephone, discussion group, or chat room (each of the 6 questions included specific examples of the locations)? (3) By whom have you been bullied: girls, boys, adult women, adult men, persons unknown to you, or a group (altogether 6 questions)? (4) Have you been scared for your safety because of threats directed at you? Each of the 21 questions included answers of 1 indicating never; 2, less than once a week; 3, more than once a week; or 4, almost every day.

EXPLANATORY VARIABLES

In addition to the demographic variables, the questionnaire included data about the student's general health and psychopathology, psychosomatic symptoms, traditional bullying behavior, substance use, and school environment.

Demographic Variables

Demographic variables included information about sex, age, grade, family composition (living in a family with both biological parents vs other family composition, eg, single, remarried, adoptive parents, grandparents, foster care), and ethnic background (being of Finnish origin or not).

General Health and Psychopathology

Physical health was queried with the question, "Do you have an illness, disability, or other health-related problem?" The items mentioned in this connection were asthma, epilepsy, allergy, diabetes, and atopic eczema, with answers of no and yes as well as an answer option of "other, please specify." For the statistical analysis, the item was dichotomized into having vs not having any illness, disability, or other health-related problem. Psychopathology was screened using the Strengths and Difficulties Questionnaire (SDQ), a self-report version of a screening instrument that can be administered to children and adolescents aged 11 to 16 years and has been shown to discriminate community and clinic samples satisfactorily.²⁴⁻²⁶ The SDQ has been validated in Finland.²⁶ The SDQ consists of 25 items concerning both positive and negative behavioral traits. The items are divided into 5 scales: the hyperactivity-inattention scale, the emotional symptoms scale, the conduct problem scale, the peer problem scale, and the prosocial behavior scale (giving a score for positive prosocial behavior). Each scale consists of 5 items. The answers are scored 0 for not true, 1 for somewhat true, and 2 for certainly true, except for 5 items that are worded positively and thus have the answers scored in the opposite direction. The score for each scale ranges from 0 to 10 and the total difficulty score ranges from 0 to 40; the prosocial scale is not included in the total difficulty score. Based on the Finnish standardization, 90th-percentile cutoff points were used.²⁶ The questionnaire also included the question, "Overall, do you think you have difficulties in any of the following areas: emotions, concentration, behavior, or getting along with other people?" The answers were 1 indicating no; 2, yes, minor difficulties; 3, yes, definite difficulties; and 4, yes, severe difficulties. For the statistical analysis, answers 3 and 4 were pooled together.

Psychosomatic Symptoms and Sleep Problems

Headache was queried with the question, "During the past 6 months, have you experienced distracting headaches?" The answers were 1 indicating at least once a week; 2, at least once a month; 3, less frequently; and 4, hardly ever. For the statistical analysis, answers 3 and 4 were pooled together. Abdominal pain was queried with the question, "During the past 6 months, have you experienced recurring abdominal pain?" The answers were 1 indicating at least once a week; 2, at least once a month; 3, less frequently; and 4, hardly ever. For the statistical analysis, answers 3 and 4 were pooled together. Sleep problems were queried with the question, "During the past 6 months, have you experienced problems with falling asleep or sleeping?" The answers were 1 indicating every night or almost every night; 2, 3 to 5 times a week; 3, once or twice a week; 4, less than once a week; and 5, never or less frequently than once a month. For the statistical analysis, answers 1 and 2 as well as answers 4 and 5 were pooled together. Thus, all of these variables had 3 answer categories.

Substance Use

Alcohol consumption to get drunk was queried with the question, "How often do you use enough alcohol to get drunk?" The answers were 1 indicating never; 2, once a month or more; and

3, once a week or more. Smoking was queried with the question, "How often do you smoke cigarettes?" The answers were 1 indicating never; 2, rarely; 3, weekly; and 4, daily. For the statistical analysis, answers 3 and 4 were pooled together.

Information About Traditional Bullying

In the questionnaire, the definition of traditional bullying (not including cyberbullying) was as follows: "A student is being bullied when he or she is exposed repeatedly over time to negative and hurtful actions on the part of 1 or more students. It is difficult for the student being bullied to defend himself or herself. Bullying may take place frequently or infrequently. Bullying can be verbal (eg, name-calling, threats), physical (eg, hitting), or psychological (eg, rumors, shunning/exclusion). It is bullying when someone is teasing repeatedly in a mean or hurtful way." Information about traditional bullying was queried with the questions, "How often have you been bullied at school during the past 6 months?" "How often have you been bullied outside school during the past 6 months?" "How often have you been bullying others at school during the past 6 months?" and "How often have you been bullying others outside school during the past 6 months?" The 2 questions about both victimization and bullying were pooled together. The answers for all of these questions were 1 indicating never; 2, less than once a week; 3, more than once a week; and 4, almost every day. Answers 2, 3, and 4 referred to being bullied or victimized at least sometimes. The sample was categorized into 4 groups: (1) never a bully or a victim; (2) victim-only group (at least sometimes a victim but never a bully); (3) bully-only group (at least sometimes a bully but never a victim); and (4) bully-victim group (at least sometimes both a victim and a bully). In our previous studies, these categories predicted later suicidality and other psychiatric outcomes in late adolescence and early adulthood.¹⁷⁻²²

School Environment

Two statements were proposed about how the school environment was experienced: "I feel safe at school" and "I feel that the teachers at my school care about me." The answers were 1 indicating almost never; 2, sometimes; 3, often; and 4, almost always. For the statistical analysis, answers 1 and 2 as well as answers 3 and 4 were pooled together.

STATISTICAL ANALYSES

The statistical significance of risk factors on outcome variables was tested with logistic regression analysis. Odds ratios (ORs) and 95% confidence intervals (CIs) were estimated using logistic regression. The logistic regression of the categorical outcomes for cyberbully groups (never, cybervictim only, cyberbully only, cyberbully-victim) was carried out by applying multinomial logistic regression analysis. The multinomial logistic regression analysis for a polychotomous response variable is a generalization of the method of logistic regression analysis for a dichotomous response variable.²⁷ All analyses were adjusted for the effect of sex unless specified otherwise. Statistical computations were performed with SAS version 9.1 statistical software for Windows (SAS Institute, Inc, Cary, North Carolina).

RESULTS

PREVALENCE OF CYBERBULLYING

In the total sample, 4.8% were cybervictims only, 7.4% were cyberbullies only, and 5.4% were cyberbully-victims. The

Table 1. Associations Between Traditional Bullying Behavior and Cyberbully Groups^a

Behavior	Boys						Girls						
	Total, No.	Cybervictim Only (n=37)		Cyberbully Only (n=97)		Cyberbully-victim (n=61)	Total, No.	Cybervictim Only (n=65)		Cyberbully Only (n=60)		Cyberbully-victim (n=50)	
		%	OR (95% CI)	%	OR (95% CI)	%		OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%
How often have you been bullied in the past 6 mo?													
Not at all	689	1.3		9.6		4.1	738	1.9		5.2		2.0	
Less than once a week	262	5.7	4.8 (2.1-11.1) ^b	9.9	1.1 (0.7-1.8)	6.1	254	13.8	9.3 (4.9-17.7) ^b	6.3	1.6 (0.9-2.9)	9.1	5.7 (2.9-11.2) ^b
More than once a week	91	14.3	15.1 (6.2-36.9) ^b	5.5	0.8 (0.3-2.0)	18.7	85	17.7	13.8 (6.3-30.2) ^b	7.1	2.0 (0.8-5.0)	14.1	10.3 (4.6-23.2) ^b
How often have you bullied others in the past 6 mo?													
Not at all	626	3.4		4.3		3.2	795	6.5		1.3		1.9	
Less than once a week	322	3.7	1.3 (0.6-2.7)	14.9	4.1 (2.5-6.8) ^b	6.5	226	4.9	0.96 (0.5-1.9)	15.5	15.8 (7.7-32.6) ^b	9.3	6.3 (3.2-12.5) ^b
More than once a week	93	4.3	2.3 (0.7-6.9)	23.7	9.7 (5.1-18.3) ^b	21.5	56	1.8	0.5 (0.1-4.0)	26.8	41.4 (17.0-101) ^b	25.0	25.7 (11.3-58.9) ^b
Bully-victim groups													
No	475	1.3		4.2		3.0	595	2.0		1.0		1.2	
Victim only	151	9.9	8.8 (3.4-23.3) ^b	4.6	1.2 (0.5-3.0)	4.0	200	20.0	12.8 (6.6-25.1) ^b	2.0	2.6 (0.7-9.2)	4.0	4.4 (1.6-12.3) ^c
Bully only	213	1.4	1.5 (0.4-5.9)	21.6	6.7 (3.8-11.6) ^b	6.6	143	1.4	0.9 (0.2-4.3)	22.4	30.1 (12.3,73.8) ^b	5.6	6.5 (2.3-18.2) ^b
Bully-victim	202	6.4	6.8 (2.5-18.3) ^b	11.9	3.8 (2.0-7.1) ^b	13.4	139	7.2	5.7 (2.4-13.5) ^b	13.0	20.4 (7.9-52.7) ^b	19.4	26.2 (11.1-62.0) ^b

Abbreviations: CI, confidence interval; OR, odds ratio.

^a Results of logistic regression analyses. The overall χ^2 *P* value for sex difference was <.001. Because sex \times traditional bully-victim interactions for cyberbullying were significant, all analyses were done separately for boys and girls.

^b *P* < .001.

^c *P* < .01.

female and male prevalences were 6.0% and 3.5%, respectively, for being a cybervictim only, 5.6% and 9.3%, respectively, for being a cyberbully only, and 4.6% and 5.8%, respectively, for being a cyberbully-victim.

TRADITIONAL BULLYING AND CYBERBULLYING

Among both girls and boys, the 6-month prevalences of traditional bullying (31.5% and 33.8%, respectively; in the total sample, 33.0%) and traditional victimization (26.1% and 40.1%, respectively; in the total sample, 33.2%) were much higher than the prevalences of cyberbullying and cybervictimization. In the total sample, the sex \times traditional bullying (*P* = .01) and sex \times traditional bully-victim status (*P* = .03) interactions were significant for the cyberbully-victim status. Therefore, analyses of associations between traditional bully-victim status and cyberbully-victim status were performed separately for boys and girls. As shown in **Table 1**, traditional victimization was associated with cybervictimization, while traditional bullying was associated with cyberbullying. The association was stronger among those who were traditionally bullied or were victimized frequently. Traditional bully-victim status was associated with cyberbully, cybervictim, and cyberbully-victim statuses in both sexes. Of girls who were traditional bully-victims, 39.6% were cyberbullies or cybervictims, while the respective figure for boys was 31.7%. Among girls but not boys, traditional victim-only status was associated with cyberbully-victim status. This indi-

cates that some of the girls who are traditionally victimized tend to be both cyberbullies and cybervictims.

METHODS OF CYBERBULLYING

Table 2 shows the methods, locations, and perpetrators of cybervictimization. The most common locations were computer instant messages (18.0%) and discussion groups (13.8%). Both girls and boys reported being cyberbullied most frequently by their peers of the same age. However, 16.0% of girls reported being bullied by their opposite-sex peers, compared with only 5.0% of boys. In the total sample, 2.3% had been bullied by a same-sex adult, 3.1% by an opposite-sex adult, 10.0% by an unknown person, and 5.1% by a group of people. In almost all of the variables, there was a significant sex difference, indicating that girls report higher prevalences of specific locations and methods of cybervictimization.

Figure A, shows the 10 most common cybervictim response profiles of how cybervictims were bullied. Name-calling only and being the target of rumors only were the most common response profiles among both sexes. Similarly, based on cybervictim response profiles, cybervictimization took usually place only in 1 or 2 sites (**Figure B**). Finally, the most common cybervictim response profiles regarding who the perpetrator was usually included only 1 or 2 types of perpetrators (**Figure C**). Being victimized by same-sex peers only was the most common response profile, while the second most common

Table 2. Characteristics of Methods, Location, and Perpetrators Among Cybervictims

Characteristic	Total, No.	Total Sample, % (n=2215)	Yes Answer		χ^2 P Value
			Boys, % (n=1093)	Girls, % (n=1094)	
How often have you been cyberbullied in these ways?					
Ignored by others	2136	7.6	4.9	9.9	<.001
Disrespected by others	2137	10.4	7.9	12.5	<.001
Called names by others	2136	17.7	16.0	18.7	.10
Had rumors spread by others	2134	13.8	10.4	16.8	<.001
Threatened by others	2135	6.9	8.3	5.1	.003
E-mail bombed by others	2136	8.5	7.7	8.8	.32
Picked on by others	2135	13.3	12.8	13.7	.54
Ridiculed	2135	9.7	8.9	10.0	.42
Scared for safety	2135	4.2	4.3	3.9	.65
What was the location of cyberbullying?					
Virtual chat room (eg, Habbo Hotel)	2089	3.7	3.6	3.6	.95
Instant messaging service	2095	18.0	12.6	23.0	<.001
E-mail	2088	2.6	2.5	2.2	.63
Text message on mobile telephone	2093	8.2	5.7	10.3	<.001
Discussion group, eg, IRC-Galleria, Suomi24, MySpace	2098	13.8	8.8	18.3	<.001
Chat room, eg, IRC, Suomi24	2083	5.6	5.0	5.7	.47
Other	1530	3.7	4.7	2.4	.02
By whom have you been bullied?					
Same-sex peer	2065	20.1	16.4	23.7	<.001
Opposite-sex peer	2063	10.5	5.0	16.0	<.001
Same-sex adult	2044	2.3	2.6	2.1	.46
Opposite-sex adult	2047	3.1	2.1	4.0	.01
Unknown person, not sure of sex or age	2052	10.0	8.9	10.7	.16
Group, eg, group of friends, school class	2044	5.1	5.0	4.9	.90

response profile was being bullied by both same-sex and opposite-sex peers. Opposite-sex victimization alone or in combination with other types of perpetrators was significantly more common among girls.

FEAR FOR SAFETY AND CYBERBULLYING

Of those who identified themselves as cybervictims, 22.8% reported that they had been scared for their safety, indicating possible trauma. The association between perpetrators and reports of feeling unsafe was studied among those who reported being cybervictims. As shown in **Table 3**, after adjustment with the effect of sex, grade, family structure, city, and ethnicity, being cyberbullied by a same-sex or opposite-sex peer was not associated with feeling unsafe after cybervictimization. However, being cyberbullied by a same-sex or opposite-sex adult, by an unknown person, and by a group of people were associated with being scared for their safety. Of those who had been cyberbullied by an adult, an unknown person, or a group, 30.6% to 46.2% reported being scared for their safety.

RISK FACTORS ASSOCIATED WITH CYBERBULLY STATUS

Table 4 shows the associations between psychosocial risk factors and cyberbully status when adjusted for the effect of sex, grade, family structure, city, and ethnicity. No significant sex interactions were found. Generally, a higher level of difficulties or symptoms had a stronger association with cyberbully status. School grade and belonging to an ethnic minority were not associated with any of the outcomes.

An additional model of explanatory variables included all SDQ scales controlled for sex and grade. Cyberbully-only and cyberbully-victim statuses were independently predicted by conduct (OR=2.6; 95% CI, 1.5-4.5; $P < .001$; and OR=2.3; 95% CI, 1.2-4.4; $P < .001$, respectively) and hyperactivity problems (OR=2.4; 95% CI, 1.4-3.9; $P < .001$; and OR=2.7; 95% CI, 1.6-4.7; $P < .001$, respectively). Furthermore, cyberbully-only status was predicted by prosocial problems (OR=2.3; 95% CI, 1.5-3.4; $P < .001$). Cybervictim-only and cyberbully-victim statuses were predicted by emotional problems (OR=2.2; 95% CI, 1.2-3.9; $P = .007$; and OR=2.1; 95% CI, 1.1-3.6; $P = .02$, respectively) and peer problems (OR=4.8; 95% CI, 2.9-7.7; $P < .001$; and OR=1.8; 95% CI, 1.05-3.2; $P = .03$, respectively). When the SDQ scales were studied as linear variables, the results remained the same.

COMMENT

To our knowledge, this study is the first population study examining psychosocial and psychiatric risk factors associated with cyberbullying among adolescents. The results have implications for public awareness, policy makers, educators, parents, and clinicians working in adolescent health services. Furthermore, the results have implications when planning antibullying programs and setting guidelines for misuse of mobile telephones and the Internet.

The results show that about 7.4% of adolescents have cyberbullied others but have not been targets of cyberaggression, while 4.8% have been targets only and another 5.4% have been both cyberbullies and cybervictims. These

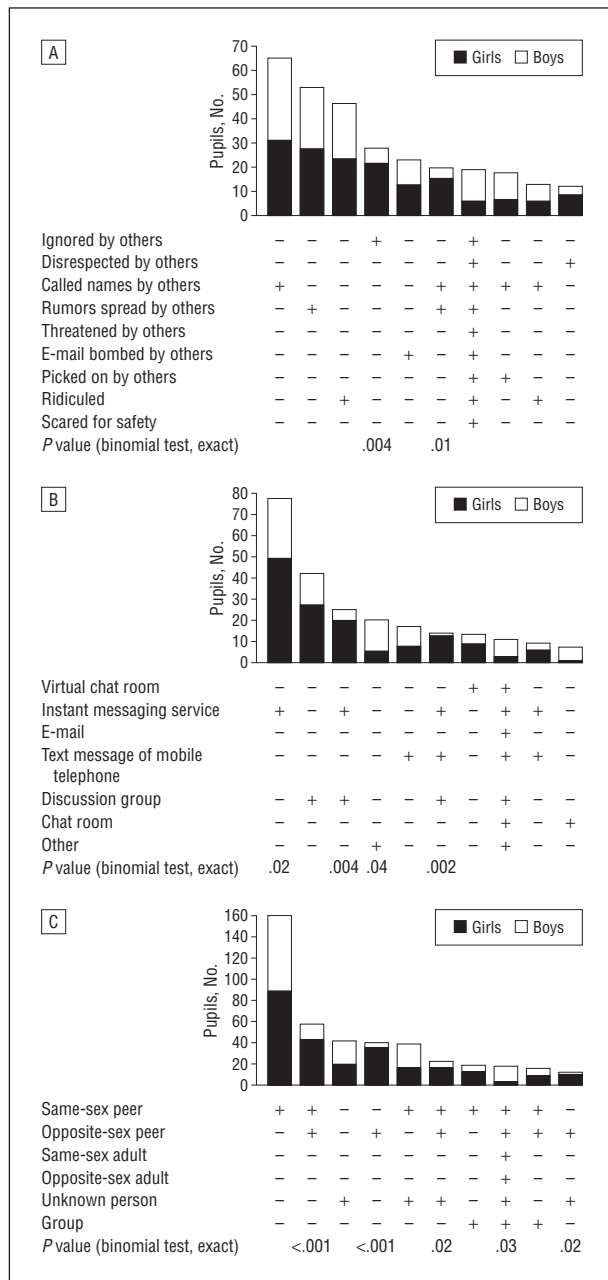


Figure. The most common cybervictim response profiles of how cybervictims were bullied (A), where the cybervictimization took place (B), and who the perpetrator was (C).

prevalence rates are rather similar to previous school surveys on this topic.³ Similar to our findings, previous surveys have shown that cyberbullying and cybervictimization are less prevalent than traditional bullying or victimization.¹ While traditional victims tend to be cybervictims and traditional bullies tend to be cyberbullies or cyberbully-victims, traditional bully-victim status was associated with all cyberbully and cybervictim groups.

An interesting finding was that girls but not boys who were only victims at school or outside school tended to be both cybervictims and cyberbully-victims. Previously, it was hypothesized that some victims of conventional bullying may use the Internet to attack others as a way of revenge.³ However, the results of previous studies have not

Table 3. Association Between Perpetrator and Being Scared About Safety Among Cybervictims^a

By whom have you been bullied?	Total, No.	Been Scared for One's Safety		P Value
		Yes, %	OR (95% CI)	
Same-sex peer				
No	58	15.5		
Yes	150	21.3	1.5 (0.7-3.6)	.31
Opposite-sex peer				
No	115	18.3		
Yes	87	24.1	1.6 (0.8-3.5)	.21
Same-sex adult				
No	172	17.4		
Yes	25	40.0	2.8 (1.1-7.0)	.03
Opposite-sex adult				
No	170	16.5		
Yes	28	42.9	3.8 (1.5-9.5)	.004
Unknown person				
No	124	13.7		
Yes	85	30.6	2.3 (1.1-4.7)	.02
Group				
No	151	11.3		
Yes	52	46.2	5.6 (2.6-12.1)	<.001

Abbreviations: CI, confidence interval; OR, odds ratio.

^aResults of logistic regression analyses. Analyses were adjusted with the effect of sex, family structure, city, ethnicity, and grade.

been consistent with this hypothesis.^{1,6} Our findings support the hypothesis among girls but not boys. One possible explanation may be that in the cyberarena, girls who are cyberbullies may hide behind the mask of anonymity. On the Internet, for example, girls who are cyberbullies can be physically weaker than the persons they attempt to frighten. However, as a cross-sectional study, it may be that victimization begins at school and then extends into the home and community through the use of technology, but it is also possible that victimization via computers and mobile telephones then leads to face-to-face victimization.

Of those who had been victimized, 1 in 4 reported that it had resulted in fear for their safety. The feeling of being unsafe is probably worse in cyberbullying compared with traditional bullying. Traditional bullying typically occurs on school grounds, so victims are safe at least within their homes. With cyberbullying, victims are accessible 24 hours a day, 7 days a week. There is no time when messages cannot be left on mobile telephones or sent via e-mail. In addition, because the cyberarena is relatively new, most do not know how to stop the cybervictimization.

Among victims, being cyberbullied by a same-sex or opposite-sex adult, by an unknown person, and by a group of people were associated with fear for safety, indicating possible trauma. These findings are in line with a previous report that those who are targeted by adults are significantly more likely to report distress because of the experience.⁴ The finding may indicate that the feeling of safety is disrupted when the bully is an adult, an unknown person, or a group because the imbalance of power is much greater compared with peer victimization.

The findings indicate that similar to children involved in traditional bullying, all those involved in cyberbullying are likely to face challenges on multiple fronts.³

Table 4. Psychiatric and Psychosocial Risk Factors and Cyberbully Groups^a

Characteristic	Total, No.	Cybervictim Only		Cyberbully Only		Cyberbully-victim	
		%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Sex							
Boys	1046	3.5		9.3		5.8	
Girls	1078	6.0	1.7 (1.1-2.6)	5.6	0.6 (0.4-0.8)	4.6	0.8 (0.5-1.1)
Grade							
7	1097	5.8		6.7		5.2	
9	1038	3.7	0.6 (0.4-0.9)	8.1	1.2 (0.9-1.7)	5.6	1.1 (0.7-1.6)
City							
Rovaniemi	1419	5.1		6.6		5.6	
Salo	722	4.2	0.8 (0.5-1.2)	9.0	1.4 (1.0-2.0)	5.0	0.8 (0.5-1.2)
Family structure							
Two-biological parent family	1417	4.0		7.4		4.7	
Other	724	6.2	1.7 (1.1-2.5)	7.3	1.1 (0.7-1.5)	6.8	1.4 (0.9-2.1)
Ethnicity							
Finnish	2048	4.8		7.4		5.1	
Other	71	2.8	0.6 (0.1-2.5)	8.5	1.1 (0.5-2.6)	9.9	1.8 (0.7-4.2)
General health							
Healthy	1114	3.7		6.8		4.9	
Somatic illness	909	6.3	1.7 (1.1-2.6)	7.7	1.3 (0.9-1.8)	5.4	1.1 (0.8-1.7)
Perceived difficulties							
None	1256	3.3		6.1		3.7	
Minor	722	6.4	2.1 (1.3-3.2)	9.4	1.9 (1.4-2.7) ^b	6.5	2.0 (1.3-3.0)
Definite or severe	137	9.5	3.8 (1.9-7.5) ^b	10.2	2.5 (1.4-4.7)	13.1	3.8 (2.0-7.0) ^b
SDQ scale cutoff, %							
Total problems							
<90	1931	3.7		6.9		4.4	
≥90	206	15.1	5.5 (3.4-8.9) ^b	11.7	2.8 (1.7-4.6) ^b	14.1	4.8 (3.0-7.7) ^b
Hyperactivity problems							
<90	1963	4.9		6.5		4.5	
≥90	175	3.4	0.8 (0.4-2.0)	17.4	3.8 (2.4-6.0) ^b	14.9	4.1 (2.5-6.7) ^b
Emotional problems							
<90	1975	4.1		7.5		4.8	
≥90	162	13.0	3.4 (2.0-5.9) ^b	6.2	1.1 (0.5-2.2)	12.4	3.1 (1.8-5.5) ^b
Conduct problems							
<90	2011	4.8		6.6		4.7	
≥90	127	4.7	1.4 (0.6-3.4)	20.5	4.7 (2.9-7.7) ^b	15.8	4.3 (2.5-7.6) ^b
Peer problems							
<90	1932	3.6		7.5		4.9	
≥90	205	16.1	5.8 (3.7-9.3) ^b	6.8	1.1 (0.6-2.0)	9.8	2.4 (1.4-4.1)
Prosocial problems							
>10	1857	4.7		6.0		4.8	
≤10	280	5.0	1.3 (0.7-2.4)	16.4	3.0 (2.1-4.5) ^b	8.9	2.2 (1.4-3.6)
Alcohol use							
Never	1337	5.0		4.9		3.4	
≥Once/mo	674	4.3	1.0 (0.6-1.7)	10.2	2.5 (1.7-3.7) ^b	7.1	2.4 (1.6-3.8) ^b
≥Once/wk	126	4.8	1.7 (0.7-4.1)	19.1	6.1 (3.5-10.6) ^b	15.9	6.3 (3.4-11.9) ^b
Drunk							
Never	1497	4.9		5.5		4.0	
≥Once/mo	544	4.6	1.1 (0.7-1.8)	11.0	2.4 (1.7-3.5) ^b	6.3	1.8 (1.1-2.9)
≥Once/wk	93	3.2	1.2 (0.4-4.0)	17.2	5.0 (2.7-9.5) ^b	20.4	7.0 (3.7-13.5) ^b
Smoking							
Never	1450	4.8		5.1		4.0	
Rarely	290	4.1	0.9 (0.5-1.8)	11.4	2.5 (1.6-3.9) ^b	6.2	1.7 (0.95-2.9)
Weekly or daily	395	5.1	1.3 (0.7-2.2)	12.9	2.9 (2.0-4.4) ^b	9.9	2.7 (1.7-4.2) ^b
I feel safe at school							
Almost always or often	1853	4.2		6.8		4.6	
Sometimes or almost never	273	9.2	2.6 (1.6-4.3) ^b	11.4	2.0 (1.3-3.0)	11.0	2.5 (1.5-4.0) ^b
I feel teachers at my school care about me							
Almost always or often	1135	3.9		4.6		4.2	
Sometimes or almost never	989	5.8	1.7 (1.1-2.6)	10.6	2.5 (1.8-3.6) ^b	6.8	1.7 (1.2-2.5)
Distracting headaches							
Hardly ever or less frequently	1395	3.4		6.4		4.1	
≥Once/mo	465	6.0	1.9 (1.1-3.0)	8.8	1.7 (1.2-2.6)	7.3	2.1 (1.3-3.3)
≥Once/wk	273	9.5	3.1 (1.9-5.2) ^b	10.3	2.0 (1.3-3.2)	8.8	2.4 (1.4-4.1)
Recurring abdominal pain							
Hardly ever or less frequently	1599	3.9		7.2		4.8	
≥Once/mo	410	6.8	1.6 (1.0-2.6)	7.6	1.4 (0.9-2.1)	5.6	1.4 (0.8-2.3)
≥Once/wk	120	9.2	2.6 (1.3-5.3)	10.0	1.8 (0.9-3.6)	12.5	2.7 (1.4-5.2)
Problems with falling asleep							
<Once/wk	1549	3.7		7.2		4.1	
Once or twice/wk	315	5.7	1.6 (0.9-2.9)	7.3	1.1 (0.7-1.8)	8.6	2.4 (1.5-3.9) ^b
Every or almost every night	266	9.8	3.1 (1.9-5.1) ^b	9.0	1.5 (0.9-2.5)	9.4	2.6 (1.5-4.3) ^b

Abbreviations: CI, confidence interval; OR, odds ratio; SDQ, Strengths and Difficulties Questionnaire.

^aResults of logistic regression analyses. All analyses were adjusted with the effect of sex, family structure, city, ethnicity, and grade.

^b*P* < .001.

Adolescents who were cybervictims only were more likely to be from families with other than 2 biological parents, have psychosomatic problems (headaches, recurring abdominal pain, and sleeping problems), have high levels of perceived difficulties, have emotional and peer problems, and feel unsafe at school and uncared about by teachers. These results indicate that the cybervictims have mainly emotional and peer problems. The results are in line with the review by Hawker and Boulton²⁸ on conventional bullying victims as well as findings regarding cybervictims of different types.^{3,29} Similarly, cyberbullies who were not victims had a high level of perceived difficulties, felt unsafe at school and uncared about by teachers, and had a high level of headaches. However, cyberbullies also had a high level of conduct problems, hyperactivity, frequent smoking and drunkenness, and low prosocial behavior. This is in accordance with studies showing an association between bullying others and behavioral and conduct problems¹¹ as well as substance use.^{30,31} Accordingly, the Youth Internet Safety Survey research showed that cybervictims are more likely to report depressive symptoms and perpetrators are more likely to report alcohol use.³⁻⁵ In our study, cyberbullies who were also victims had all of these problems. This is in accordance with previous findings from the bullying literature, indicating that bully-victims are the most troubled group.^{17,18} Previous cross-sectional and longitudinal studies have shown that traditional bully-victims are most strongly at risk for a wide range of psychiatric problems, crime, and suicidality.^{17,18,20}

The finding regarding the psychosomatic problems is in line with previous studies^{10,32,33} from the bullying literature, indicating an association between victimization and sleeping problems, bed-wetting, headaches, and stomachaches. The results are also in line with a recent review¹⁶ indicating that all children involved in bullying behavior (bullies, victims, and bully-victims) are at significantly higher risk for a variety of psychosomatic problems compared with uninvolved peers. As in a meta-analysis of traditional bullying,¹⁶ however, we found that the largest risk was for victims and bully-victims, whereas bullies were at lower risk for psychosomatic problems than the other 2 groups. These results indicate that psychosomatic reactions should alert us to those youngsters involved not only in traditional bullying behavior³³ but also in cyberbullying.

Several limitations should be considered when interpreting the findings. First, all of the information was based on self-reports. However, because of the anonymity of cyberbullying, information on peer nomination and parent and teacher information may not be very reliable. Second, the study design was cross-sectional. No interpretation of direction of causality between cyberbullying and psychosocial factors can be drawn. Therefore, longitudinal research examining correlations between cyberbullying and later mental health distress is strongly warranted. Third, shared method variance stemming from the use of the same informants for both predictors and outcomes may inflate the observed associations. Fourth, information about traditional bullying was based on self-reports and no information about other sources (eg, parents, teachers, peer nomination) was available. Finally,

there is no clear-cut understanding of how cyberbullying should be defined, and there is a need for operationalizing what acts should be included in that concept.

The results suggest that childhood bullying not only happens in schools but has now become electronic. Cyberbullying should be viewed as an increasingly important type of bullying behavior. Both cyberbullying and cybervictimization are associated with psychiatric and psychosomatic problems. The most troubled are those who are both bullies and victims. This implies the need for new strategies for prevention and intervention. It is not enough to adopt the recommendation by Olweus³⁴ for a whole-school antibullying approach that includes school-wide and classroom components. There is a need to create cyberenvironments and supervision that provide clear and consistent norms for healthy cyberbehavior. Clinicians working in child and adolescent health services should be aware that cyberbullying is potentially traumatizing. Questions about cyberbullying should be included in adolescent mental health assessment.

Rapid technological changes, the anonymity of the perpetrator, and the potentially large audience make cyberbullying more complicated to prevent than traditional bullying. The potential of cyberbullying is probably growing with the increasing penetration of networked computers and mobile telephones among children and adolescents. Therefore, policy makers, educators, parents, and adolescents themselves should be aware of the potentially harmful effects of cyberbullying. Future research is needed on whether antibullying policies, materials, interventions, and mobile telephone and Internet user guidelines are effective for reducing cyberbullying.

Submitted for Publication: April 18, 2009; final revision received September 28, 2009; accepted December 14, 2009.

Correspondence: Andre Sourander, MD, PhD, Department of Child Psychiatry, Turku University Hospital, 20520 Turku, Finland (andre.sourander@utu.fi).

Financial Disclosure: None reported.

Funding/Support: The study was supported by a grant from the Pediatric Research Foundation, Finland, and by the Finnish-Swedish Medical Association (Finska Läkaresällskapet).

Additional Contributions: Anniina Helenius, Vilja Salo, and Saana Sourander assisted with data collection.

REFERENCES

1. Smith PK, Mahdavi J, Carvalho M, Fisher S, Russell S, Tippett N. Cyberbullying: its nature and impact in secondary school pupils. *J Child Psychol Psychiatry*. 2008;49(4):376-385.
2. Balding J. *Young People in 2004: The Health-Related Behaviour Questionnaire Results for 40 430 Young People Between the Ages of 10 and 15*. Exeter, England: Schools Health Education Unit; 2005.
3. Ybarra ML, Mitchell KJ. Online aggressor/targets, aggressors, and targets: a comparison of associated youth characteristics. *J Child Psychol Psychiatry*. 2004; 45(7):1308-1316.
4. Ybarra ML, Mitchell KJ, Wolak J, Finkelhor D. Examining characteristics and associated distress related to Internet harassment: findings from the Second Youth Internet Safety Survey. *Pediatrics*. 2006;118(4):e1169-e1177. doi:10.1542/peds.2006-0815.
5. Ybarra ML. Linkages between depressive symptomatology and Internet harassment among young regular Internet users. *Cyberpsychol Behav*. 2004;7(2): 247-257.

6. Raskauskas J, Stoltz AD. Involvement in traditional and electronic bullying among adolescents. *Dev Psychol.* 2007;43(3):564-575.
7. Smith P, Mahdavi J, Carvalho M, Tippett N. *An Investigation Into Cyberbullying, Its Forms, Awareness and Impact, and the Relationship Between Age and Gender in Cyberbullying.* London, England: Department for Education and Skills; 2006. Research brief RBX03-06.
8. Olweus D. *Bullying at School: What We Know and What We Can Do.* Oxford, England: Blackwell; 1993.
9. Due P, Holstein BE, Lynch J, Diderichsen F, Gabhain SN, Scheidt P, Currie C; Health Behaviour in School-Aged Children Bullying Working Group. Bullying and symptoms among school-aged children: international comparative cross sectional study in 28 countries. *Eur J Public Health.* 2005;15(2):128-132.
10. Rigby K. Peer victimization at school and the health of secondary school students. *Br J Educ Psychol.* 1999;69(pt 1):95-104.
11. Nansel TR, Overpeck MD, Haynie DL, Ruan WJ, Scheidt PC. Relationships between bullying and violence among US youth. *Arch Pediatr Adolesc Med.* 2003;157(4):348-353.
12. Arseneault L, Walsh E, Trzesniewski K, Newcombe R, Caspi A, Moffitt TE. Bullying victimization uniquely contributes to adjustment problems in young children: a nationally representative cohort study. *Pediatrics.* 2006;118(1):130-138.
13. Craig WM. The relationship among bullying, victimization, depression, anxiety, and aggression in elementary school children. *Pers Individ Dif.* 1998;24(1):123-130. doi:10.1016/S0191-8869(97)00145-1.
14. Kumpulainen K, Räsänen E. Children involved in bullying at elementary school age: their psychiatric symptoms and deviance in adolescence: an epidemiological sample. *Child Abuse Negl.* 2000;24(12):1567-1577.
15. Kim YS, Leventhal BL, Koh YJ, Hubbard A, Boyce WT. School bullying and youth violence: causes or consequences of psychopathologic behavior? *Arch Gen Psychiatry.* 2006;63(9):1035-1041.
16. Gini G, Pozzoli T. Association between bullying and psychosomatic problems: a meta-analysis. *Pediatrics.* 2009;123(3):1059-1065.
17. Sourander A, Jensen P, Rønning JA, Niemelä S, Helenius H, Sillanmäki L, Kumpulainen K, Piha J, Tamminen T, Moilanen I, Almqvist F. What is the early adulthood outcome of boys who bully or are bullied in childhood? the Finnish "From a Boy to a Man" study. *Pediatrics.* 2007;120(2):397-404.
18. Sourander A, Jensen P, Rønning JA, Elonheimo H, Niemelä S, Helenius H, Kumpulainen K, Piha J, Tamminen T, Moilanen I, Almqvist F. Childhood bullies and victims and their risk of criminality in late adolescence: the Finnish From a Boy to a Man study. *Arch Pediatr Adolesc Med.* 2007;161(6):546-552.
19. Sourander A, Rønning J, Brunstein Klomek A, Gyllenberg D, Kumpulainen K, Niemelä S, Helenius H, Sillanmäki L, Ristkari T, Tamminen T, Moilanen I, Piha J, Almqvist F. Childhood bullying behavior and later psychiatric hospital and psychopharmacological treatment: findings from the Finnish 1981 birth cohort study. *Arch Gen Psychiatry.* 2009;66(9):1005-1012.
20. Klomek AB, Sourander A, Kumpulainen K, Piha J, Tamminen T, Moilanen I, Almqvist F, Gould MS. Childhood bullying as a risk for later depression and suicidal ideation among Finnish males. *J Affect Disord.* 2008;109(1-2):47-55.
21. Klomek AB, Sourander A, Niemelä S, Kumpulainen K, Piha J, Tamminen T, Almqvist F, Gould MS. Childhood bullying behaviors as a risk for suicide attempts and completed suicides: a population-based birth cohort study. *J Am Acad Child Adolesc Psychiatry.* 2009;48(3):254-261.
22. Rønning JA, Sourander A, Kumpulainen K, Tamminen T, Niemelä S, Moilanen I, Helenius H, Piha J, Almqvist F. Cross-informant agreement about bullying and victimization among eight-year-olds: whose information best predicts psychiatric caseness 10-15 years later? *Soc Psychiatry Psychiatr Epidemiol.* 2009;44(1):15-22.
23. Hinduja S, Patchin JW. *Bullying Beyond the Schoolyard: Preventing and Responding to Cyberbullying.* Thousand Oaks, CA: Corwin Press; 2009.
24. Goodman R. The Strengths and Difficulties Questionnaire: a research note. *J Child Psychol Psychiatry.* 1997;38(5):581-586.
25. Goodman R. The extended version of the Strengths and Difficulties Questionnaire as a guide to child psychiatric caseness and consequent burden. *J Child Psychol Psychiatry.* 1999;40(5):791-799.
26. Koskelainen M, Sourander A, Vauras M. Self-reported strengths and difficulties in a community sample of Finnish adolescents. *Eur Child Adolesc Psychiatry.* 2001;10(3):180-185.
27. Hosmer DW Jr, Lemeshow S. *Applied Survival Analysis: Regression Modeling of Time to Event Data.* New York, NY: John Wiley & Sons; 1999.
28. Hawker DSJ, Boulton MJ. Twenty years' research on peer victimization and psychosocial maladjustment: a meta-analytic review of cross-sectional studies. *J Child Psychol Psychiatry.* 2000;41(4):441-455.
29. Finkelhor D, Mitchell KJ, Wolak J. Online victimization: a report on the nation's youth, 2000. http://www.missingkids.com/en_US/publications/NC62.pdf. Accessed March 15, 2009.
30. Nansel TR, Craig W, Overpeck MD, Saluja G, Ruan WJ; Health Behaviour in School-aged Children Bullying Analyses Working Group. Cross-national consistency in the relationship between bullying behaviors and psychosocial adjustment. *Arch Pediatr Adolesc Med.* 2004;158(8):730-736.
31. Kaltiala-Heino R, Rimpela M, Rantanen P, Rimpela A. Bullying at school: an indicator of adolescents at risk for mental disorders. *J Adolesc.* 2000;23(6):661-674.
32. Fekkes M, Pijpers FIM, Fredriks AM, Vogels T, Verloove-Vanhorick SP. Do bullied children get ill, or do ill children get bullied? a prospective cohort study on the relationship between bullying and health-related symptoms. *Pediatrics.* 2006;117(5):1568-1574.
33. Williams K, Chambers M, Logan S, Robinson D. Association of common health symptoms with bullying in primary school children. *BMJ.* 1996;313(7048):17-19.
34. Olweus D. Bullying at school: basic facts and an effective intervention programme. *Promot Educ.* 1994;1(4):27-31, 48.