Journal of Adolescent Health 51 (2012) 59–65

ELSEVIER

JOURNAL OF ADOLESCENT HEALTH

www.jahonline.org

Original article

Longitudinal Predictors of Cyber and Traditional Bullying Perpetration in Australian Secondary School Students

Sheryl A. Hemphill, Ph.D.[a,*], Aneta Kotevski, D.Psych.[a], Michelle Tollit, M.Ed. Psych.[a], Rachel Smith, M. Psych.[b,c], Todd I. Herrenkohl, Ph.D.[d], John W. Toumbourou, Ph.D.[e,f], and Richard F. Catalano, Ph.D.[d]

[a] *School of Psychology, Australian Catholic University, Australia*
[b] *Centre for Adolescent Health, Royal Children's Hospital, Murdoch Childrens Research Institute, Victoria, Australia*
[c] *Department of Paediatrics, The University of Melbourne, Victoria, Australia*
[d] *Social Development Research Group, School of Social Work, University of Washington, Seattle, Washington, United States*
[e] *School of Psychology, Deakin University, Australia*
[f] *Centre for Mental Health and Wellbeing Research, Deakin University, Australia*

Article history: Received June 30, 2011; Accepted November 22, 2011
Keywords: Cyberbullying; Bullying; Adolescents; Covert bullying; Relational aggression; Longitudinal study

See Editorial p. 3

A B S T R A C T

Purpose: Cyberbullying perpetration (using communication technology to engage in bullying) is a recent phenomenon that has generated much concern. There are few prospective longitudinal studies of cyberbullying. The current article examines the individual, peer, family, and school risk factors for both cyber and traditional bullying (the latter is bullying that does not use technology) in adolescents.
Methods: This article draws on a rich data set from the International Youth Development Study, a longitudinal study of students in Victoria, Australia and Washington State, United States, which began in 2002. In this article, data from almost 700 Victorian students recruited in grade 5 are analyzed to examine grade 7 (aged 12–13 years) predictors of traditional and cyberbullying perpetration in grade 9 (aged 14–15 years).
Results: Fifteen per cent of students engaged in cyberbullying, 21% in traditional bullying, and 7% in both. There are similarities and important differences in the predictors of cyber and traditional bullying. In the fully adjusted model, only prior engagement in relational aggression (a covert form of bullying, such as spreading rumors about another student) predicted cyberbullying perpetration. For traditional bullying, previous relational aggression was also predictive, as was having been a victim and perpetrator of traditional bullying, family conflict, and academic failure.
Conclusions: The use of evidence-based bullying prevention programs is supported to reduce experiences of all forms of bullying perpetration (cyber, traditional, and relational aggression). In addition, for traditional bullying perpetration, addressing family conflict and student academic support are also important.

IMPLICATIONS AND CONTRIBUTION

This study explored longitudinal factors that influence the development of cyber and traditional bullying. It is one of only a few studies to examine the longitudinal predictors of cyberbullying and contrast them with traditional bullying. Such knowledge can inform prevention efforts to reduce bullying experiences for young people.

Advances in communication technology provide young people with new ways to communicate and, in turn, bring new forms of adverse social interactions among young people, referred to as "cyberbullying." A national Australian study of 8–14-year-olds found rates of cyberbullying perpetration were 3.8% for boys and 3.3% for girls [1]. In a large, national study in the United States of 10–17-year-olds, 15% of youth had engaged in cyberbullying [2].

* Address correspondence to: Sheryl Hemphill, Ph.D., School of Psychology, Australian Catholic University, 115 Victoria Parade, Fitzroy VIC 3065, Australia.
E-mail address: sheryl.hemphill@acu.edu.au (S.A. Hemphill).

1054-139X/$ - see front matter © 2012 Society for Adolescent Health and Medicine. All rights reserved.
doi:10.1016/j.jadohealth.2011.11.019

Rates of cyberbullying of up to 53% have been reported [3]. Research has shown that some students who engage in cyberbullying also engage in traditional (e.g., physical) bullying [4,5]. Despite the increasing evidence of (cyber) bullying perpetration in young people, there have been few studies of the longitudinal predictors of traditional and cyberbullying perpetration. The current article focuses on longitudinal predictors of cyber and traditional bullying among students in Victoria, Australia. Such knowledge can inform the development of prevention strategies for bullying.

Traditional bullying includes aggressive/negative intentional acts repeatedly directed (by one or more individuals) toward victims over time. When bullying occurs, there is typically a power imbalance between perpetrators and victims, with victims often being unable to easily defend themselves from perpetrators [6]. However, it is increasingly recognized that the measurement of bullying can be difficult, particularly when trying to capture the repetitious nature and power imbalances reflected in current definitions [7,8]. Cyberbullying is often described as an extension of "traditional" bullying (bullying as it occurred before the use of technology), with similar defining features to traditional bullying. In the current article, we measured cyber and traditional bullying using examples of bullying behaviors and do not ask about repetition or power imbalances in the relationships. This more general framing of bullying dynamics is similar to that used elsewhere [9].

Bullying behavior can be covert (e.g., exclusion, spreading rumors) or overt (e.g., verbal and physical abuse). A related behavior is "relational aggression." Cyberbullying is often considered a specific form of covert bullying that involves the use of electronic devices to carry out bullying. Electronic media, such as computers, mobile telephones, and personal digital assistants, are used by young people to bully, embarrass, exclude, or humiliate others, via methods such as e-mail, chat-rooms, social networking sites, instant messaging, Web sites, telephone calls, video, and text messaging [1,5]. Cyberbullying can also be overt (e.g., deliberate cyber stalking, sending derogatory, or hate mail) [10]. Young people may be aware that they are victims of overt types of cyberbullying or alternatively may initially be oblivious to cyberbullying (e.g., being removed from social network sites) [10].

Traditional and cyberbullying have similar psychological, emotional, and social effects on victims. Cyberbullying is associated with emotional distress [4], substance use, and delinquency [2], as well as feelings of fearfulness, powerlessness, sadness, and anger [11], and in severe circumstances, adolescent suicide [4]. In addition, cyberbullying can negatively impact young people's dating, peer, and parental relationships, and friendships [10].

The unique features of cyberbullying compared with traditional bullying are the ability of the perpetrator to remain anonymous [12] and to bully large numbers of people relatively effortlessly, irrespective of the time of day or geographic location [13]. Participating in traditional bullying is associated with a greater likelihood of engaging in cyberbullying [14], and being a victim of traditional bullying is linked with being a perpetrator of online harassment [2].

Predictors of cyberbullying

Few studies have examined predictors of cyberbullying perpetration and compared these with traditional bullying. Williams and Guerra (2007) found that shared predictors of Internet bullying, physical bullying, and verbal bullying include normative beliefs that accept bullying behavior, a negative school climate, and perceived lack of peer social support [15].

Research on predictors of cyberbullying can be guided by the extant literature on traditional bullying and youth violence. Predictors are referred to as prospective "risk" factors. A risk factor increases the likelihood of a person developing poor outcomes or problematic behaviors, such as bullying [16,17]. The theory informing the research presented in the current article is the Social Development Model (SDM) [18]. Consistent with ecological perspectives, the SDM organizes risk factors according to their influence in different socialization settings (student, family, peer group, school, and community) across development, recognizing different contextual influences at different developmental periods [18]. The SDM postulates that antisocial behavior (including bullying) originates with unhealthy beliefs and unclear standards, as well as bonds or attachment to deviant peers and others involved in antisocial behavior (e.g., family members, neighbors).

School risk factors for bullying perpetration have been extensively studied. Attending a school with a positive climate and being connected to school are associated with a lower risk of bullying perpetration [15]. There is also an association between low academic performance and school-based bullying [19]. School suspension has been shown to increase the likelihood of violent [20] and antisocial behavior [21]. In the current study, the authors sought to examine whether school suspension and factors associated with school disengagement (academic failure, low school commitment) were associated with bullying, given that these school factors may provide students with more (unsupervised) time to engage in bullying.

In the family context, high parental support is negatively related to physical, verbal, relational, and cyberbullying [22]. Having a poor emotional bond with a caregiver increases the likelihood of being involved in online bullying perpetration [2]. Family conflict is an established predictor of youth violence, physical aggression, and bullying [20,23–25]. Poor family management (reflected by lack of clear rules and monitoring of students) is also an established risk factor for violent and antisocial behaviors [20,23,24]. It is likely to be important in the context of cyberbullying, given that cyberbullying can occur anytime, anywhere, including in the family home, and parent monitoring and rule setting may be key. Families may be involved in exacerbating or discouraging cyberbullying, as well as participating in the cyberbullying experience itself [10]. Understanding the impact of family risk factors on cyberbullying perpetration is an important area of study.

It is a well-established finding that antisocial peer influences increase the risk of violence and antisocial behavior [20,23,24]. Online peers can readily become bystanders for cyberbullying, and similar to the off-line world, negative peer interactions can result in increased levels of cyberbullying through the development of a group culture that rewards bullying behavior, for example, posts on Facebook [26]. Given that bullying behavior may be encouraged by peer onlookers (online and off-line), association with antisocial friends or peers will be examined in the current study.

Further exploration of the predictors of cyber versus traditional bullying across a range of risk factors is warranted to develop prevention approaches. The main research question of the current article is whether the longitudinal predictors of cyberbullying perpetration are the same as those of traditional

bullying. The authors hypothesize that the predictors will be similar.

Methods

Participants

This article draws on data from the International Youth Development Study, a longitudinal study of the development of students from Victoria, Australia and Washington State, United States who were recruited through schools in grades 5, 7, and 9 in 2002. To obtain state representative samples from the two states, a two-stage cluster sampling approach was used. In the first stage, within each state and grade level, public and private schools containing grades 5, 7, or 9 were randomly selected using a probability proportionate to grade-level size sampling procedure [27]. A target classroom within each school was randomly selected in the second stage. Further details about recruitment and participation rates are described in McMorris et al [28].

Data for the current study are taken from participants in the Victorian grade 5 cohort (n = 927) who had complete data in grades 7 and 9 (n = 696; 75% of the original sample). No data were collected from this sample in grade 8. Participants consisted of 336 males (48.2%) and 360 females (51.8%), aged between 11.9 and 14.4 years (mean age = 12.9 years; standard deviation = .4 years) in seventh grade and between 14.2 and 16.5 in ninth grade (mean age = 15.2 years; standard deviation = .4 years).

Procedure

Permission to conduct the research in Victorian schools was obtained from the Royal Children's Hospital Ethics in Human Research Committee, the Human Research Ethics Committee at the University of Melbourne, the Department of Education and Training for government (public) schools, and from the Catholic Education Office for Catholic schools. Then permission was sought from school principals. Parents provided written consent for their children to participate in the study, and students provided assent on the day of the survey. In 2006, the Department of Education and Training (government schools) required passive parental consent for their child's continued participation in the study. Study staff administered surveys in each year of the study between May and November. The pen-and-paper surveys were group administered in classrooms during a 50–60 minute period. Students who were no longer attending school were interviewed over the telephone (3% and 4% of surveys in grade 7 and 9, respectively), and students received small thank you gifts upon survey completion (e.g., a highlighter, a book voucher). The survey was completed by 98% of the students in the original panel in grade 7 (n = 907) and 87% in grade 9 (n = 805).

Measures

Cyber & traditional bullying perpetration. Traditional bullying perpetration was measured in grade 7 and 9 by asking students to report if they had "taken part in bullying another student(s) at school recently." Students were given examples of bullying behaviors (i.e., teasing or calling names, spreading rumors about others, deliberately leaving another out of things, threatening another physically, or actually hurting another). This item was based on questions asked in the Gatehouse Bullying Scale [29]. *Cyberbullying perpetration* was assessed for the first time in grade 9 using an item developed by the authors to be similar to the traditional bullying question and to be consistent with the wording of other behavioral items in the survey. Students were asked if in the past 12 months they had "bullied another student using technology, such as mobile telephones, the Internet, computers, answering machines, or cameras?" Item responses were *no; yes, less than once a week; yes, about once a week;* and *yes, most days* on a 4-point Likert scale. A dichotomous measure was created separately for both cyber and traditional bullying perpetration. Students reporting no involvement in bullying perpetration were given a score of zero, and students reporting any bullying perpetration (less than once a week or more) were given a score of one.

Risk factors. The self-reported measures of individual, family, peer group, and family risk factors in grade 7 were obtained from a modified version of the *Communities That Care* survey, which has acceptable psychometric properties in the United States [30,31] and has been previously used in Victoria [32,33]. The means, standard deviations, number of items, item responses, example items, and Cronbach's alphas are listed in Table 1. Because of the positively skewed distribution of scores for some risk factors, traditional bullying victimization and perpetration, interaction with antisocial friends, and school suspension were dichotomized for the analyses (1 = risk factor present, 0 = risk factor absent). The correlation between relational aggression and traditional and cyberbullying perpetration was less than .40, supporting the inclusion of all three measures, each capturing different facets of bullying behavior.

Analysis

Data analysis was performed with the Stata/IC 10.0 for Windows program [34]. First, unadjusted logistic regression analyses were conducted to examine prospective associations between each of the grade 7 risk factors and grade 9 cyber and traditional bullying perpetration. Next, adjusted logistic regression models investigated prospective associations between risk factors and cyber and traditional bullying perpetration, controlling for prior traditional bullying and relational aggression. Factors included in the analyses were entered in blocks before the multivariate model; individual factors were entered first, followed by the peer group factor, family factors, and finally, school factors. All analyses in this study controlled for age, gender, and the clustering of students in schools. Statistically nonsignificant interactions between gender and risk factors for each form of bullying were found, and hence interactions are not included in the multivariate model.

Results

Rates of bullying perpetration

Table 2 shows the distribution of cyber and traditional bullying perpetration at grade 9 in 2006. Approximately 15% of students reported that they had engaged in cyberbullying and 21% of students had engaged in traditional bullying. Further analyses revealed that 7.3% of students had cyberbullied others and engaged in traditional bullying. Traditional bullying was more prevalent in boys than girls; however, there were no gender differences for cyberbullying perpetration.

Table 1
Descriptive statistics (means, standard deviations, percentages) on risk factors measured in grade 7

Continuous measures	Mean (SD)	Number of items in scale	Response options	Cronbach's α
Individual risk factors				
Relational aggression (e.g., "how many times in the past 12 months have you told lies about a student to make other kids not like them?")	1.47 (.83)	2	8 (never to 40 times or more)	.62
Family risk factors				
Poor family management (e.g., "would your parent know if you did not come home on time?")	1.52 (.49)	9	4 (definitely no to definitely yes)	.83
Family conflict (e.g., "people in my family have serious arguments.")	1.94 (.76)	3	4 (definitely no to definitely yes)	.82
School risk factors				
Academic failure (e.g., "what were your grades like last year?")	1.86 (.56)	2	4 (very poor to very good)	.63
Low commitment to school (e.g., "how interesting are most of your school subjects to you?")	2.04 (.59)	7	5 (very interesting to very boring)	.80
Categorical measures	**%**	**Number of items in scale**	**Response options**	**Cronbach's α**
Individual risk factors				
Traditional bullying victimization (e.g., "have you been teased or called names, had rumors spread about you?")	38.8	1	2 (no to yes, once a week)	N/A
Traditional bullying perpetration (e.g., "have you taken part in bullying another student at school recently?")	17.2	1	2 (no to yes, once a week)	N/A
Peer risk factor				
Interaction with antisocial friends (e.g., "in the past 12 months, how many of your best friends have sold illegal drugs?")	34.8	8	2 (no friends to one or more friends)	.78
School risk factor				
School suspension (e.g., "in the past 12 months have you been suspended from school?")	5.2	1	2 (no suspensions to one or more)	N/A

SD = standard deviation; N/A = not applicable.

Correlations between all risk factors and bullying variables

Intercorrelations between all risk factors and bullying variables were generally moderate and below .40. Given that no correlations approached .80, bivariate associations did not indicate problems with multicollinearity [35].

Unadjusted and adjusted logistic regression analyses for cyberbullying

Unadjusted logistic regression analyses examined grade 7 risk factors for grade 9 cyberbullying (Table 3). Grade 7 traditional bullying perpetration was associated with an approximately two-and-a-halffold increase in cyberbullying, whereas prior bullying victimization, relational aggression, interaction with antisocial friends, poor family management, family conflict, academic failure, and low commitment to school were associated with a one-and-a-halffold increase in cyberbullying.

Adjusted logistic regression analyses revealed that relational aggression in grade 7 was associated with an almost one-and-a-halffold increase in grade 9 cyberbullying perpetration (see Table 3). The remaining risk factors were not associated with cyberbullying perpetration in grade 9 in the fully adjusted model.

Unadjusted and adjusted logistic regression analyses for traditional bullying

Traditional bullying shared similar predictors to cyberbullying perpetration in the unadjusted analysis. School suspension was not a statistically significant risk factor for either cyberbullying or traditional bullying perpetration. Adjusted logistic regression analyses showed that grade 7 traditional bullying perpetration was associated with an almost twofold increase in traditional bullying perpetration in grade 9. Relational aggression, traditional bullying victimization, family conflict, and aca-

Table 2
Percentage (%) and number of students engaging in cyber and traditional bullying in the past 12 months for grade 9 Victorian boys and girls

	Total sample (n = 696)		Cyberbully (n = 696)		Traditional bully (n = 696)	
Bullying status	Cyber	Traditional	Boys	Girls	Boys	Girls
Bully perpetration	14.7 (n = 102)	21.4 (n = 149)	13.4 (n = 45)	15.8 (n = 57)	28.3 (n = 95)	15.0 (n = 54)
Never bullied others	85.3 (n = 594)	78.6 (n = 547)	86.6 (n = 291)	84.2 (n = 303)	71.7 (n = 241)	85.0 (n = 306)

For cyberbullying perpetration, χ^2 (1) = .8, $p > .05$ for gender difference.
For traditional bullying perpetration, χ^2 (1) = 18.2, $p < .05$ for gender difference.

Table 3
Unadjusted and adjusted logistic regression analyses comparing grade 7 risk factors for grade 9 cyber and traditional bullying (n = 696)

	Grade 9 cyberbullying		Grade 9 traditional bullying	
Grade 7 risk factors	Partially adjusted analyses OR (95% CI)	Adjusted analyses OR (95% CI)	Partially adjusted analyses OR (95% CI)	Adjusted analyses OR (95% CI)
Individual risk factors				
Traditional bullying victimization	1.5 (1.0, 2.3)*	1.3 (.9, 2.1)	1.9 (1.3, 2.8)**	1.6 (1.1, 2.5)*
Relational aggression	1.4 (1.2, 1.8)***	1.3 (1.1, 1.5)**	1.6 (1.2, 2.2)***	1.4 (1.1, 1.7)*
Traditional bullying perpetration	2.6 (1.6, 4.3)***	1.6 (.9, 2.9)	3.3 (2.1, 5.0)***	2.1 (1.3, 3.4)**
Peer risk factor				
Interaction with antisocial friends	1.7 (1.1, 2.8)*	1.2 (.7, 2.1)	2.0 (1.3, 3.1)***	1.4 (.9, 2.3)
Family risk factors				
Poor family management	1.4 (1.0, 2.0)*	.9 (.6, 1.5)	1.8 (1.3, 2.6)***	1.4 (.9, 2.2)[a]
Family conflict	1.4 (1.1, 1.8)**	1.1 (.8, 1.5)	1.6 (1.3, 2.0)***	1.4 (1.0, 1.8)*
School risk factors				
School suspension	2.1 (.8, 5.6)	1.5 (.5, 4.0)[a]	1.3 (.7, 2.4)	.8 (.4, 1.9)[a]
Academic failure	1.7 (1.2, 2.4)**	1.3 (.8, 2.1)	1.8 (1.2, 2.7)**	1.6 (1.0, 2.4)*
Low commitment to school	1.7 (1.2, 2.4)**	1.1 (.7, 1.8)	1.5 (1.1, 2.1)*	.7 (.4, 1.1)

The partially adjusted analyses control for gender, age, and the clustering of students in schools.
The fully adjusted analyses control for gender, age, the clustering of students in schools, and all the grade 7 risk factors in the table. Note it was not possible to control for grade 7 cyberbullying perpetration and victimization because these measures were not collected until students were in grade 9.
OR = odds ratio; 95% CI = 95% confidence interval.
[a] Refers to a reduction in association with bullying outcomes after the inclusion of additional risk factors into the fully adjusted model. For cyberbullying perpetration, individual, peer group, and family risk factors were associated with an increase in cyberbullying in the unadjusted analysis, however, these relationships were no longer statistically significant when school suspension was included in the adjusted model. For traditional bullying perpetration, the relationship between interaction with antisocial friends and traditional bullying was no longer statistically significant after the inclusion of family and school factors in the adjusted model (full details available from first author on request).
* $p < .05$; ** $p < .01$; *** $p < .001$.

demic failure also predicted an approximately one-and-a-halffold increase in traditional bullying.

Discussion

Cyberbullying is a recent phenomenon raising many concerns for adolescents, parents, and educators. There are few studies that provide longitudinal data on the predictors of cyberbullying perpetration, particularly with detailed information about established risk factors for traditional bullying and related behaviors. This study is unique in examining whether the longitudinal predictors of cyberbullying perpetration are the same as those of traditional bullying perpetration. The results show only a single common predictor for cyber and traditional bullying perpetration in the fully adjusted model; students having previously engaged in relational aggression (itself a form of covert bullying). For traditional bullying, additional predictors were previous student experiences of traditional bullying victimization and perpetration, family conflict, and student academic failure. These findings show the predictive associations between different forms of bullying (traditional, cyber, relational aggression) [2,14].

Predictors of cyber and traditional bullying

Consistent with previous research, the results of this study show associations between different forms of bullying [2,14]. The findings for traditional bullying demonstrate that having previously engaged in different types of bullying perpetration increases the likelihood of engaging in subsequent traditional bullying. In addition, for traditional bullying, the link between previous experiences of bullying victimization and subsequent engagement in bullying perpetration is consistent with the results of other studies [2]. Future longitudinal studies of multiple types of bullying are needed to better understand the predictive associations between bullying subtypes relative to other risk factors. The results of this study also underline the importance of further theoretical and conceptual development of "bullying" and the subtypes of bullying.

In the current study, family conflict was a predictor of traditional bullying. This is not an unexpected finding because young people living in a home environment characterized by conflict may themselves engage in problem behavior, including bullying, in other contexts [20,23–25]. Academic failure was a predictor of traditional bullying in the current study. This finding confirms the results of other studies showing links between poor academic performance and problem behaviors, including bullying at school [19].

Rates of cyber and traditional bullying

The rates of cyber and traditional bullying in the current study were higher than those reported recently in Australia [1]. This may be explained in part by the older age of the students in the current study (grades 7 and 9) compared with grades 4–8 in Cross [1], Shaw and Hearn (2009) and the different measures used to assess bullying. Further research is needed to confirm this higher prevalence of different forms of bullying in Australian students.

A small minority of students (7%) in the current study engaged in both cyber and traditional bullying. Overall, this result suggests that most students who engage in cyberbullying do not engage in traditional bullying. Previous research has shown overlap between cyber and traditional bullying and victimization [4,5]. It is possible that some students who engage in cyberbullying but not traditional bullying do so because of anonymity

and the perception that this form of bullying is less likely to be detected. Cyberbullying may also rely on different forms of power where some students who are typically the recipients of traditional bullying use superiority in technological skills (rather than physical dominance) to bully others online. Future research should investigate these possibilities.

Implications of findings for practice and policy

Potential implications for the prevention of cyber and traditional bullying perpetration are that addressing student experiences of bullying victimization and engagement in relational aggression are important. There are established bullying prevention programs, such as the Olweus Bullying Prevention program (see http://www.olweus.org/public/bullying_prevention_program.page) for use in schools. However, in the Australian context, schools have a range of bullying prevention programs to choose from, not all of which are evidence based. Researchers need to better communicate with schools about which programs are likely to reduce bullying victimization and perpetration.

The current results suggest that young people who engage in traditional bullying can be predicted by a greater range of longitudinal factors through early adolescence. Those engaging in this behavior are more likely to live in families experiencing difficulties. Therefore, an important focus of prevention programs targeted at the family is in assisting families to resolve disagreements without using aggression to solve problems. In this study, it is surprising that family factors were not related to cyberbullying perpetration in the adjusted model. Cyberbullying can occur at any time and anywhere, including within the family home. Further research with longitudinal data is required to tease out the importance of family factors for the prediction of cyberbullying.

Experiencing academic failure increases traditional bullying perpetration, consistent with many other studies showing a relationship between young people who are struggling academically and engagement in problem behavior [36]. Schools play a key role in identifying young people with academic difficulties and helping them to find appropriate assistance so that they remain engaged with school and continue to be exposed to the protective factors schools can provide for students.

Strengths and limitations of the study

This study has several strengths. It draws on data collected as part of an ongoing longitudinal study of adolescents with rich data on risk factors. It therefore provides a rare opportunity to examine the longitudinal predictors of bullying across different contexts, using a state-representative sample.

A limitation of this study is that a generic item was used to measure traditional and cyberbullying and that cyberbullying was measured for the first time in grade 9. It is important that studies like this one are replicated using more sophisticated measures of cyber and traditional bullying.

This study examined the associations between earlier risk factors with subsequent bullying behavior. Research is also needed to investigate associations from early bullying perpetration to subsequent risk factor exposure, as well as reciprocal relationships between bullying and risk factors.

There are access factors that are likely to be particularly relevant to the longitudinal prediction of cyberbullying. These include access to technology, amount of time a student spends using Internet and electronic communication technologies, competence in using technology, and the behavior of onlookers in the cyber environment [37–40]. More sophistication in measuring these factors is required.

Conclusions

This study is unique in examining the longitudinal factors that influence cyber and traditional bullying perpetration using comprehensive measures of risk factors. The results of this study underline the importance of further theoretical and conceptual development of "bullying" and the subtypes of bullying. Further longitudinal research of the predictors of cyber versus traditional bullying is warranted. This information can then inform the development of prevention programs and strategies which aim to reduce cyber and traditional bullying by targeting the predictors of these behaviors. The implementation of such strategies may positively impact the health and well-being of young people by reducing their exposure to bullying.

Acknowledgments

The authors are grateful for the financial support of the National Institute on Drug Abuse (R01-DA012140) for the International Youth Development Study initial data collection. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institute on Drug Abuse or the National Institute of Health. Continued data collection in Victoria, Australia, has been supported by two Australian Research Council Discovery Projects (DPO663371 and DPO877359). The authors appreciate and thank the project staff and participants for their valuable contribution to the project. Earlier preliminary versions of the analyses reported in this article have been presented at three different conferences: the 7th Annual Australian and New Zealand Adolescent Health Conference, the University of Melbourne, Melbourne, Australia, November 5, 2008; workshop in April 2010 at the National Center Against Bullying conference entitled "Navigating the Maze: Cybersafety and wellbeing solutions for schools," Melbourne, Australia; and the Crime and Violence Across The Life Course conference (international symposium) in July 2010, Brisbane, Australia.

References

[1] Cross D, Shaw T, Hearn L, et al. Australian Covert Bullying Prevalence Study (ACBPS). Perth, Australia: Child Health Promotion Research Centre, Edith Cowan University, 2009.
[2] Ybarra ML, Mitchell KJ. Youth engaging in online harassment: Associations with caregiver-child relationships, internet use, and personal characteristics. J Adolesc 2004;27:319–36.
[3] Keith S, Martin ME. Cyber-bullying: Creating a culture of respect in a cyber world. Reclaiming Child Youth 2005;13:224.
[4] Raskauskas J, Stoltz AD. Involvement in traditional and electronic bullying among adolescents. Dev Psychol 2007;43:564–75.
[5] Smith PK, Mahdavi J, Carvalho M, et al. Cyberbullying: Its nature and impact in secondary school pupils. J Child Psychol Psychiatry 2008;49:376–85.
[6] Olweus D. Bullying at school: What we know and what we can do. Cambridge, MA: Blackwell, 1993.
[7] Dooley JJ, Pyzalski J, Cross D. Cyberbullying versus face-to-face bullying: A theoretical and conceptual review. J Psychol 2009;217:182–8.
[8] Grigg DW. Cyber-aggression: Definition and concept of cyberbullying. Aust J Guid Couns 2010;20:143–56.
[9] Hamburger ME, Basile KC, Vivolo AM. Measuring bullying victimization, perpetration, and bystander experiences: A compendium of assessment tools. Atlanta, GA: Centers for Disease Control and Prevention, National Center for Injury Prevention and Control, 2011.
[10] Spears B, Slee P, Owens L, et al. Behind the scenes and screens: Insights into the human dimension of covert and cyberbullying. J Psychol 2009;217:189–96.

[11] Hoff DL, Mitchell SN. Cyberbullying: Causes, effects, and remedies. J Educ Adm 2009;47:652–65.
[12] Patchin JW, Hinduja S. Bullies move beyond the schoolyard: A preliminary look at cyberbullying. Youth Violence Juvenile Justice 2006;4:148–69.
[13] Kowalski RM, Limber SP. Electronic bullying among middle school students. J Adolesc Health 2007;41:S22–30.
[14] Juvonen J, Gross EF. Extending the school grounds? Bullying experiences in cyberspace. J Sch Health 2008;78:496–505.
[15] Williams KR, Guerra NG. Prevalence and predictors of internet bullying. J Adolesc Health 2007;41:S14–21.
[16] Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. Psychol Bull 1992;112:64–105.
[17] National Crime Prevention. Pathways to prevention: Developmental and early intervention approaches to crime in Australia. Canberra, Australia: Commonwealth Attorney General's Department, 1999.
[18] Catalano RF, Hawkins JD. The social development model: A theory of antisocial behavior. In: Hawkins JD, ed. Delinquency and Crime: Current Theories. New York, NY: Cambridge, 1996:149–97.
[19] Demosthenous HT, Bouhours T, Demosthenous CM. Socioeconomic status and youth aggression in Australia. Youth Stud Aust 2002;21:11–5.
[20] Hemphill SA, Smith R, Toumbourou JW, et al. Modifiable determinants of youth violence in Australia and the United States: A longitudinal study. Aust N Z J Criminol 2009;42:289–309.
[21] Hemphill SA, Toumbourou JW, Herrenkohl TI, et al. The effect of school suspensions and arrests on subsequent adolescent antisocial behavior in Australia and the United States. J Adolesc Health 2006;39:736–44.
[22] Wang J, Iannotti RJ, Nansel TR. School bullying among adolescents in the United States: Physical, verbal, relational, and cyber. J Adolesc Health 2009; 45:368–75.
[23] Hawkins JD, Herrenkohl TI, Farrington DP, et al. Predictors of youth violence. Washington, DC: The Office of Juvenile Justice and Delinquency Prevention—Juvenile Justice Bulletin, 2000.
[24] Herrenkohl TI, Maguin E, Hill KG, et al. Developmental risk factors for youth violence. J Adolesc Health 2000;26:176–86.
[25] Farrington DP, Ttofi MM. Bullying as a predictor of offending, violence and later life outcomes. Crim Behav Ment Health 2011;21:90–8.
[26] Dodge KA, Dishion TJ, Lansford JE. Deviant peer influences in intervention and public policy for youth. Social Policy Rep 2006;20:1–20.
[27] Kish L. Survey sampling. New York, NY: Wiley, 1965.
[28] McMorris BJ, Hemphill SA, Toumbourou JW, et al. Prevalence of substance use and delinquent behavior in adolescents from Victoria, Australia and Washington State, United States. Health Educ Behav 2007;34:634–50.
[29] Bond L, Wolfe S, Tollit M, et al. A comparison of the Gatehouse Bullying Scale and the Peer Relations Questionnaire for students in secondary school. J Sch Health 2007;77:75–9.
[30] Arthur MW, Hawkins JD, Pollard JA, et al. Measuring risk and protective factors for substance use, delinquency, and other adolescent problem behaviors: The Communities That Care Youth Survey. Eval Rev 2002;26:575–601.
[31] Glaser RR, Van Horn ML, Arthur MW, et al. Measurement properties of the Communities That Care Youth Survey across demographic groups. J Quant Criminol 2005;21:73–102.
[32] Beyers JM, Toumbourou JW, Catalano RF, et al. A cross-national comparison of risk and protective factors for adolescent substance use: The United States and Australia. J Adolesc Health 2004;35:3–16.
[33] Hemphill SA, Heerde JA, Herrenkohl TI, et al. Risk and protective factors for adolescent substance use in Washington state, United States and Victoria, Australia: A longitudinal study. J Adolesc Health 2011;49:312–20.
[34] StataCorp. Stata statistical software: Release 10.0. College Station, TX: Stata Corporation, 2007.
[35] Tabachnick BG, Fidell LS. Using multivariate statistics (4th ed.). Boston, MA: Allyn and Bacon, 2001.
[36] Scott TM, Nelson CM, Liaupsin CJ. Effective instruction: The forgotten component in preventing school violence. Educ Treat Child 2001;24:309–22.
[37] Li Q. Bullying in the new playground: Research into cyberbullying and cyber victimisation. Australas J Educ Technol 2007;23:435–54.
[38] Ybarra ML, Mitchell KJ. Online aggressor/targets, aggressors, and targets: A comparison of associated youth characteristics. J Child Psychol Psychiatry 2004;45:1308–16.
[39] Li Q. New bottle but old wine: A research of cyberbullying in schools. Comput Hum Behav 2007;23:1777–91.
[40] Hinduja S, Patchin JW. Cyberbullying: An exploratory analysis of factors related to offending and victimization. Deviant Behav 2008;29:129–56.