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Attacking Others Online: The Formation of Cyberbullying in Late Adolescence

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Cyberbullying frequency is related to a wide range of negative outcomes. Little research has attempted to delineate the long-term predictors and mechanisms to predict cyberbullying. Study 1 ($N = 493$) used a correlational study that tested our long-term model of cyberbullying. This model predicted that cyberbullying is a function of positive attitudes toward cyberbullying, which are formed by attitudes toward strength and anonymity that exists in aggressing against others in the mediated world. Results showed strong support for our model. Study 2 ($N = 181$) used a longitudinal design to further test our model. Participants completed measures of cyberbullying and cyber-victimization at Wave 1, and again two months later. Positive attitudes toward cyberbullying and reinforcement of cyberbullying tactics were also assessed at Wave 2. Results showed that positive attitudes and reinforcement mediated the stability in cyberbullying. Future research and implications are discussed.

Keywords: cyberbullying, bullying, electronic bullying, attitudes, anonymity

Blogging, social networking Web sites, e-mails, instant messengers, and web-forums are ways that today's technologically savvy culture can communicate with others all over the world. Although beneficial, some have used these popular mediated forms of communication to harm others, termed cyberbullying. Specifically, cyberbullying, defined as, ". . .the use of information and communication technologies such as e-mail, cell phone and pager text messages, instant messaging, defamatory personal Web sites, and defamatory online personal polling Web sites to support deliberate, repeated, and hostile behavior by an individual or group, that is intended to harm others" (cited in Li, 2007 p. 1779), is an emerging societal problem. Prevalence rates of cyberbullying range from 4% to 36% (depending on the specific questionnaire used by researchers; see Rivers & Noret, 2010). We elected to use the term cyberbullying in our research rather than cyber-aggression. Although these constructs overlap greatly there are measurement and theoretical rationale for using cyberbullying. First, the measure of cyberbullying used in our research is a validated measure (described in the Method section) and specifically uses the term "cyberbullying." Second, cyberbullying specifies repeated online attacks, which is absent from the term cyber-aggression, and because we are testing the long-term predictors of cyberbullying, cyber-aggression was inappropriate.

Although research on cyberbullying is relatively new, there is a paucity of research testing the psychological processes involved in predicting its frequency. The current research utilized one cross-sectional and one longitudinal study to test what reinforced learning processes are related to the development of cyberbullying. We predicted that readily accessible attitudes, beliefs, and other knowledge structures likely predict cyberbullying behavior. In doing so, we attempted to elucidate a psychological model that integrated learning and aggression theories to predict cyberbullying. However, prior to elaborating on our distal predictors of cyberbullying, it is important to discuss differences between traditional and cyberbullying, which helped develop our models.

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Traditional Bullying and Cyberbullying

Disentangling traditional bullying (e.g., punching, kicking, yelling) from cyberbullying is difficult. However, if our cyberbullying model is valid, then the key predictors of cyberbullying should correlate stronger with cyberbullying measures than a measure of traditional (or face-to-face) bullying. By definition cyberbullying is a form of aggression; however, not all aggressive acts use technology. For example, research has shown that cyberbullies tended to also be traditional bullies (Smith et al., 2008; Williams & Guerra, 2007). Thus, in the short-term, the psychological processes and consequences of traditional bullying may be applied to the study of cyberbullying. However, there are differences between traditional and cyberbullying that makes further theoretical overlap risky, especially in the long-term.

First, researchers (e.g., Salmivalli & Nieminen, 2002; Vaillancourt, Hymel, & McDougall, 2003; Veenstra et al., 2007) have suggested that one defining characteristic of traditional bullying is a strength imbalance between the aggressor and the victim. This suggests that bigger, stronger children are more likely to be aggressive than their smaller, weaker peers. Since anybody can cyberbully via technology, even the physically weak or lower status children can harm others (Vandebosch & Van Cleemput, 2008). Thus, the strength imbalance may be removed due to the nonphysical nature of cyberbullying.

The second distinction between traditional and cyberbullying is the lack of visibility. Although a victim of cyberbullying will often know their assailant (Mishna, Saini, & Solomon, 2009), that is not a necessary condition in the online world (Vandebosch & Van Cleemput, 2008). Anonymity exists in cyberbullying in other ways. For instance, the aggressor may not see the pain inflicted on the victim. Also, because cyberbullying happens in the mediated world, tone and sarcasm in any mediated message are removed. This is important because one may perceive a message to be damning, but the sender may be making a joke that is lost on the receiver. In traditional bullying, the aggressor is identified, sarcasm is apparent, and the physical pains of the victim are clear.

A final difference concerns the types of behaviors afforded the online versus traditional bully. In traditional bullying, one may punch, kick, yell, spit, push, and so forth that cannot be accomplished in the mediated world. Although the online aggressor can send a mean e-mail (or other messages) to the victim, that is not identical to face-to-face yelling due to the visibility distinction discussed above.

Despite these differences, similarities do exist between traditional bullying and cyberbullying. Research has shown that victimization via traditional bullying is related to fear (Boulton, Trueman, & Murray, 2008) and depression (Bauman, 2008). Similarly, research has shown that cyber-victimization is related to anger (e.g., Dehue, 2008), fear (e.g., Beran & Li, 2005), and sadness (e.g., Patchin & Hinduja, 2006). Traditional bullies tend to be aggressive (Craig, 1998) and have poor school competence (Andreou, 2001). Similarly, cyberbullies tend to engage in more aggressive behaviors (Hinduja & Patchin, 2008) and also have problems in school (Beran & Li, 2007). Also, some bullying behaviors are similar in the real versus mediated world. For instance, a bully can socially exclude a victim from a peer group on the playground, but may also do so by not inviting them to join a certain Facebook group, for example. However the methods by which such similar behaviors are different due to the distinctions discussed previously. Therefore, we do expect there to be a high degree of overlap between traditional and cyberbullying; however, the long-term predictors of traditional and cyberbullying are expected to differ due to anonymity and lack of strength differential often present in the mediated word.

Long-Term Model of Cyberbullying

Little is known about the variables that are important for the long-term development of cyberbullying behavior. The first postulation of our model is that cyberbullying and cyber-victimization are highly correlated. Anderson and colleagues (Anderson, Buckley, & Carnagey, 2008) found that early aggressive actions predict subsequent aggressive behavior from the initial victim. Also, the cyberbullying literature has consistently shown strong correlations between cyberbullying and cyber-victimization (e.g., Bauman, 2010). Second, we postulate that positive attitudes toward cyberbullying directly predict cyberbullying behavior. The General Learning Model (GLM; Gen-

tile et al., 2009) posits how continued experience with any stimulus is predicted to be related to the formation of attitudes. Although the majority of research testing the postulates of GLM have tested violent and prosocial media effects (see Gentile et al., 2009), GLM is broad and can be incorporated into explaining cyberbullying. Learning is more likely to occur when a behavior is observed and the actor is positively reinforced for their actions. This type of learning is predicted to be related to the formation of positive attitudes toward those actions. There is a rich social psychological literature suggesting that attitudes predict behavior (see Ajzen & Fishbein, 2003), and applied to GLM, successful cyberbullying should be related to positive attitudes toward cyberbullying. In other words, positive attitudes toward cyberbullying and reinforcement of cyberbullying should predict subsequent cyberbullying behavior and mediate the stability between cyberbullying behaviors over time.

The third postulate of our model predicts that two predictors of the formation of positive attitudes toward cyberbullying tactics are anonymity and strength differential, discussed previously. Broader aggression theory, such as the distal General Aggression Model (GAM: Anderson & Bushman, 2002) suggests that reinforced learning processes, including learning that cyberbullying tactics are often anonymous and that the traditional bully victim strength differential is removed, are related to subsequent aggressive behaviors, including cyberbullying.

Study 1: Distal Processes

The objective of Study 1 was to test our long-term model of cyberbullying. We predicted that cyberbullying would be a direct function of positive attitudes toward cyberbullying, anonymity, and the lack of a strength differential. These latter two factors should also directly predict the development of positive attitudes toward cyberbullying. Finally, cyberbullying predicted cyber-victimization.

Method

Participants

Four hundred and 93 participants (46% male) from a large Midwestern university participated in the current study for partial course credit for their psychology classes. The majority of participants were Caucasian (85%). The average age of the sample was 19.36 ($SD = 1.30$).

Materials

Cyber-behavior. Six items from Ybarra, Diener-West, and Leaf (2007) had participants rate how often in the last year they cyberbullied others and were cyber-victimized by others on a 1 (*never*) to 6 (*everyday/almost everyday*) rating scale ($\alpha s > .67$). The cyberbullying questionnaire consisted of three items and a sample item includes, "Made rude comments or mean comments to anyone online." The three items were summed such that higher scores indicated higher reported frequency of cyberbullying. The cyber-victimization subscale also consisted of three items that were summed together such that higher scores indicated higher levels of reported cyber-victimization. A sample item includes, "Someone made rude or mean comments to you online."

Anonymity and strength differential. As previously argued, cyberbullying differs from traditional aggression due to anonymity and strength differential. To measure these two constructs, we created an Anonymity and Strength Differential (ASD) in Cyberbullying Questionnaire (see Appendix A). Participants rated their level of agreement using a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale. The Anonymity subscale consisted of five items ($\alpha = .62$). A sample item includes, "I feel comfortable sending mean text messages or e-mails to anybody no matter if I know them or not." The Strength Differential subscale also consisted of five items ($\alpha = .72$). A sample item consisted of, "The only way for smaller, weaker people to get even against bullies is to attack them online." All items were summed, such that higher scores indicate more agreement with Anonymity and Strength attitudes.

Positive attitudes toward cyberbullying. In order to measure positive attitudes toward cyberbullying, we created the Positive Attitudes toward Cyberbullying Questionnaire (PACQ; see Appendix B). This is a nine-item questionnaire that asks participants to rate their level of agreement on a 1 (*strongly disagree*) to 5 (*strongly agree*) rating scale ($\alpha = .76$). A sample item includes, "It is acceptable to send mean e-mails to others when they deserve it." Items

were summed such that higher scores indicated more positive attitudes toward cyberbullying.

Procedure

All data was collected using an online data collection tool, SurveyMonkey. Data was collected as part of a larger cyberbullying/aggression research project. Upon completion of the online informed consent document, participants completed the aforementioned questionnaires, which took approximately 50 minutes. After the questionnaires were completed, participants read an online debriefing form and were thanked for their participation.

Results

Path Models

We hypothesized that cyberbullying stemmed from positive attitudes toward cyberbullying, anonymity, and strength differential. Also, positive attitudes toward cyberbullying were predicted to result from strength differential and anonymity. Finally, cyberbullying predicted cyber-victimization. Strength differential and anonymity were correlated (see Figure 1).

Correlations are presented in Table 1. Results showed that this model fit the data well, $\chi^2 = 3.78$ ($df = 3$), $p = .29$, CFI = 1.00, TLI = 1.00, SRMR = .01, RMSEA = .02 (90% CI: .00 to .08; see Table 2). Examination of the relations between the variables in the model showed that all relations were significant (all βs $> .15$, all ps $< .02$). The correlation between strength differential and anonymity was significant ($r = .70$, $p < .001$).

Results from mediation tests showed that positive attitudes toward cyberbullying mediated the relation between strength and cyberbullying (95% CI: .05 to .11) and anonymity and

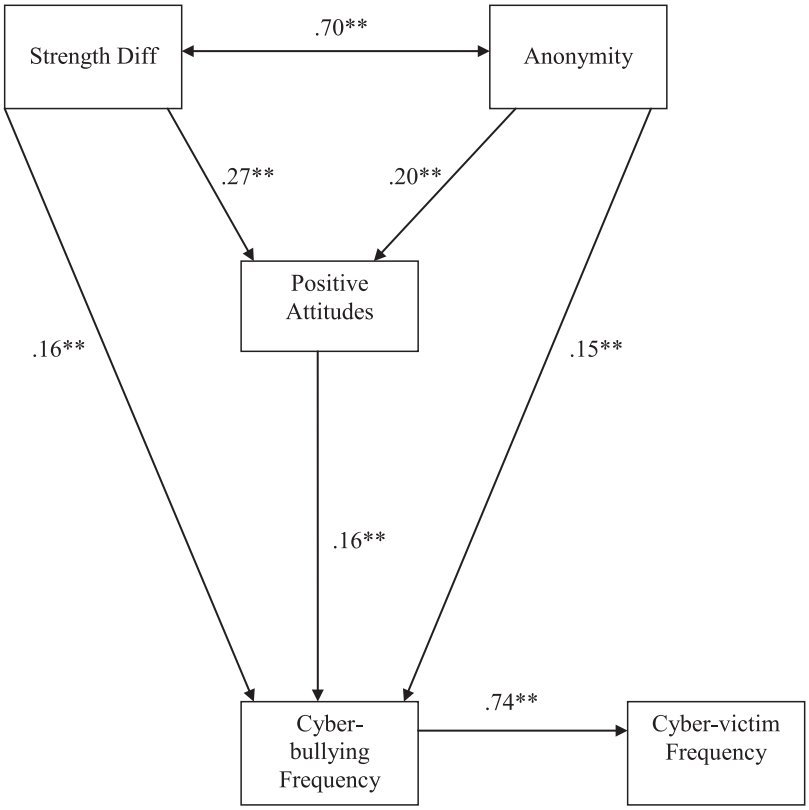

Figure 1. Distal path structure from Study 1. $^{*}p < .05$. $^{**}p < .01$.

Table 1
Correlation Matrix Between Relevant Variables in Study 1

	1	2	3	4	5	6
1	—					
2	.74**	—				
3	.40**	.35**	—			
4	.33**	.23**	.49**	—		
5	.32**	.26**	.49**	.70**	—	
6	.11*	.11*	.18**	.06	.17**	—
Mean	4.85	5.34	17.20	10.97	11.18	−.05
StDev	2.01	2.26	5.62	3.62	4.14	1.00

Note. 1 = Cyber-bullying frequency; 2 = Cyber-victimization frequency; 3 = Positive Attitudes towards Cyber-bullying Wave 2; 4 = Anonymity; 5 = Strength Differential; 6 = Sex (1 = male, −1 = female).
* $p < .05$. ** $p < .01$.

cyberbullying (95% CI: .06 to .12). Specifically, positive attitudes toward cyberbullying predicted cyberbullying behavior ($B = .11$, $p < .001$). Anonymity and strength predicted positive attitudes toward cyberbullying ($Bs > .67$, $p < .001$). These latter two variables predicted cyberbullying ($Bs > .15$, $ps < .01$).

Conclusion

Study 1 tested our long-term model of cyberbullying and found that positive attitudes toward anonymity and strength differential predicted attitudes toward cyberbullying. Positive attitudes toward cyberbullying, strength differential and anonymity all significantly predicted cyberbullying. Finally, results showed that positive attitudes toward cyberbullying mediated the relations between anonymity and cyberbullying and strength differential and cyberbullying. Such findings corroborate those suggested by Rivers and Noret (2010), by suggesting that anonymity provides the aggressor with a greater license to more extreme acts of online aggression.

Study 2: Longitudinal Evidence

Results from Study 1 show how positive attitudes toward cyberbullying predict cyberbullying behavior. However, it could be argued that anonymity and strength differential are a bi-product of learning. Thus, Study 2 will test the role that positive reinforcement has on cyberbullying. We predict that such reinforced learning will be related to subsequent cyberbullying and be correlated with the formation of positive attitudes toward cyberbullying.

An additional test for support of our model is to determine if cyberbullying attitudes and reinforcement mediate the relation between cyberbully behaviors longitudinally. If the tenants of our model are accurate, then results will show that cyberbullying will predict subsequent cyberbullying two months later. Also, cyberbullying at Wave 1 should be related to positive attitudes toward cyberbullying and reinforcement that act as mediators to predict cyberbullying 2 months later.

Finally, the relations in Study 1 should only be applicable to cyber rather than traditional bullying. Support for our models will show that the magnitude of the correlation between cyberbullying and positive attitudes toward cyberbullying is greater than the magnitude of the correlation between traditional bullying and positive attitudes toward cyberbullying. We do expect both cyber- and traditional bullying will

Table 2
Model Fit Indices for the Path Models for all Studies

Study	Model	χ^2	*df*	CFI	TLI	SRMR	RMSEA	90% CI
One	One	3.78	3	1.00	1.00	.01	.02	.00 to .08
Two	One	0.00	0	1.00	1.00	.00	.00	.00 to .00
Two	Two	1.14	3	1.00	1.00	.01	.00	.00 to .09

Note. CFI = Confirmatory Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean-Square Residual; RMSEA = Root Mean Square Error of Approximation.

be significantly related to positive attitudes toward cyberbullying because of the high degree of colinearity between these two types of bullying. However, if our distal model is correct then cyberbullying will be more related to positive attitudes toward cyberbullying than traditional bullying.

Method

Participants

One hundred and 81 (31% male) participants from a large Midwestern university completed Waves 1 and 2 of the study for partial credit for their psychology courses. The majority of the sample was Caucasian (90%). The average age of the sample was 19.48 ($SD = 2.68$) years.

Materials

The same cyberbullying, cyber-victimization, demographic, and PACQ scales from Study 1 were used in the current study. In addition the following questionnaires were added:

Cyberbullying reinforcement. In order to measure how frequently participants are positively reinforced for their cyberbullying, the Cyberbullying Reinforcement Questionnaire (CRQ; see Appendix C) was used. This is a 12-item questionnaire that asks participants to respond to the items on a 1 (*not at all*) to 7 (*extremely*) rating scale. Certain items were reverse scored and summed, such that higher scores indicate that participant's receive more reinforcement regarding their cyberbullying ($\alpha = .77$).

Traditional bullying. The Ybarra et al. (2007) traditional bullying scale was used to assess frequency of traditional, or face-to-face, bullying. Akin to the cyberbullying questionnaire, this is a three item questionnaire that asks participants how often they aggressed against others using a 1 (*never*) to 6 (*everyday/almost everyday*) rating scale ($\alpha = .67$). A sample item includes, "Made rude comments or mean comments to anyone." The three items were summed such that higher scores indicated higher reported frequency of face-to-face bullying.

Procedure

All data was collected using an online data collection tool, SurveyMonkey. Data was collected as part of a larger cyberbullying/aggression research project. Upon completion of the online informed consent document, participants at Wave 1 completed the cyberbullying, cyber-victimization, and traditional bullying questionnaires. Approximately 2 months later, again using SurveyMonkey, participants completed the cyberbullying questionnaire, cyber-victimization questionnaire, PACQ, and cyberbullying reinforcement questionnaire. After all Wave 2 questionnaires were completed, participants read an online debriefing form and were thanked for their participation.

Results

Path Models

The first path model tested was a cross-lagged analysis involving cyberbullying and cyber-victimization frequency (Model 1). This allows a test for the stability of these variables and shows if cyberbullying at Wave 1 predict cyber-victimization at Wave 2, and vice versa. Figure 2 shows that there was significant stability in cyberbullying and cyber-victimization between Waves 1 and 2 (βs $> .37$, ps $< .001$). Also the relations between cyberbullying and cyber-victimization at both Waves were significant ($rs > .68$, ps $< .001$). Finally, cyber-victimization at Wave 1 was related to cyberbullying at Wave 2 ($\beta = .22$, $p < .01$), and cyberbullying at Wave 1 was significantly related to cybervictimization at Wave 2 ($\beta = .28$, $p < .01$).

Model 2 tested the mediating role that positive attitudes toward cyberbullying and reinforcement had on the relation between cyberbullying at Wave 1 and Wave 2. Also, cyberbullying at Wave 2 was hypothesized to predict cyber-victimization at Wave 2, and the two mediators were correlated (see Figure 3). Results show that this model fit the data well, $\chi^2 = 1.14$ ($df = 3$), $p = .77$, CFI = 1.00, TLI = 1.01, RMSEA = 0.00 (90% CI: 0.00 to 0.09), SRMR = .01. Examination of the path coefficients showed that cyberbullying at Wave 1, positive attitudes toward cyberbullying, and reinforcement all significantly pre-

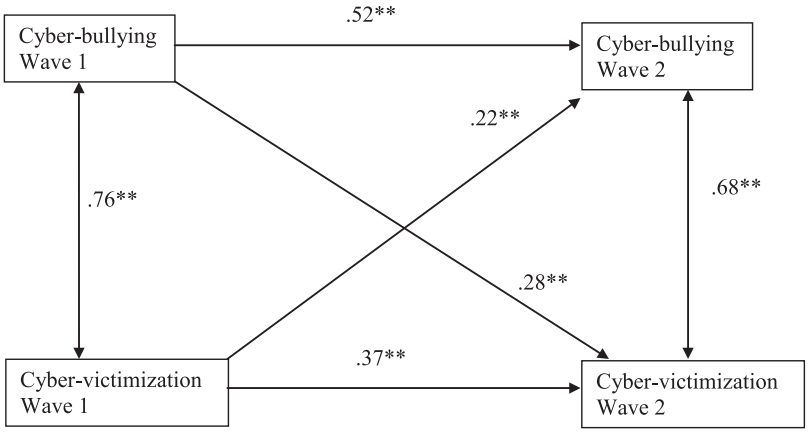

Figure 2. Cross-Lagged analysis for Study 2. ** $p < .01$. Time difference between Waves 1 and 2 is approximately two months.

dicted Wave 2 cyberbullying (βs $> .14$, ps $< .05$)[1]. Furthermore, cyberbullying at Wave 1 significantly predicted positive attitudes and reinforcement at Wave 2 (βs $> .41$, ps $< .001$). The two mediators were correlated ($r = .55$, $p < .001$). Indirect model statements showed that positive attitudes toward cyberbullying ($B = .08$, $p < .04$) and reinforcement ($B = .14$, $p < .001$) significantly mediated the stability in cyberbullying over time.

Difference in Correlation Tests

If the tenants of our argument regarding the differences between traditional and cyberbullying are accurate, then there should be a significant difference in the magnitude of the correlations between Wave 1 cyberbullying and the two mediators compared to the magnitude of the relations between Wave 1 traditional bullying and the two mediators. Simple relations between all of these variables appear in Table 3. A difference in correlation test for dependent samples was conducted (Cohen & Cohen, 1983). Results show a significant difference, $t(170) = 3.46$, $p < .05$, in the magnitude of the relation between cyberbullying and positive attitudes toward cyberbullying ($r = .503$) and traditional bullying and positive attitudes toward cyberbullying ($r = .297$), while controlling for the colinearity of traditional and cyberbullying ($r = .597$). This suggests that although the relation between traditional bullying and positive attitudes toward cyberbullying was significant, this relation was stronger when cyberbullying was the predictor.

Conclusion

Results from Study 2 showed stability in cyberbullying and cyber-victimization, and significant relations between cyberbullying, cyber-victimization, positive attitudes toward cyberbullying, and reinforcement over two months.

[1] We are aware that statistical inferences regarding causality cannot be made regarding the relations between any variables assessed at Wave 2 because they were measured simultaneously, possibly violating temporal precedence in mediation. However, we can get closer to making such inferences by testing alternative models. Our model posits that positive attitudes and reinforcement are correlated mediators in the relation between cyberbullying at Waves 1 and 2. Cyberbullying at Wave 2 then predicts cyber-victimization at Wave 2. The subsequent models will focus on positive attitudes, reinforcement, and cyberbullying at Wave 2. We rotated these variables from our original model, such that every variable was the dependent variable predicting cyber-victimization, while the other two variables were correlated mediators. Results showed that the best fitting model is what we presented. This model fit better compared to when cyberbullying and positive attitudes were both mediators, $\chi^2 = 118.56$ ($df = 3$), CFI = .74, TLI = .14, RMSEA = .48 (90% CI: .41 to .56), SRMR = .14, and when cyberbullying and reinforcement were correlated mediators, $\chi^2 = 121.21$ ($df = 3$), CFI = .74, TLI = .12, RMSEA = .49 (90% CI: .42 to .57), SRMR = .14. Although this only provides little support for the temporal precedence of the Wave 2 variables, the data show, and we have empirical support to suggest, that this model is the best fitting model for this data.

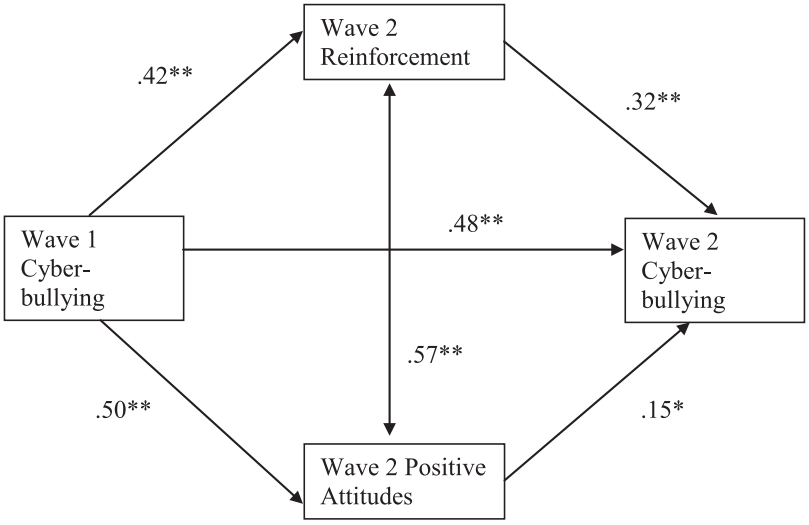

Figure 3. Longitudinal mediation test in Study 2.

The path models supported the distal model by showing that cyberbullying at Wave 1 was indirectly related to cyberbullying at Wave 2 through reinforcement and positive attitudes. The cross-lagged analysis suggests a natural bidirectional relation between cyberbullying and cyber-victimization. Finally, results showed that there was a stronger relationship between cyberbullying and positive attitudes toward cyberbullying compared to the relation between traditional bullying and positive attitudes toward cyberbullying.

General Discussion

Results from both studies support the hypothesis that distal learning processes predict cyberbullying. These distal predictors were found to influence cyberbullying cross-sectionally and

Table 3
Correlation Matrix Between Relevant Variables in Study 2

	1	2	3	4	5	6	7	8	9
1	—								
2	.75**	—							
3	.60**	.47**	—						
4	.51**	.66**	.74**	—					
5	.69**	.61**	.46**	.42**	—				
6	.56**	.59**	.37**	.45**	.81**	—			
7	.50**	.44**	.30**	.23**	.58**	.50**	—		
8	.43**	.35**	.32**	.28**	.59**	.50**	.66**	—	
9	.20**	.11	.23**	.16*	.27**	.25**	.25**	.17*	—
Mean	4.52	5.03	5.68	6.25	4.27	4.29	16.05	23.42	−.37
StDev	2.35	2.71	2.63	2.85	2.13	2.18	6.06	9.16	.93

Note. 1 = Cyber-bullying frequency Wave 1; 2 = Cybervictimization frequency Wave 1; 3 = Traditional aggression frequency at Wave 1; 4 = Traditional victimization frequency at Wave 1; 5 = Cyber-bullying frequency Wave 2; 6 = Cybervictimization frequency Wave 2; 7 = Positive Attitudes towards Cyber-bullying Wave 2; 8 = Cyber-bullying Reinforcement at Wave 2; 9 = Sex (1 = male, −1 = female).
* $p < .05$. ** $p < .01$.

longitudinally. Such processes will be elaborated on.

Our Distal Model

Our theoretical model to predict cyberbullying has three primary postulations. First, we predicted that cyberbullying and cyber-victimization are highly related to one another. Results showed strong correlations between these two variables cross-sectionally (Study 1) and longitudinally (Study 2). This is consistent with the work of Anderson et al. (2008) that shows a cycle of violence from aggressor to victim.

Second, our model predicted that positive attitudes toward cyberbullying would be a direct predictor of cyberbullying behavior. GLM (Gentile et al., 2009) posits that each successful experience with cyberbullying is a learning trial. Repeated learning will be related to long-term attitude formation. Positive attitudes were predicted from anonymity and the lack of strength differential. Evidence for this was found in Study 2, which found that cyberbullying at Wave 1was related to cyberbullying 2 months later, which was mediated by cyberbullying reinforcement and positive attitudes.

Third, our model predicts that anonymity and the lack of strength differential are going to be related to both cyberbullying behavior and the formation of positive attitudes toward cyberbullying. Study 1 found evidence to support this conclusion. As argued by Vandebosch and Van Cleemput (2008), these are two important differences between traditional and cyberbullying. Indeed, results from Study 2 showed that the relation between positive attitudes toward cyberbullying and traditional bullying was significantly lower than the relation between positive attitudes toward cyberbullying and cyberbullying. Our findings also suggest that strength differential and anonymity are strong predictors of positive attitudes toward cyberbullying.

Implications to Aggression/Learning Theory

The findings reported in these studies have implications for the study of aggression. Our findings suggest that when individuals are positively reinforced to cyberbully and when individuals endorse positive attitudes toward cyberbullying (due to positive attitudes toward the strength differential and anonymity), cyberbullying is likely to occur. These findings map onto the General Learning Model well. Most notably, increased use of cyberbullying tactics that are positively reinforced should be related to a more positive endorsement of cyberbullying attitudes, which will likely predict cyberbullying in the immediate situation. More work is needed to test how situational factors (being provoked online) and personality factors (history of cyberbullying) interact to influence cyberbullying after being provoked. Also, the correlations between cyber-victimization and cyberbullying suggest that one may be motivated to cyberbully another as a function of being cyberbullied. In other words, individuals may be motivated to harm others online after receiving such harm, suggesting retaliatory motivations. This has been suggested by others (e.g., Rivers & Noret, 2010), and provides further evidence for discussing cyberbullying in the context of GLM and, more specifically, GAM.

Our findings and model predictions also show strong incremental validity between traditional and cyberbullying. As previously argued, cyberbullying differs from traditional bullying in several respects, including the possibility of anonymity, reduction of the influence of a strength differential, and lack of physical aggression (see Vandebosch & Van Cleemput, 2008). Correlation findings suggest that cyber and traditional bullying are significantly correlated, and both forms of aggression were correlated with similar constructs, such as positive attitudes toward cyberbullying. However, cyberbullying was more strongly related to positive attitudes toward cyberbullying than traditional bullying. Therefore, this research also extends GLM by showing domain specificity in long-term learning processes.

Limitations and Future Work

These studies have implications for interventions focused at reducing cyberbullying. If distal variables can be identified, then learning trials associated with cyberbullying can be punished rather than reinforced, preventing the formation of positive attitudes and subsequent cyberbullying.

However, Studies 1 and 2 are limited by the correlational nature of the data, and cannot establish causal relations. We used path analysis

and longitudinal findings to estimate predicted causal relations, but these would need to be tested experimentally to verify causality. More work is needed to further test the causal claims of our models. However, experimental designs in the cyberbullying domain may be extremely difficult, because it may not be feasible to randomly assign participants to be cyberbully another.

A second limitation is the length of time between assessments in Study 2. Only two months separated Wave 1 from Wave 2. We selected this time frame because technology changes so much rapidly and new ways to cyberbully are becoming more accessible. However, future research should build upon Study 2 in two ways. First, more assessments are important. If researchers can get three or more assessments longitudinally, then growth curve analyses can be conducted to test what personality variables predict the slope and intercept of cyberbullying and cyber-victimization. Second, if only two data assessments are feasible, more time between assessments may allow for more variability in the key variables.

Third, we focused on late adolescence for our population of study. Specifically, participants in both studies were college-aged students (mean age in Study 1 was 19.36 years). The cyberbullying questionnaire asks participants to indicate how often they cyberbullied others (or were cyberbullied by others) in the past year. No context was given for whether the cyber-behaviors occurred while they were in college or in high school (for freshman participants). Recent work using the cyber-behavior scale with children suggests that teenagers and preteenagers self-report using cyberbullying tactics more than late adolescents. This suggests that the distal processes elucidated on in this article may be stronger for younger samples. Future research should test the tenants of our model using younger children.

Fourth, we limited the operational definition of cyber-behavior to the Internet. With technology that allows the Internet on one's cellular phone, we did not attempt to disentangle such definitional differences. Future research should assess cyberbullying on the phone, the Internet, or online during video/computer game play.

Finally, one limitation is that we had to create our own measures to assess positive attitudes toward cyberbullying, cyberbullying reinforcement, strength differential, and anonymity attitudes. We were forced to do this considering that no published questionnaires specific to cyberbullying have been developed to test these constructs. This may explain why the reliability of the measures was only adequate. Although the reliability coefficients were in the range of acceptability, more refinement may be needed to the newly created scales. However, our measures showed strong validity. Specifically, in both studies positive attitudes toward cyberbullying, anonymity, strength differential, and cyberbullying reinforcement (Study 2 only) were positively correlated with cyberbullying frequency (assessed using a published validated scale from Ybarra et al., 2007). Also, the difference in correlation tests revealed strong discriminant validity by showing that some of these measures were stronger predictors of cyberbullying compared to traditional bullying. Although this may be seen as a limitation, one could argue that this is also a strength of the manuscript.

Final Remarks

The studies reported in this article are the first to try to apply aggression and learning theories to cyber-behavior to delineate the distal motivations for engaging in cyber-behavior. Once these results have been further tested and replicated, then intervention efforts can apply such findings to help prevent future cyberbullying.

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(*Appendices follow*)

Appendix A

Anonymity and Strength Differential

Please rate each of the following items on how much you agree or disagree with each statement using the scale provided.

1 2 3 4 5
Strongly Agree Strongly Disagree

1. Sending mean e-mails or text messages is easy to do because I am not face-to-face with the other person. A
2. When I am angry at someone who is bigger, stronger, or more strengthful than I, the easiest way to get even is to send a mean text or e-mail. S
3. I feel comfortable sending mean text messages or e-mails to anybody no matter if I know them or not. A
4. Anybody can send a mean text messages or e-mail to another person no matter how big, strong, or strengthful they are. S
5. I join Facebook or MySpace groups that are mean to someone I do not know because my friends are members of that group. A
6. I am not scared to send mean text messages or e-mails to anybody no matter how big, strong, or strengthful they are. S
7. I am less likely to send mean e-mails or text messages if my name can be identified. A
8. The only way for smaller, weaker people to get even against bullies is to attack them online. S
9. Mean e-mails or text messages that do not have my name attached to them are easy to forward on to others. A
10. I can send mean e-mails or text messages to anybody no matter how big or small they are. S

A = Anonymity, S = Strength

Appendix B

Attitudes Toward Cyberbullying

Please rate each of the following items on how much you agree or disagree with each statement using the scale provided.

1 2 3 4 5
Strongly Agree Strongly Disagree

1. It is acceptable to send mean e-mails to others when they deserve it.
2. People who join groups on Facebook or MySpace that make fun of others are justified in doing so.
3. It makes me feel good to send texts that make fun of others.
4. Sometimes using passive aggressive methods of sending mean e-mails to others is the only way to get even.
5. I do not find it appropriate to send mean text messages or e-mails to others.*
6. I feel bad sending mean text messages or e-mails to others.*
7. I have sent mean text messages to others after they have text messaged me hurtful comments.
8. Teasing others on Facebook, e-mails, or text messages if fun.
9. Those that create Facebook or MySpace groups that are socially exclusive are fun to join.

* = Reverse Coded

(*Appendices continue*)

Appendix C

Reinforcement Questionnaire

Please use the following scale to complete the questions below.

1 2 3 4 5 6 7
Not at all Extremely

1. I find it rewarding to cyberbully others online if they deserve it.
2. Cyberbullying others who deserve it makes me feel good.
3. I am usually satisfied with myself for successfully cyberbullying those who deserve it.
4. I feel bad when I cyberbully others, even if I think they deserve it.*
5. I get rewarded from my friends for cyberbullying others who deserve it.
6. My family members have praised me for cyberbullying others who deserve it.
7. Cyberbullying those who deserve it is easy for me to do because I feel good afterward.
8. My friends and I both get satisfaction from being mean to others online.
9. I get amusement from sending mean text messages or e-mails to others.
10. My friends and I will often joke about some of the mean text messages that we sent to others.
11. My friends and I will often smile and laugh about the content of e-mails, text messages, or instant messages we sent.
12. None of my friends find it amusing that I send mean texts, e-mails, or messages to others online.*

* = Reverse Coded

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