

Toxic Ties: Networks of Friendship, Dating, and Cyber Victimization

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Abstract

We examine instances of youth cyber aggression, arguing that the close relationships of friendship and romance substantially influence the chances of being targeted. We investigate networks of friendship, dating, and aggression among a sample of 788 eighth- to twelfth-grade students in a longitudinal study of a New York school. Approximately 17 percent reported some involvement in cyber aggression within the past week. LGBTQ youth were targeted at a rate over four times that of their heterosexual peers, and females were more frequent victims than males. Rates of cyber aggression were 4.3 times higher between friends than between friends of friends. According to both an exponential random graph model and a lagged, network MRQAP regression, electronic attacks emerged far more frequently between current or former friends and dating partners, presumably due to competition, revenge, or attempts to fend off romantic rivals.

Keywords

cyber aggression, electronic bullying, social networks, dating, friendship networks

Aggression among school children and adolescents can pose serious problems that result in deleterious psychological, physical, and academic consequences for both its victims and perpetrators (e.g., Nansel et al. 2001; Ttofi et al. 2011). The unprecedented expansion of the use of the Internet, mobile phones, and social media means that adolescent antagonism now extends beyond locker bays and cafeterias, continuing in electronic forms well after the school day ends. A nationally representative 2005 survey of 7,182 school-aged children found that 14 percent reported being bullied electronically at least once during the last two months (Wang, Iannotti, and Nansel 2009), and a meta-analysis found that between 20

and 40 percent of all youth have experienced cyberbullying at least once during their lifetime (Tokunaga 2010). Electronic harassment is distinct not only in its pervasiveness but also by the ease with which others can join the harassment of victims. Perhaps for these reasons, victims often exhibit emotional distress (Ybarra, Espelage, and Mitchell

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2006), low self-esteem (Patchin and Hinduja 2010), and other negative emotions (e.g., Juvonen and Gross 2008). Those targeted by forms of electronic aggression also reported more suicidal thoughts and were more likely to attempt suicide than those who had not been victimized (Hinduja and Patchin 2010). The widely publicized suicides of young people who were victims of electronic messages or humiliating online videos highlight the potential gravity of the problems stemming from this phenomenon.

Recent research has begun to investigate school cyberbullying (e.g., meta-analysis, Kowalski et al. 2014), but studies tend not to consider the social networks in which this type of harassment arises. The purpose of this research, therefore, is to outline and test several of the key processes by which cyber aggression develops, relying on a social network perspective. We conceptualize aggression relationally, as a negative tie that arises within an interconnected web of two significant, close social network relationships, those of friendship and dating. We hypothesize that harmful electronic acts are more likely to occur between individuals directly linked through the ties of friendship or romance, in part due to the competition and rivalry associated with the attainment of status and recognition. In addition, we expect that those viewed as challenging the traditional norms of heterosexuality, that is, youth identifying as LGBTQ, will be common targets. Our arguments build on formative theories of groups and networks that emphasize the fundamental nature of stratification and normative processes.

We examine our hypotheses by means of unique longitudinal data on the overlapping networks of friendship, aggression, and romance, allowing for analysis at the level of the individual and the dyad. The data were collected from

a New York school comprised of students in grades 8–12. To the best of our knowledge, this study represents the only investigation of school victimization to have access to network information on digital forms of aggression, friendships, LGBTQ identification, and romantic relationships. While a few studies have documented cyberbullying between dating partners (Zweig et al. 2013) and friends (Mishna, Wiener, and Pepler 2008), ours is the first to disentangle the effects of the complex and overlapping ties of romance and friendship from a social network perspective. Unlike previous studies, our data allow us to assess the risks posed by friends and dating partners, compared to each other and to other schoolmates, while controlling for individual and structural, network processes. We test whether friendships and romantic relationships increase the risk of electronic victimization with the use of both an exponential random graph model (ERGM) and a multiple regression quadratic assignment procedure (MRQAP). We also examine the hypothesis that LGBTQ youth are more likely to be targeted. We proceed with a discussion of key concepts before outlining our theory of cyber victimization.

BACKGROUND

Cyber Aggression

Cyber aggression refers to electronic or online behavior intended to harm another person psychologically or damage his or her reputation.¹ Possible venues include email, instant messaging, cell phones, digital messages, chat rooms, as well as social media, video, and gaming websites. The term *cyber aggression* is useful because of its inclusion of a wide range of negative Internet and cell phone

¹Debate exists regarding the correct term for this concept (e.g., Grigg 2010).

behaviors (Grigg 2010) and because of its predominance in previous research (see meta-analyses, Kowalski et al. 2014; Tokunaga 2010). Related terms include *electronic*, *online*, and *digital aggression/bullying*. Following a recent shift in the study of aggression (Bauman, Underwood, and Card 2012; Slonje, Smith, and Frisen 2013), our definition departs from the strict definition of bullying, which requires that harmful behavior be repeated over time and target a less powerful victim (Olweus 1993), and is the subject of some debate (e.g., Langos 2012). We believe the important aspects of both bullying and cyber aggression are harm and intent, and we have chosen to abandon requirements that bullying be repeated or directed toward a less powerful victim. While repetition increases the anguish of victimization, unrepeated aggression—a single rumor or trip in a crowded cafeteria, for example—can cause substantial trauma (Ybarra et al. 2014). In some cases, moreover, those with less power are able to harm their more influential schoolmates (particularly, but not necessarily, while anonymous). Our conceptualization is consistent with definitions elicited from children and teens themselves, who rarely include power imbalance or repetition in their definitions (Vaillancourt et al. 2008).

Research on cyber aggression is in its comparative infancy, and the lack of consensus regarding the definition of the phenomenon makes it particularly difficult to estimate its prevalence (Kowalski et al. 2014). Yet, numerous studies document that the damaging consequences of cyberbullying extend beyond those of traditional forms of bullying (e.g., Fredstrom, Adams, and Gilman 2011). While scholars agree about the harm of cyberbullying, the field is divided about the extent to which theories of bullying also apply to online aggression (Li 2007). We

do not attempt to detect these differences empirically but rather extend and revise theories of aggression to better suit the digital environment. In particular, theories of bullying may not fully account for the possibility of anonymity, the facilitation of coordinated targeting campaigns, the potentially vast “viral” audience, and the social distance afforded by device-mediated communication. These key differences pose special challenges to theories of bullying centered around psychological deficiencies such as low self-control (Moon and Alarid 2015), since reactive and maladjusted youth are less likely to wield significant influence on social media or gain the necessary trust to betray confidants.

Group Processes

Enforcing social norms. Even early theorists in social psychological work (e.g., Homans 1950) stress that individuals in group situations engage in two main processes, and these include: (1) the establishment of common standards for behavior, or social norms, and (2) the unfolding of systems of stratification in which individuals are differentiated along dimensions of status. We argue that these two processes form the foundation for online aggression in school settings. The first of these, norm enforcement, likely drives certain types of school cyber aggression, particularly those cruel actions aimed at young people whose behavior or appearance is found “wanting” when it comes to the traditional expectations of U.S. adolescent culture. Aggressors who harass the most vulnerable members of the student body are not only picking on the easiest targets therefore, but they also are reinforcing standards, unwittingly or not, of what is considered appropriate. Research suggests that such “normative targeting” focuses on social

isolates, the physically underdeveloped, and those with poor body image (Faris and Felmlee 2014.)

Among the myriad, fluctuating norms governing adolescent culture, however, heterosexuality is likely to be one of the most demanding. LGBTQ adolescents often face the most brutal levels of torment and ostracism on the part of their schoolmates (e.g., Katz-Wise and Hyde 2012). Recent research finds that nonheterosexuals also are more frequent targets of cyberbullying than heterosexuals (Hinduja and Patchin 2011). According to a national survey by the Gay, Lesbian, Straight Education Network (GLSEN 2013), LGBTQ youth were close to three times as likely as non-LGBT youth to report being bullied online and twice as likely to be victimized via text messages. To the best of our knowledge, however, previous research has not used a school-based, social network study of aggression to determine whether LGBTQ youth are at greater risk of electronic aggression over time. Our study will be one of the first to use multivariate, network, statistical models to examine this issue. These models enable us to determine whether LGBTQ young people remain targeted at a significantly higher rate after controlling for several other factors that influence victimization, such as instances of reciprocal cyber aggression, within-grade homophily, and the occurrence of past friendship and dating ties. Given our theoretical arguments discussed previously and findings in the previous literature, we hypothesize that young people who identify as lesbian, gay, bisexual, transgender, or queer/questioning/intersex are apt to be overrepresented over time as targets of cyber aggression even after controlling for other network and dyadic factors.

Hypothesis 1: To evaluate social vulnerability, we anticipate that LGTBQ

students are more likely to be the victims of cyber aggression than heterosexuals.

Rivalry among friends. Friendship is particularly important during adolescence as youth begin to distance themselves from parental control. These affiliation bonds improve academic outcomes (Vaquera and Kao 2008), mental health (Ueno 2005), and the stability of romantic relationships (Felmlee 2001). With respect to school bullying, having at least one friend can partially shield youth from harassment (Mouittapa et al. 2004) and aid in diminishing the harmful outcomes associated with victimization (Newman, Holden, and Delville 2005).

At the same time, friendships can be problematic. Social norms governing friendship can be unclear, for example, particularly when friendship and romance overlap, which can lead to serious misunderstandings (Felmlee, Sweet, and Sinclair 2012). Moreover, relational and physical victimization can occur between young friends (Besag 2006; Crick and Nelson 2002; Mishna et al. 2008). Some evidence suggests that cyber bullying can transpire among friends or acquaintances (Juvonen and Gross 2008; Mishna et al. 2010), although other surveys fail to reach the same conclusion (Li 2007; Wolak, Mitchell, and Finkelhor 2007).

We argue that there are many reasons to believe that victims of electronic aggression are more likely to be targeted by someone who is considered a friend or a former friend. First, friends are often competitors for the admiration and respect of the friends they share in common. Assuming that adolescents are contending for status and respect within the school setting, they are likely to vie with those to whom they are tightly connected. For example, friends typically belong to the same clubs, teams, and extracurricular activities (Schaefer et al.

2011) and may find themselves competing for identical positions. According to Gould (2002), the result is a subtle struggle for dominance where even trivial disagreements or social slights have the potential to boil over into serious conflict, which is likely to be expressed digitally. Second, friends share vulnerabilities, insecurities, and secrets that could be devastating if publicized online. Finally, friends also have more opportunities to harm one another; they are apt to routinely interact via text messaging and social network media, and frequent interaction sets the stage for aggressive incidents.

More generally, research points to the elemental nature of stratification processes, whereby interaction among members of groups inevitably leads to the development of informal status hierarchies (e.g., Berger, Cohen, and Zeldich 1972; Homans 1950; Simmel 1950). Recent studies suggest that general aggression in schools is often, if not always, motivated by the desire for status (Faris and Ennett 2012; Sijtsema et al. 2009) and can be effective for that purpose, boosting the social prospects of aggressors while marginalizing their victims (Faris 2012). If this is the case, then we argue that particular dimensions of friendship—rivalry and face-saving, respectively—should generate high levels of aggression, which is especially likely to be expressed online.

We expand on prior work by (1) investigating the friendship and electronic victimization networks of a school and (2) using network analyses (ERGM and MRQAP) to account for possible links between the friendship and victimization networks. In particular, we examine whether friendship ties between adolescents significantly increase the likelihood that former friends experience an incident of electronic aggression in which one of them targets the other. Unlike previous research that relies on surveys of

victims, our approach benefits from examining the network connections of both friends and “nonfriends” to compare their subsequent likelihood of victimization in network analyses. Moreover, we examine whether victimization occurs between friends more often than chance while controlling for the effects of several individual and network factors that also likely shape the victimization network, such as network density, mutuality, and homophilous behavior (e.g., same grade victimization). We follow friend and non-friend ties over time, in addition, and estimate the degree to which being friends is significantly more likely to be associated with incidents of subsequent electronic harassment.

Hypothesis 2: Youth friendships increase the likelihood of cyber aggressive ties.

Romantic relationships. Most U.S. adolescents experience a romantic relationship during their teen years, with two-thirds reporting such an involvement (Carver, Joyner, and Udry 2003). Yet establishing such ties is not always smooth. The “dating market,” similar to the “marriage market,” can be a competitive venue in which people vie for the same highly valued potential partners. Once forged, romantic relationships entail the same sharing of intimacies and insecurities as friendships. So with each budding relationship comes the potential for humiliation and disgrace. To be known as an inept or inexperienced dating partner can damage reputations, as can violations of sexual norms (Kreager and Staff 2009).

We argue that former dating partners constitute a particularly central source of romantic threat for both young men and women engaged in the dating game. Past boyfriends and girlfriends represent people who already have engaged in courtship activities together, which

increases the chances that the two will experience jealousy or resentful feelings that result in hurtful behavior. In particular, breakups lead to distress, frustration, loneliness, and depression (Sprecher 1994). Furthermore, romantic partners, as with close friends, are likely to readily possess knowledge regarding which “buttons to push” to most effectively wound the other. Not surprisingly, adolescents engaged in romantic relationships reported experiencing more conflict, and those who became romantically involved in the past year reported greater levels of depression (Joyner and Udry 2000) and aggression (Faris and Felmlee 2011). According to a recent Massachusetts survey (Englander 2008), one of the most common justifications for cyber bullying concerned who the target dated or befriended. In addition, approximately 26 percent of youth in a recent relationship from a northeast sample reported being a victim of electronic dating abuse (Zweig et al. 2013).

Romance is apt to be implicated in school aggression via a number of processes. First, cyber aggression may serve as a strategy for preventing potential partners from becoming involved with a current girlfriend or boyfriend. Second, aggression may be employed to hurt and ridicule people who become involved with one’s former partner as a form of revenge or as a method to discourage their involvement and win back the former mate. In addition, aggression may be used to punish one’s former partner for becoming involved with another person, to humiliate him or her in order to save face, or in an attempt to dominate and control that person’s behavior, possibly with the intention—no matter how ill-formulated—to reunite. Finally, it is likely that sexual harassment and violence that occur within ongoing romantic relationships will be expressed through cyber aggression. Most scholars argue

that relationship aggression takes place as an attempt to gain power and control over a romantic partner, especially for males (e.g., Felson and Messner 2000); electronic forms of communication may facilitate these attempts. For example, a substantial minority of girls (27 percent) reported being bullied into “sexting” situations in which they were coerced, blackmailed, or threatened into sending a nude photo of themselves (Snell and Englander 2010). We hypothesize, therefore, that victims are at higher risk to be targeted by former romantic partners than by those whom they have never dated.

Hypothesis 3: Cyber aggressive ties are more likely to develop between youth who have dated.

In sum, we extend previous research on this topic in several ways. We investigate in some depth the extent to which aggression occurs between intimately connected adolescents as opposed to other schoolmates. More specifically, we use information derived from network data to examine the possible roles of friendship and romantic relationships in shaping cyber victimization. In particular, we focus on the interactions between past and current romantic partners, a process that has not been studied systematically in relation to school victimization. Finally, we have longitudinal network data, which allow us to examine dynamic models of the factors that influence change in online victimization over time.

METHODS

Data

The data set derives from the Long Island School study, a short-term longitudinal study conducted in the spring of 2011 on a single public school in a wealthy suburb of New York. The school of nearly 800 students (788) includes grades 8 – 12. The

student body is disproportionately white (70 percent) and largely from upper-class backgrounds, with 72 percent of fathers and 56 percent of mothers employed in professional or managerial occupations.

Students were given paper questionnaires in which they were asked to identify up to ten of their closest friends, up to eight current and former dating partners, and also up to eight students “who picked on you or were mean to you” and who “you picked on or were mean to” during the previous week; students were then asked whether the behavior occurred via the Internet or text message. Participants were instructed to disregard playful teasing and focus only on seriously harmful or mean actions. Students were asked to provide a brief description of the incident(s) in a short, open-ended format. These descriptions are the subject of ongoing analysis, but a team of three research assistants independently coded the severity of these incidents and found that only a small fraction (<10 percent) were deemed low in severity.

The survey was administered early in the spring term with three closely spaced follow-ups over a period of four weeks at the end of the school year. In order to reduce missing cases, instances of victimization were combined from those three data collections to form the second time point. In addition, there were not enough new cases of aggression between the two-week collection points to examine change in these time periods separately. The response rate was approximately 94 percent for the merged Time 2 data, with response rates of 74 percent, 58 percent, and 48 percent, respectively, for the three aggregated Time 2 waves. We used multiple imputation to handle missing data.

Dependent variables. We generated cyber aggression networks (matrices of ties produced by harmful email, texting, or Internet communication) based on the

nominations provided by victims and aggressors at two time points. The two networks (the network according to victims and the network according to the aggressors) were merged such that an aggressive link from A to B was considered present if either A nominated B as a victim or B nominated A as an aggressor. We combined these networks because of possible underreporting concerns and also because previous research (Ladd and Kochendorfer-Ladd 2002) demonstrates the utility of collecting multiple sources of information, such as self-report and peer report, for measures of bullying or aggression. Using this combined network, we calculated a count variable, *cyber victimization*, or the number of times students harassed or attacked the respondent via the Internet or text messages.² The count measure is used in the network regression (multiple regression quadratic assignment procedure [MRQAP]) analysis. For the exponential random graph model (ERGM), we use a dichotomized version of the matrix of cyber victimization (0 = never a victim, 1 = a victim at least once during the study).

Independent variables. We include several control variables in the ERGM to account for both individual and dyadic factors. Our controls include a measure of *edges*, which represents the total number of edges (or ties) in the network; *reciprocity*, which accounts for mutual ties; *female* (1 = female, 0 = male); *LGBTQ* (1 = lesbian/gay/bisexual/transsexual/queer/questioning/intersex, 0 = heterosexual); and a measure for each *grade* level. We also include several dyadic variables that measure the degree to which

²Conclusions regarding trends in school aggression victimization have been shown to be robust to the decision to analyze network data compiled from victims only, aggressors only, or the combined networks used here (Faris and Felmlee 2014).

homophily drives victimization ties. These include *same gender, same sexuality*, and a measure for each grade level (*same grade*). Our key dyadic variables include *friends* (1 = friends at some time, 0 = never friends) and *dating partners* (1 = dating partners at some time, 0 = never dated).

In analyses not shown here, we estimated additional ERG models that controlled for alternative independent variables, such as measures of triadic tendencies (e.g., if A victimizes B, and B victimizes C, then A also victimizes C) and measures of outdegree for several variables (e.g., grade level, female, LGBTQ). However, these models either failed to converge, due to the sparseness of the network, or displayed a poor fit to the data. For example, there were only four transitive triads in our cyber aggression data set, which made estimation of various triad effects problematic. In analyses not shown here, we also found that victimization was not distributed evenly, with some students victimized more than once, by estimating weighted measures of indegree. Our final ERG model, however, provided a better test of our hypotheses than any of the alternative models.

Exponential Random Graph Model

We begin by using an exponential random graph model to examine our hypotheses (e.g., Hunter et al. 2008; Wasserman and Pattison 1996). The ERGM allows for testing of dyadic associations as well as for nodal and structural tendencies. Our goal is to examine the relationship between two key dyadic variables (e.g., whether a friendship tie or a dating tie is associated with a victimization tie) while controlling for individual and other dyadic and network properties. The ERG model specifies the probability of a set of network ties, Y , conditional on a set of actors and their characteristics:

$$PY=y|X=\exp[\theta^T g(y;X)]/k(\theta).$$

The term X represents a matrix of covariates, $g(y, X)$ is a vector of network statistics, θ is the set of coefficients, and $k(\theta)$ is a normalizing constant. The coefficients in our ERG model reflect the log-odds of obtaining the observed network of victimization ties, conditional on the matrix, X , of individual and structural covariates (e.g., edges, reciprocal ties, mutual grade ties).

Network Regression: Multiple Regression Quadratic Assignment Procedure

As a robustness test, we also conduct a lagged, multiple regression quadratic assignment procedure of the network of cyber victimization ties. The MRQAP allows us to examine our relational, dyadic hypotheses (2 and 3) in a model in which the coefficients are relatively unbiased in the face of structural autocorrelation among the dyads (Krackhardt 1988). Because our dependent variable is a count of victimization ties, the MRQAP has the advantage over the ERGM that it can readily account for a dependent variable that is not a dichotomy. Although it is unlikely, an observed link between close relationships and victimization could be due to a friendship or romance developing between two youth *after*, rather than before, an act of electronic aggression, and therefore we use a lagged model to control for causal order.

The first step in the MRAQP consists of an ordinary least squares (OLS) regression in which the dependent variable, a matrix of cyber victimization ties at Time 2, is regressed on three independent variables that each consists of the same size matrix at Time 1 (i.e., networks of friendship, dating, and cyber victimization). The second step, similar to bootstrapping, consists of repeated permutations of the

Table 1. Descriptive Statistics

	Females	Males	Overall	SD	Min	Max
Internet victimization, Time 2	.12	.08	.095	.48	0	5
Internet aggression, Time 1	.06	.04	.05	.26	0	3
Internet victimization, Time 1	.09	.02	.05	.34	0	6
Female			.48	.5	0	1
LGBTQ	.04	.04	.03	.18	0	1
Grade 9	.22	.2	.21	.41	0	1
Grade 10	.18	.2	.19	.39	0	1
Grade 11	.19	.21	.2	.4	0	1
Grade 12	.2	.19	.19	.4	0	1
Dated another student	.42	.43	.43	.5	0	1
Single parent home	.14	.1	.1	.3	0	1
Parent did not attend college	.11	.08	.08	.27	0	1
Caucasian	.73	.67	.7	.46	0	1
Asian	.17	.19	.18	.39	0	1
African American/Latino	.06	.06	.06	.24	0	1

Note: N =788. Statistically significant gender difference ($p < .05$) in bold text.

rows and columns of the matrix representing the dependent variable and after each permutation, recalculating the regression coefficients. Statistical significance represents the proportion of results from random permutations of matrices with OLS coefficients as high as those from the original dependent variable matrix. Here we use 2,000 permutations via Double-Dekker Semi-Partialling, which is a useful permutation method under the conditions of high skewness and spuriousness typically associated with negative binomial distributions (Dekker, Krackhardt, and Snijders 2007). To the best of our knowledge, this study represents one of the first to use information from both friendship and dating networks to account for change in networks of aggressive contacts over time.

Descriptive Results

The student body consists predominately of whites (70 percent), with 18 percent Asians and 6 percent African Americans, Latino(a)s, and other ethnic groups (see

Table 1). Somewhat less than half (43 percent) have dated another adolescent in the school. We find gender differences, with females significantly more likely than males to be victimized at Time 1 but also more prone to engage in cyber aggression at that same time period. About 24 students (3.3 percent) identified their sexuality as not heterosexual. Despite their relatively small numbers, we find that LGBTQ youth are significantly more likely to be the victims of cyber aggression than their heterosexual counterparts. The large majority of students have at least one parent who attended college, and only a small proportion live in a single family home. However, family structure (single parent home vs. two parents), parent occupation (manager/professional status vs. other), and parent education (no parent attended college) do not have any significant relationship to cyber victimization (in analyses not shown here). Thus, we do not include controls for family background in our final models. We also exclude various measures of race, none of which had significant effects, possibly because of

the high degree of racial homogeneity in the school.

Descriptions of Cyber Aggression Incidents

In one or more of the surveys, 17.2 percent of the participants reported involvement in cyber aggression "in the past week," either solely as an aggressor (9.1 percent), a victim (5.8 percent), or both (2.3 percent). Students also briefly described recent cases of cyber aggression that they had experienced in response to an open-ended question. The most common (41 percent) involved the social networking site Facebook, with typical incidents consisting of mean, hurtful comments. Damaging cell phone text messages comprised the second most frequent type (38 percent). Instant Messaging (12 percent) was the third most frequent venue, with miscellaneous types of media (e.g., chat rooms, online games) encompassing the remaining cases (9 percent).

In their open-ended descriptions, several individuals recounted incidents in which someone posted humiliating photos or nasty rumors about them on Facebook. One young woman reported a criminal incident in which another student stole her identity on Facebook and created a fake account under her name. In another case, a boy printed out on paper a fight between him and a girl that transpired on Instant Messenger in order to show it to her current boyfriend. People also communicated damaging rumors (e.g., a supposed pregnancy) and texted vulgarities and personal threats. Finally, a popular girl pretended to "friend" a lonely, young classmate on a social network site, and he was then treated badly by others on the site.

Participants wrote about the harmful results of these aggressive actions for the victims, noting that in some cases

self-esteem "was destroyed." Students reported that they were "hurt," "depressed," "lonely," and/or had "lost friends" because of untrue gossip and other forms of aggression aimed at them. In one case, a student chose to change schools to escape repeated badgering regarding her alleged sexual conduct.

RESULTS

Friendship, Dating, and Victimization Networks

Next, we examine in more detail the extent to which cyber victimization occurs between young people who had close relationships, as opposed to those who had few or no close ties. As depicted visually in Figure 1, harmful Internet and cell phone relations do not appear to be independent of friendships but instead often are interconnected. The network of cyber aggressive ties is superimposed on the friendship network in this figure, and considerable electronic harassment ensues within dense areas of the graph that are characterized by many mutual friendships; little aggression extends toward the periphery.

Furthermore, an extremely dense network of dating relations exists within this school, with a chain of connections that extends throughout the network from one point to the other (Figure 2). Only a handful of pairs remains unconnected to the central group, not unlike findings from another high school setting in which a long chain of ties connected many sexually involved adolescents (Bearman, Moody, and Stovel 2004). The light colored edges highlight the heavily concentrated set of interconnections among actively dating young people, connections that may lead to jealousy, misunderstandings, and other disputes that incite online aggression. The dark edges in Figure 2 represent cyber aggressive links that are superimposed on top of

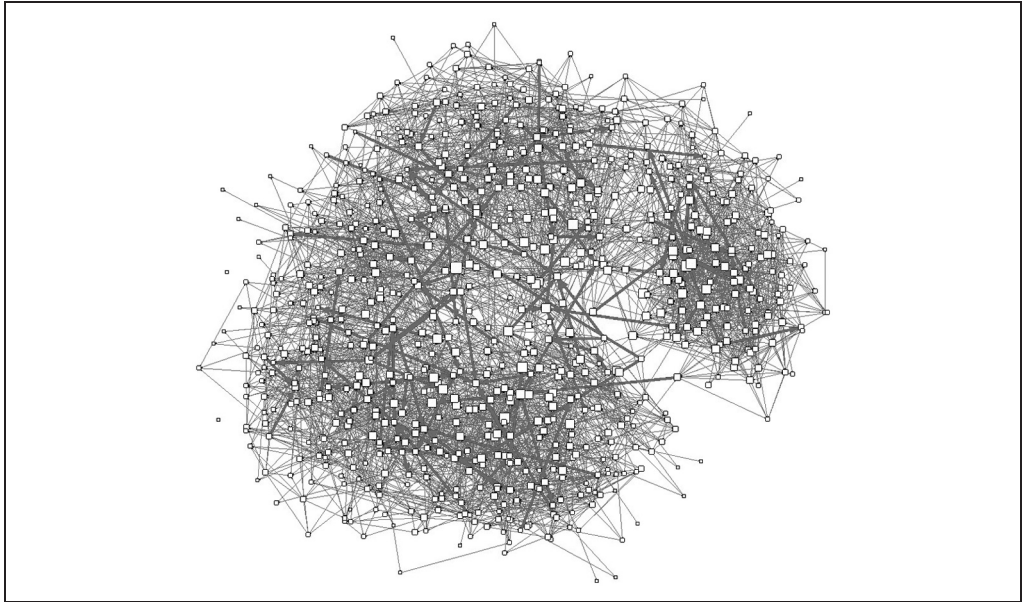


Figure 1. Friendship and Cyber Aggressive Ties

Note: Cyber aggressive ties (dark edges) are superimposed on top of friendship ties (grey edges). Nodes are inflated by friendship degree.

the lighter dating relationships. The electronic ties tend to center largely in the densest areas of dating ties, which suggests that Internet aggression frequently occurs between individuals linked by the bonds of past romance.

Exponential Random Graph Model: Friendship and Dating

The sociograms discussed previously indicate that friendship, dating, and cyber victimization overlap substantially, but such an inference needs to be tested formally. The visible pattern of overlap among relationship and victimization network ties could be due to several uncontrolled factors. These factors include the high density of edges in the network, the overrepresentation of certain actors (e.g., LGBTQ, females), patterns of reciprocal victimization, and/or homophilous ties among those of the same gender, sexual orientation, or same grade. In order to test our

hypotheses while controlling for these types of dyadic independent (i.e., nodal/individual) and dyadic dependent processes, therefore, we begin our analysis by estimating an ERGM of the victimization network.

As shown in Model 1 of Table 2, both individual and dyad factors contribute significantly to the observed pattern of ties in the victimization network. As expected, nonheterosexuals (i.e., LGBTQ) are significantly overrepresented as victims of cyber aggression at a rate of over four times that of their heterosexual peers (odds ratio = 4.44). Females also are targeted more often (odds ratio = 2.05), and as compared to eighth graders, students in all grades except for twelfth are more likely to be victimized. There is evidence of significant reciprocity, or mutuality, in digital forms of victimization as well, indicating that the network is characterized by more mutual ties than would be expected by chance. In addition, homophily is a potentially

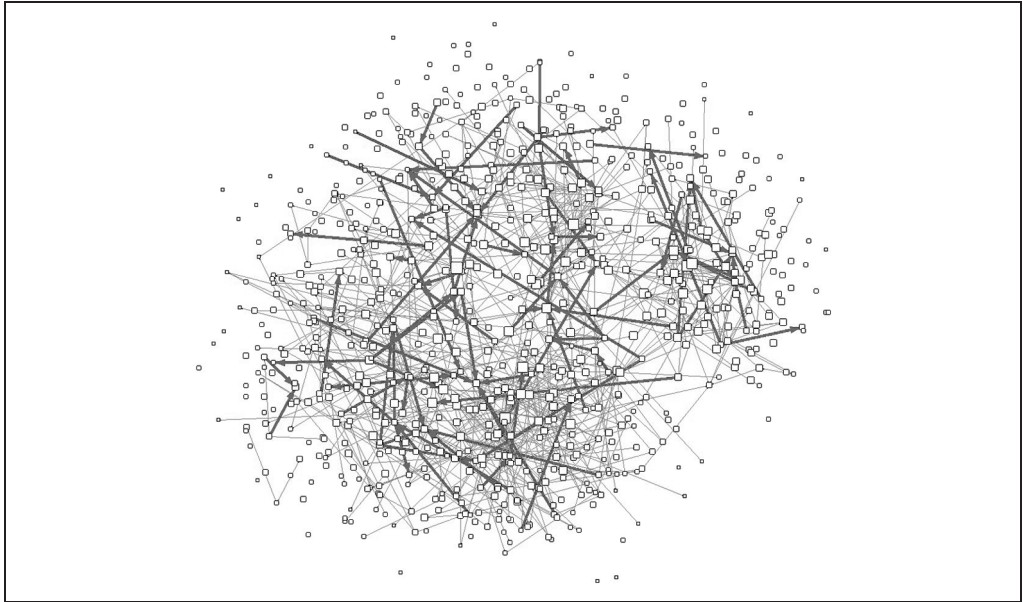


Figure 2. Dating and Cyber Aggressive Ties

Note: The network of cyber aggressive ties (dark edges) superimposed on the network of dating relationships (light edges). Nodes inflated by friendship degree.

Table 2. Coefficients for Exponential Random Graph Models of Aggression Victimization by Time 2; (Standard Errors in parentheses)

Time 1 variables	Model 1	Model 2
Edges	-11.84*** (.94)	-11.75*** (.86)
Reciprocity	4.82*** (.67)	4.50*** (.57)
Female	.72*** (.20)	.69*** (.20)
LGBTQ	1.49** (.64)	1.43** (.58)
Grade 9	1.44* (.80)	1.46** (.74)
Grade 10	1.36* (.82)	1.39* (.77)
Grade 11	1.56* (.79)	1.58** (.75)
Grade 12	.92 (.85)	.94 (.81)
Same gender	.30 (.19)	.15 (.20)
Same sexuality	.37 (.58)	.36 (.53)
Same grade 8	3.61*** (.75)	3.34*** (.71)
Same grade 9	1.85*** (.41)	1.64*** (.41)
Same grade 10	2.33*** (.45)	2.14*** (.44)
Same grade 11	2.06*** (.41)	1.82*** (.40)
Same Grade 12	1.22* (.67)	1.03 (.66)
Friends		1.91*** (.25)
Dating		1.94*** (.46)
Akaike Information Criterion	1,947	1,903
Bayesian Information Criterion	2,117	2,096

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 3. Quadratic Assignment Procedure Regression of Time 2 Cyber Victimization Network on Time 1 Cyber Victimization Network, Time 1 Dating Network, and Time 1 Friendship Network

Independent variables	β	SE
Intercept	.000	
Cyber victimization network, Time 1	.102***	.002
Friendship network, Time 1	.002***	.000
Past dating network, Time 1	.002*	.001

Note: Adjusted $R^2 = .006$; $N = 620,156$.

* $p < .05$. *** $p < .001$.

important explanation for the pattern of links with respect to several dyadic variables. Within-grade homophily is common, for instance, with eighth graders, being picked on by other eighth graders, ninth graders by other ninth graders, and so on. Features of the school setting that group students together thus play a part in the unfolding of cyber aggression. On the other hand, there is no significant evidence of gender homophily while controlling for other covariates. Nor is there significant homophily on the basis of sexual orientation.³

As expected, we find strong support for both of our interpersonal, dyadic hypotheses in Model 2 while controlling for all the significant individual and dyadic factors included in Model 1.⁴ Having a friendship at Time 1 significantly predicts tie formation, for instance, with the odds of victimization over six times more likely

between original friends than between those who were never friends (odds ratio = 6.75). An early romantic connection also significantly and substantially boosts the risk of victimization. A dating tie increases the chances of a cyber aggression link by a factor of approximately 7 (odds ratio = 6.96). Model 2 also represents a significant improvement in fit over the baseline model, and the effects of the baseline covariates remain relatively stable.⁵

Multivariate Network Regression: Friendship and Dating

Next we estimate the influence of both friendship and dating ties at Time 1 on cyber victimization ties at Time 2 while controlling for initial Time 1 cyber victimization in a lagged multiple regression quadratic assignment procedure (MRQAP). This procedure allows us to examine the effect of our relationship dyadic variables on a count measure of the number of times a youth was victimized.

As can be seen in Table 3, the MRQAP findings corroborate those from the exponential random graph model (ERGM) analyses. All three of the Time 1 social network ties have significant effects on

³The small numbers of LGBTQ youth (24) may contribute to the lack of homophily by sexual orientation. Given their shared minority status, however, LGBTQ youth also may avoid harassing each other.

⁴In analyses not shown here, we controlled for a number of other network structural factors, such as variables to examine triadic effects. As discussed earlier in the Data section, these models either failed to converge or had fit problems. Note that we do not anticipate, theoretically, that triadic tendencies would be common in electronic aggression. It seems unlikely that an aggressor will target the victim of a victim, that is, target the “enemy” of an “enemy.”

⁵Goodness of fit plots for Model 2 (not shown here) for edge-wise shared partners and degree indicate that the simulated model provides a very good representation of the observed data, although not a perfect fit.

the Time 2 network of counts of victim-aggressor relations. In support of our hypothesis, the presence of a friendship tie at Time 1 is positively associated with the rate of subsequent incidences of cyber victimization between the same two individuals while controlling for prior victimization and dating. Furthermore, two people who have dated previously are significantly more likely to be victimized by the other at a later point in time, as expected. Not surprisingly, pairs in which one victimizes the other also are more likely than random pairs to repeat that behavior in the future.

Finally, we examine the rate of electronic victimization at Time 2 as a function of the distance in the friendship network between the victim and the aggressor at Time 1. In analyses not shown here, we find that the rate per thousand of being attacked diminishes as the friendship distance between the aggressor and the victim widens. Approximately 21 percent of all cyber aggression ties that occur are among friends (one tie apart), and 25 percent take place among friends of friends (two ties apart). Time 2 cyber aggression is 4.3 times more likely to occur between Time 1 friends (or former friends) than between friends of friends.

DISCUSSION

Cyber aggression, bullying, and online harassment embroil many students in the school we studied, which consists largely of college-bound whites. Approximately 17.2 percent of the student body in our sample was involved in cyber aggression in some way, with approximately 8.1 percent victimized by cyber aggression within a short timeframe. Victimization is unrelated to a host of demographic and family background factors—factors that are normally strong predictors of behaviors and outcomes. Here we

addressed the question as to whether cyber aggression occurs between those who are closely linked within the social stratosphere of a high school. Online aggression in our study is significantly more likely among those who have been closely and intimately tied as compared to among those relegated to distant connections. Friendships increase rather than decrease the likelihood of future incidents of electronic aggression, even while controlling for previous dating relations and victimization. Friendships are significantly associated with at least one incident of victimization while controlling for several significant individual and dyadic predictors in an ERGM analysis, such as gender, sexuality, grade level, mutuality, and homophily by grade. Comments on the part of the study participants underscore the crucial role of friendship. Two people taunted each other on the Internet, according to one student, “because they used to be friends.” Another youth laments: “Sometimes your own friends bully you . . . I don’t understand why, why my friends do this to me.”

Aggressive electronic acts are shaped by the pattern of romantic relationships in the school. Controlling for prior friendship ties and past victimization, the network of past dating relationships is positively and significantly associated with the subsequent network of harmful electronic ties. Victimization ties occur much more frequently than expected by chance among pairs who have dated, in a network model that includes multiple individual and dyadic factors that contribute to such ties. Past romantic partners thus are at disproportionate risk of online attacks. These harmful acts may be intended to increase the status of the aggressor and at the same time reduce the likelihood that a possible rival threatens the viability of a romance. In an illustration of such competition, one young woman reports: “A group of girls

harassed me this year because I was talking to one of their ex-boyfriends.” In another case that involved direct dating violence, a senior male punched his girlfriend in the face outside the school and then posted about it on Facebook, possibly in an attempt to control her.

Our findings demonstrate that the strong ties of friendship and romance are heavily implicated in online and electronic harassment among adolescents. Several possible explanations exist for this pattern. In the first place, well connected people have more information with which to injure the other than do those who are weakly tied. People interact more frequently with these tight connections, which creates opportunities for misunderstandings and discord. Moreover, friends are apt to find themselves in direct competition for the same club or sport (Schaefer et al. 2011) or for attention from a similar set of acquaintances, and this struggle may lead to conflict and aggression. In addition, an adolescent may badger a former romantic partner in order to avenge an unwanted breakup, prevent an ex from dating another, or “save face” among friends. As noted elsewhere (Spears et al. 2009), cyberbullying constitutes a deep-seated relationship problem. These findings also underscore the argument that much of what is significant in social life is not just abstractly social and interactional but is directly relational and that close relationship ties are a key to understanding a range of social phenomenon (Felmlee and Sprecher 2000; Ridgeway and Correll 2004).

Note that these results do not imply that strangers never engage in cruel online actions toward adolescents. Indeed, such cases do occur and sometimes with tragic consequences. Moreover, we do not doubt that many of the young people with whom students are intimately acquainted play a beneficial

role in their lives when it comes to negative online interactions. Friends and loved ones likely attempt to protect those close to them from electronic and other forms of maltreatment, console them in the event of an attack, and most do not themselves commit aggressive, digital acts. Yet here we also see evidence of the perils associated with intimacy. These risks are not unlike those regarding violent crime, whereby the likelihood of being victimized by a close tie or acquaintance greatly exceeds that of being targeted by a stranger (Harrell 2012). Ironically, general fears regarding cyber victimization may focus on the risky stranger, and only rarely does one expect the perpetrator to be located nearby, among one’s most intimate associates.

Furthermore, the risk of being victimized by electronic or textual means emerged as alarmingly high for vulnerable, nonheterosexual youth. Young people who identified as gay, lesbian, bisexual, or queer were targeted by their classmates at over four times the rate of heterosexual students, even after controlling for a host of individual, friendship, dating, and other dyadic factors. Illustrations include one openly gay boy who was called “fag” and other slurs on Facebook and a girl whose cell phone was taken by a boy who sent a mass message to her contacts saying “I am gay,” causing the girl to “tear up, and nobody said anything.” Although the numbers of LGBTQ youth in the sample remain small, the large effect size highlights the significance of the finding. We find here additional evidence that gay, lesbian, bisexual, intersex, or queer/questioning adolescents are not only frequent victims of physical, verbal, and relational aggression (Katz-Wise and Hyde 2012) but that their tormentors also utilize the Internet and other electronic venues to carry out their viciousness. Our study reinforces and extends previous work on this topic.

We uncover rates of LGBTQ victimization that are at least as high as those found in previous surveys (GLSEN 2013; Hinduja and Patchin 2011) while using multivariate network models and relying on data based on the reports of both victims and aggressors.

Several underlying group processes likely contribute to the development of cyber aggressive relations, including those involving social norms, status hierarchies, and romantic relationships. In the first place, social norms enforcing heterosexuality that are prevalent among U.S. youth and society are apt to be involved in acts that target gay, lesbian, or bisexual youth. Adolescents who are in the beginning stages of developing and exploring their sexuality may reflect such norms as they attempt to establish and reinforce their own sexual identity. Girls were frequent victims of electronic harassment, at about twice the rate of boys, which also may signify normative pressures. Girls likely represent “easier targets” than boys, for both other girls and boys, due to their lower status in the larger society and to social norms that restrict girls’ access to certain forms of revenge (e.g., relational but not physical aggression; Underwood 2003).

The link between friendship and cyber victimization, moreover, underscores the possibility that jockeying for status and recognition among relative equals represents an elemental group process involved in online aggression. Furthermore, the association between romance and electronic victimization highlights an additional group mechanism implicated in aggression and one that has received less attention in the literature: that of intimate relationship formation. A primary goal of many adolescents is to establish romantic relationships, yet this process is also intensely competitive, with young people inevitably vying for the most valued romantic partners. One

way to fend off potential challengers may be to humiliate and scare them via a nasty, threatening text message or to post an embarrassing photo on Facebook. Additionally, dating in high school can be conflictual, and distressing breakups are not uncommon. Posting a cruel comment on an ex’s Facebook page may be one approach to wound someone back, avenge a wrong, or attempt to shame and coerce a former partner into reuniting.

Strengths of the research presented herein include the use of networks of friendship, dating relationships, and cyber aggression, which allows us to examine the relational nature of victimization in more detail than previously. In particular, networks of romantic relationships are rare. In addition, our data set was longitudinal, enabling us to track changes in the likelihood of becoming a target over time. The use of an ERGM framework enabled us to control simultaneously for several nodal and dyadic factors that contribute to electronic victimization. The lagged network regression also allowed us to examine the association between the ties of friendship and dating at one point in time on the subsequent frequency of connections between perpetrators and victims of electronic aggression. Nevertheless, additional work is needed to expand this research to other school settings, geographical regions, and longer time periods. Future research should consider differences between public humiliation and private harassment, a distinction we are unable to make with our data. Another crucial task remains to extend this investigation to consider possible interventions that might reduce victimization, especially for the most severe cases, such as the use of highly networked, salient students to alter patterns of school harassment (e.g., Paluck and Shepherd 2012).

In sum, a series of complex social relationship processes contribute to the

development of school cyber aggression. Moreover, electronic and Internet threats to young people do not necessarily originate from strangers to their social circles; instead, they are disproportionately sent from those once held near and dear, friends and romantic partners. Thus, camaraderie and courtship do not always provide a safety net for young people when it comes to intentional, harmful behavior via electronic means. Instead, aggressive online actions commonly spread within a web of familiar relational ties that comprise a school's dynamic social system.

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