With Friends Like These: Aggression from Amity and Equivalence[1]

Robert Faris
University of California, Davis

Diane Felmlee
Pennsylvania State University

Cassie McMillan
Northeastern University

Some teenagers are willing to bully, harass, and torment their schoolmates in order to achieve popularity and other goals. But whom do they bully? Here, we extend the logic of instrumental aggression to answer this question. To the extent that friendships are the currency of social status, we should expect social aspirants to target their own friends, their friends' friends, and other structurally equivalent schoolmates. This tendency, we argue, extends beyond what would be explained by propinquity, and we expect that victimization by friends will be particularly distressing. We test these hypotheses using panel social network data from 14 middle and high schools at two time points during a school year. Findings from temporal exponential random graph models suggest that our expectations are correct: the tendency to be cruel to friends is not significantly influenced by propinquity, and victimization by friends has adverse consequences for mental health.

INTRODUCTION

Abraham Lincoln once asked, "Do I not destroy my enemies when I make them my friends?" Abraham Lincoln never attended middle school. Two

centuries later and fewer than three hundred miles away from Lincoln's Indiana home, a Missouri seventh grader named Megan Meier desperately sought the embrace of the popular crowd at Fort Zumwalt West Middle School, only to be met with harsh mockery of her weight. Megan's anguish over this rejection so alarmed her parents that they transferred her to a local Catholic school, where her fortunes changed quickly and dramatically: she lost twenty pounds, joined the volleyball team, and successfully joined the ranks of the popular. But Megan's best friend from Fort Zumwalt, Sarah Drew, did not fit in with her new social circle, opening newfound distance between them. Eventually Megan's ascent strained their friendship to the point where she told Sarah she no longer wanted to be friends. Seeking retribution, Sarah and her mother, Lori, created a phony MySpace account of an attractive but fictitious boy, "Josh," and over the ensuing month used it to flatter, manipulate, and ultimately torment Megan. After "Josh" sent a message to Megan saying, "I don't like the way you treat your friends, and I don't know if I want to be friends with you," Megan retreated to her bedroom and hanged herself in her closet (Maag 2007). The resulting public outcry inspired calls for criminalizing bullying, which were later reignited by prosecutors' inability to convict Lori Drew on anything more serious than three misdemeanor charges of computer fraud.

The tragedy of Megan Meier highlights more than the limitations of the criminal justice system in addressing complex, often subtle, social problems like bullying. It is a sensational account of ambition, rejection, betrayal, and cruel treachery. But, we argue, Megan's story is sensational primarily because its tragic ending was orchestrated by an adult. Its core elements—the dark side of intimacy and the collateral damage of social climbing—are not exceptional, but routine. And contrary to the once-prevailing view of bullying as a maladjusted reaction to psychological deficiencies, emotional dysregulation, empathy deficits, or problematic home lives, Sarah Drew is one of millions of adolescents who has harmed a schoolmate for instrumental reasons: to exact retribution, achieve prominence, or vanquish a rival. Recent research bolsters the case for the instrumental view of bullying and aggression, concluding that the desire for popularity motivates much aggressive behavior (Sijtsema et al. 2009; Faris and Ennett 2012), which in turn boosts the social prospects of perpetrators and impairs those of their victims (Faris 2012; Reijntjes et al. 2013; Wegge et al. 2016).

But how do bullies select their targets? Chickens (Chase 1982) and summer campers (Martin 2009a) alike tend to peck and ridicule transitively, creating linear dominance hierarchies. But ethological studies offer limited guidance

regarding the choice of targets, not so much because their observational capacity constrains group size to very small numbers, but because they do not distinguish between status and aggression, instead enveloping both in the concept of dominance, achieved through victory in the preponderance of agonistic bouts and signaled through the induction of ritualized submission. This is no doubt appropriate for chicken coops and perhaps even for short-term summer camp cabins, but in larger,[2] more durable contexts like high schools, with more sophisticated actors and more subtle maneuvering, overt aggression is not the only means by which status is attained. Prom queens do not fight their way to their thrones.

Balance theory, the foundation for many analyses of signed (positive or negative tie) networks, offers straightforward propositions: our enemies are the enemies of our friends or the friends of our enemies. While friends-of-friends tend to become friends (e.g., Moody 2001; Block 2015), empirical support for the "enemy" propositions of balance theory is mixed. Some findings on relations of disliking (Berger and Dijkstra 2013; Rambaran et al. 2015; Fujimoto, Snijders, and Valente 2017) and bullying and defending (Huitsing, Van Duijn et al. 2012; Huitsing, Snijders et al. 2014) provide support. On the other hand, only a tiny fraction of university students' lunch partner preferences are consistent with balance theory (Yap and Harrigan 2015) and a longitudinal analysis of a fraternity found that imbalanced triples *increased* in prevalence over time, while some balanced triples vanished completely (Doreian and Krackhardt 2001). Accordingly, as Everett and Borgatti (2014) argue, it is a mistake to assume that seemingly mirror-image negative and positive ties operate on parallel terms.

We both heed this warning and expand on it, by challenging a core assumption in balance theory and in most network research: that positive and negative ties are mutually exclusive. Thus, our goal here is not to test balance—an impossibility if friends are also enemies—but instead to propose a theory of "frenemies." Overlap between positive and negative networks is rarely if ever examined in the small empirical literature on negative tie networks, as it would seem strange to dislike a friend or to avoid eating lunch with a classmate you would nominate for student council (Berger and Dijkstra 2013; Harrigan and Yap 2017). But it is not incomprehensible for people to be cruel to their friends, or their friends' friends. Indeed, there are good reasons to expect them to do so.

In contrast to both balance theory and much of the empirical literature on bullying, which concludes that victims are isolated or marginal and thus sit at relatively large social distances from their tormentors, we extend the

[2] One valuable insight from Martin's (2009*b*) theory of the emergence of large social structures is the problem of scale in networks. Natural limits on the number of relationships an actor can sustain as well as the capacity to avoid agonistic relationships are fundamental obstacles to scaling a model from small groups to large ones.

logic of instrumental aggression to anticipate higher rates of aggression at *low* social distances,[3] between friends and among structurally equivalent schoolmates. This is not because they spend more time with one another, but because they compete for the same social positions and relationships. We test these hypotheses using temporal exponential random graph models (TERGMs) of networks of aggression from 14 middle schools and high schools over two time points during one school year. We further anticipate that betrayal by friends is acutely painful relative to harassment by others, and so we also examine the consequences of each source of victimization for well-being. And thus, we are not so sanguine as Lincoln in asking, *Where do our enemies come from?* The answer, we conclude, is that they are close by.

INSTRUMENTAL AGGRESSION

While most scholars have adopted Olweus's definition of bullying—as "aggressive behavior or intentional harmdoing which is carried out repeatedly and over time in an interpersonal relationship characterized by an imbalance of power" (Olweus 1993 p. 9)—few seem to be entirely satisfied with it, chafing at either the requirement of repetition or the potential tautology of the power imbalance criterion, or both. The Megan Meier case arguably falls short of both standards, and so ironically would not qualify as bullying at all. Similar exceptional cases led two prominent bullying scholars to conclude, in 2003, that "perhaps the most challenging aspect of bullying prevention programming is reaching a consensus on a definition of bullying" (Espelage and Swearer 2003, p. 368). A decade later, they were joined by a host of other leading researchers in determining that little conceptual progress had been made, and there was still no adequate definition of bullying (Volk, Dane, and Marini 2014). Accordingly, we sidestep the conceptual morass of bullying and focus instead on the broader term of *aggression*, which refers to behavior with the intent to harm, injure, or cause pain (Kinney 2007). We focus on several forms of peer aggression, including physical (e.g., hitting, kicking), verbal (e.g., name-calling, threats), and indirect aggression (e.g., spreading rumors, ostracism).

Traditional explanations for bullying and related aggressive behaviors paralleled their apparent senselessness, focusing on psychological explanations rooted in empathy deficits, emotional dysregulation, problematic home lives, or internalizing problems (e.g., Swearer et al. 2001; see Cook et al. 2010 for a

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[3] It is important to clarify that our focus is on *rates* of peer aggression, rather than overall frequencies. School social networks are sparse, and friends are rare. Aggression too, is (fortunately) even more rare. So we do not anticipate that most aggression comes from the hands of friends or that most friends are aggressive, only that they are disproportionately so. By analogy, people are more likely to be murdered by someone they know than by a stranger. This does not mean that most of the people we know commit murders.

meta-analysis). As research expanded beyond individual-level psychological factors to consider peer contexts, however, an alternative to this pathologized account quickly emerged, issuing from the discovery that bullies can be popular and hold high status (e.g., Espelage and Holt 2001; Vaillancourt, Hymel, and McDougall 2003), even if they are not widely liked (Parkhurst and Hopmeyer 1998). While some scholars rapidly embraced the perspective that bullying was goal-oriented behavior aimed at status (see Salmivalli 2010 for a review), empirical support has come in piecemeal fashion, and some core tenets only recently articulated. Research soon documented and parsed the profiles of popular bullies (e.g., Farmer et al. 2003), but the first empirical tests of whether status goals drive bullying—a foundational requirement of instrumental aggression—are less than a decade old (Sijtsema et al. 2009; Faris and Ennett 2012; see also Duffy et al. 2017). They confirm that much aggression is purposeful and intended for social climbing. And as adolescents ascend their school's social ladder, they tend to become more aggressive—that is, until they approach its top rungs (Faris and Felmlee 2011). At that point, the logic of instrumental aggression implies that, having reached the pinnacle of their school's social hierarchy, they have no further need for aggression and should desist. By contrast, if aggression is primarily a function of empathy deficits, which grow as status rises (Galinsky et al. 2006), we would expect heightened aggression among the most popular youths. Empirical results, however, support the instrumental argument (Faris and Felmlee 2011).

Research on victims, meanwhile, generally focused on physical, social, and psychological vulnerabilities (Veenstra et al. 2007), such as depression and anxiety (Fekkes et al. 2006), acne and related skin disorders (Magin 2013), obesity (Janssen et al 2004), poor body image (Faris and Felmlee 2014), disability (Mishna 2003), LGBTQ status (Friedman et al. 2011; Felmlee and Faris 2016), and social isolation or low-quality friendships (Pellegrini and Bartini 2000; Kendrick et al. 2012). Targeting such vulnerable schoolmates could be a way of enforcing (and defining) group norms but is unlikely to boost popularity. It is more impressive to challenge the strong than to abuse the weak, and so the socially ambitious bully is arguably better off targeting high-status social rivals rather than wallflowers. Empirical support for this aspect of instrumental aggression, however, has been found only recently: victimization rates tend to increase, not decrease, as adolescents gain social status (Faris and Felmlee 2014; Andrews et al. 2016; Malamut, Dawes, and Xie 2018) or act aggressively (Goldbaum et al. 2003).

Finally, and crucially, recent research documents that aggression can in fact improve social status. Sophomore bullies were more likely to join elite social circles (as reflected in yearbook designations) by their senior year— provided that their victims were high status, socially close (e.g., within the same friendship group), or aggressive themselves (Faris 2012). Moreover, their victims were effectively banished from elite social circles (Faris 2012).

Other research confirms that the status benefits of aggression depend on "punching up," finding that targeting high-, rather than low-status victims is associated with greater status gains (Andrews et al. 2017; Peets and Hodges 2014). New analyses on a large ($N = 56$) number of New Jersey middle schools find that conflict is, up to a threshold, associated with subsequent increases in social status and is also more likely to occur between friends (Callejas and Shepherd 2020).[4]

Cumulatively, these findings paint a picture of "social combat," whereby certain high-status youths tear down their popular rivals to boost their own prospects, desisting only once they ascend the peak of their school's social pyramid. Still, questions remain: beyond their similarly high status, we know little about the specific social relationships between instrumental aggressors and their victims and what factors influence who, in particular, harasses whom.

Intimacy and Aggression

Here, we extend the logic of instrumental aggression to anticipate higher rates of aggression between friends and between structurally equivalent actors. Some research has already noted that aggression can occur between friends, but the studies documenting it are qualitative (e.g, Mishna, Wiener, and Pepler 2008; Bouchard et al. 2018), cross-sectional (e.g., Wei and Johnson-Reid 2011), small scale (e.g., Besag, 2006; Waasdorp. Bagdi, and Bradshaw 2009), or rely on unique populations (e.g., identical twins [Brendgen et al 2015]). Others examine cyberbullying (e.g., Mishna et al. 2008; Felmlee and Faris 2016), which, due to the nature of social media platforms, may be especially likely to occur between friends. Often these studies focus exclusively on friend aggression as a unique form and lack a comparison to aggression between others (e.g., Crick and Nelson 2002; Daniels et al. 2010; Closson and Watanabe 2016). To our knowledge, this is the first large-scale social network study to compare rates of aggression between friends, friends-of-friends, and others.

External processes: status struggles.—There are multiple reasons to expect higher rates of aggression between friends—trivially, they spend more time together. But beyond propinquity, we anticipate higher rates of aggression between friends for reasons both internal and external to the friendship. External factors center on competition for relationships and status. First, and fundamentally, friends are often rivals, competing for prominence and

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[4] The increased rate of aggression between friends is based on our calculations from descriptive statistics. It is worth noting that, in contrast to Faris's (2012) results, Callejas and Shepherd (2020) find that conflict between friends is *not* associated with increased status, perhaps because conflict is a more general concept than cruelty, or because its reciprocal nature does not distinguish between perpetrators and victims, with the status gains made by the former offset by the marginalization of the latter.

prestige. But while *role* contests—for prom queen, starting quarterback, or class president—may draw socially distant adversaries, homophily and transitivity imply that the competition for *relationships*—to be the best friend of a popular student, to lead a clique, to be invited on a friend's family ski vacation—will put friends (and friends-of-friends) at odds with each other. They are eyeing the same rungs on the social ladder, and the zero-sum nature of these rivalries can spur gossip, betrayals of confidence, and other forms of social sabotage, all justified by the memories of past slights and snubs.

Healthy friendships recover from conflicts and betrayals, at least until the next point of contention emerges. But often these antagonisms ultimately dissolve ties, particularly when the combatants are popular, with plenty of potential replacements. In other cases, however, the friendship is of such importance—either because of shared history, the number of mutual friends caught in the middle, or lack of viable alternatives—that the parties devolve into "frenemies" who covertly persist with their malevolent campaigns.

Regardless of whether the friendship is repaired, dissolved, or feigned, the distress of the vanquished is heightened, not mitigated, when the victor is (or was) a friend. Being outperformed in a valued academic, athletic, or social context is unpleasant and inhibits friendship formation (Salovey and Rodin 1984), but poses greater threats to an individual's self-esteem when one has been surpassed by a friend (Pleban and Tesser 1981; Tesser, Millar, and Moore 1988; Guay, Boivin, and Hodges 1999). Friends are adolescents' primary social comparisons, yardsticks that are always around to remind those who do not measure up (Lubbers, Kuyper, and Van Der Werf 2009). Adolescents commonly feel resentful and jealous of their closest friends, which is subsequently associated with both aggressive behavior and feelings of loneliness (Parker et al. 2005). Experimental research, for instance, finds that, compared to strangers, friends are more critical of one another (Nelson and Aboud 1985) and more likely to sabotage each other when tasks are framed as "important skills" rather than merely games (Tesser and Smith 1980). Workplace conflicts are significantly more disruptive and damaging when they involve friends rather than team members (Hood, Cruz, and Bachrach 2016).

Even in the absence of head-to-head competition for status or deference, the external logic of instrumental aggression can intensify the internal dynamics of conflict and aggression between friends, so long as one of them seeks upward mobility. Relationships are the currency of status, and insofar as bridging higher- and lower-status groups creates tension, moves up the ladder will strain current friendships. So when social climbing opportunities emerge, adolescents are generally forced to choose between newfound opportunities and loyalties to old friends, who inevitably feel abandoned and betrayed.

The internecine struggles of friendships are complicated by an ambiguity inherent in the relation: friends are formally presumed to be social equals,

and for friendships to work, each must deny—or be seen to deny—erstwhile differences in social rank. Yet differences may exist, and each party to a friendship may have varied understandings of the degree, and direction, of these status differences. Gould (2003) argues that ambiguity concerning relative status—intrinsic to symmetric role relations like roommate and friend—invites subtle maneuvering in a struggle for dominance. Such maneuvering has been observed in patterns of gift giving between friends, for example, where reciprocity is delayed longer when relative status is ambiguous (Park and Kim 2017). Furthermore, when this ambiguity disappears and is supplanted instead by an irreconcilable misunderstanding concerning to whom deference is owed (as can occur in the event of an insulting remark or a trivial dispute), the resulting humiliation can prompt deadly violence (Gould 2003).

Internal processes: emotional asymmetry.—While status rivalries and their attendant conflicts must be adjudicated by external audiences, friendships, like any close relationship, can also become toxic or abusive for purely private, internal reasons. Even when not directly a function of status competition, private strife between friends is likely to intensify when one or both seek higher status. The emotional dynamics of friendship, with fluctuations and asymmetries in each party's attachment to the other, often generate discord. According to the principle of least interest (Waller 1938; Sprecher, Schmeeckle, and Felmlee 2006), the person who cares less about maintaining a dyadic relationship can exert more power over the one with greater investment, including engaging in behavior that threatens to end the relationship. Such an unequal balance of power can lead the weaker member to struggle to regain power, creating potentially volatile situations, as when Sarah Drew sought revenge when she sensed that Megan Meier was distancing herself. Fundamentally, any friendship can become a battleground worth fighting over. Even without any status rivalry or competition for valued social positions, in other words, control and dominance of the friendship itself can become an important goal. Just as romantic, kinship, and employment ties can become abusive in response to internal dynamics, so too can friendship, which explains why media outlets as varied as those of *Business Insider, Reader's Digest, Cosmopolitan, Teen Vogue*, and *CBS News* all offer advice on detecting and ending "toxic friendships."[5]

Finally, treachery can only arise from trust: friends share secrets in confidence, and confidences may be violated, disastrously. Intimacy begets vulnerability, particularly during adolescence, and friends have unique capacities to betray and humiliate. Greater intimacy within friendships is associated with

[5] Lindsay Dodgson, "Thirteen Signs Your Friendship with Someone Is Toxic," *Business Insider*, May 17, 2018; Christine Coppa, "Seven Signs Your Friend Is Actually a Frenemy," *Reader's Digest*, June 26, 2018; Julia Pugachevsky, "Six Reasons Why It's So Hard to Dump a Toxic Friend," *Cosmopolitan*, February 2, 2018; Helaina Hovitz, "How to Spot a Toxic Friend," *Teen Vogue*, August 18, 2017.

increases in relational aggression (Burr et al. 2005; Murray-Close, Ostrov, and Crick 2007; Banny et al. 2011). For instance, fourth graders who share more secrets with their friends experience higher rates of relational victimization (Murray-Close et al. 2007). All the above suggest friends are more likely than nonfriends to be cruel to each other, and furthermore, that these acts of cruelty will be particularly distressing for friends compared to nonfriends. Accordingly, we propose the following hypotheses:

HYPOTHESIS 1.—*Aggression at time 2 (T2) is more likely to occur between time 1 (T1) friends compared to schoolmates who were not friends at T1.*

HYPOTHESIS 1a.—*Aggression at T2 is more likely to occur between dissolved friends (T1 friends who ended their friendship prior to T2) compared to schoolmates who were not friends at T1.*

HYPOTHESIS 1b.—*Aggression at T2 is more likely to occur between sustained friends (friends at both T1 and T2) compared to schoolmates who were not friends at T1.*

HYPOTHESIS 2.—*Aggression at T2 is more likely to occur between students who shared at least one mutual friend at T1, but were not friends themselves, compared to schoolmates who did not share any mutual friends (and were not friends themselves).*

HYPOTHESIS 3.—*Victimization by friends is associated with greater emotional distress, in the form of decreased attachment to school and heightened symptoms of anxiety and depression, than victimization by others.*

Structural Equivalence

Friends or not, youths may exhibit similar patterns of social connections that are likely to influence their chances of engaging with each other aggressively. Structurally equivalent actors, who send ties to and receive ties from the same actors (Lorrain and White 1971), are interchangeable with respect to their positions in a network and therefore apt to encounter similar experiences (Friedkin 1984; Burt 1987). Structural equivalence aids in explaining similarity between actors with respect to a wide range of attitudes, beliefs, and behaviors (Borgatti and Grosser 2015), and also contributes substantially to social contagion processes (Burt 1987; Galaskiewicz and Burt 1991).

Intimacy does not typically characterize the relationships of friends-of-friends (e.g., students who are not friends but share at least one friend in common), and we do not expect it be the cause of conflict between structurally equivalent youth (who are not also friends). However, competitive rivalries may intensify between them, unchecked by bonds of friendship. First, structurally equivalent youth are arguably no less likely than friends to compete for the same social positions. Second, just as friends struggle for control, friends-of-friends strive for the attention and affection of their mutual friends, particularly when their friend's friendships threaten to supersede their own, a
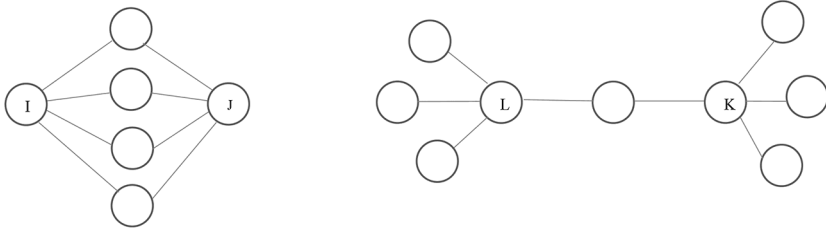
F<small>IG</small>. 1.—Equivalent and nonequivalent pairs at geodesic distance *2*

common experience among adolescents, and one that is associated with aggressive behavior (Parker et al. 2005). Moreover, these skirmishes are uninhibited by amity or the bonds of friendship. Finally, if relationships are the currency of status, then structurally equivalent youth occupy *identical* status positions (unlike friends, who may have different degrees of social status, depending on other friends they do not share in common). The resulting ambiguity allows each to sustain contradictory understandings of their relative rank, a potentially explosive situation (Gould 2003).

Structural equivalence, however, is confounded with both social cohesion and network distance—structurally equivalent schoolmates by definition have friends in common but are also likely to be friends themselves—and a key contribution of our analysis will be to disentangle these factors. Thus, we will test for an effect of equivalence net of distance in the friendship network. Consider in figure 1, two pairs of students i,j and k,l, who are friends-of-friends with each other (i.e., i and j are not friends but have at least one friend in common, as do k and l). The i,j pair make identical friendship (and nonfriend) choices, while k and l share only one friend in common and each have other, nonoverlapping friendships. Each pair in this example has the same geodesic distance (the shortest possible path between them is *2* in both cases) and degree, but i,j are structurally equivalent and k,l are not. We test whether aggression is more likely between i,j.

Additionally, we will examine equivalence on two distinct relations, friendship and prior aggression, independently. To the extent that aggression arises in socially competitive relationships, we also expect conflict to arise between adolescents who are structurally equivalent with respect to aggression—who target the same victims or who are harassed by the same bullies. Though balance theory cannot guide our core argument, its proposition concerning our enemies' enemies can inform our expectations for equivalence in the aggression network. Both theory (Heider [1958] 1982; Davis 1963)[6] and empirical investigation (Lerner 2016) suggest that actors with mutual enemies

[6] Heider (1982, p. 206) states, "If two negative relations are given, balance can be obtained either when the third relationship is positive or when it is negative, though there appears to be a preference for the positive alternative."

are more likely than others to be tied *somehow*, as friends *or* enemies, simply based on their greater likelihood of interacting. Either eventuality places them at a greater risk of victimization—as friends, for the reasons outlined above. But friends or not, aggression will occur more frequently between actors with common adversaries since they are reaching for the same rung on the social ladder (or, if they are victims bullied by the same schoolmate, trying to slow their fall down it).[7] This effect has been observed empirically in the "undo" edits of Wikipedia editors (Leskovec, Huttenlocker, and Kleinberg 2010; although see Lerner and Lomi [2020] for a contrary result), wars and other militarized conflicts between nation-states (Maoz et al. 2007; Brandes, Lerner, and Snijders 2009), antipathies in middle schools (Rambaran et al. 2015), and collisions of Formula One drivers (Piezunka et al. 2018). Accordingly, we test the following:

HYPOTHESIS 4.—*Higher levels of structural equivalence in the friendship network at T1 will be associated with higher rates of aggression at T2.*

HYPOTHESIS 5.—*Higher levels of structural equivalence in the aggression network will be associated with higher rates of aggression at T2.*

DATA AND METHODS

Data

Data for these analyses come from the Contexts of Adolescent Substance Use study, a longitudinal, semiannual, in-school survey of middle and high school students in three counties in North Carolina. Initially, all public school students in grades 6, 7, and 8 in each of three counties were eligible to participate, and eligibility was extended to new students at each wave. While the study includes seven waves of data, data on aggression only became available starting at the fourth wave, in fall 2004 (here, T1), and the largest county dropped out of the study (for reasons unrelated to the study) after spring 2005 (T2). There were 6,369 students eligible to participate at T1 and 6,239 at T2. The response rate was 76% and 72% for each time point, respectively (for more detail on the survey, see Ennett et al. [2006]). After dropping 227 cases who were not in any study school at T1, 131 who were not attending a study school at T2, 83 who were present but switched schools within the same county, and 535 who never participated in the study (even at earlier or later waves), the final temporal exponential random graph (TERGM) sample includes 5,526 eighth, ninth, and tenth graders.[8] For the

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[7] Although our theory does not imply a difference, we also test whether the effect of aggression equivalence varies by tie direction (e.g., whether being attacked by the same bullies has a different effect than attacking the same victims).

[8] Because our TERGM covariates are time invariant, and because a student who did not participate in the survey at one time point may nonetheless be nominated as an aggressor,

analysis of distress, using indicators of school attachment and symptoms of anxiety and depression, we use multiple imputation (with 10 imputations) to address missing covariate data, including the dependent variables in the imputation process, but excluding cases with missing dependent variables in the analysis (von Hippel 2007). After excluding 10 influential outliers from the anxiety model and 9 influential outliers in the school attachment model, the final sample sizes for the mental health analyses were 3,497 (depression), 3,516 (anxiety), and 3,370 (school attachment), respectively.

Temporal Exponential Random Graph Model

We test our hypotheses with the use of a temporal exponential random graph model (TERGM), which allows for simultaneous estimation of nodal, dyadic, as well as network structural tendencies (e.g., Wasserman and Pattison 1996). Our goal is to examine the relationship between our key variables (e.g., structural equivalence between two nodes and the subsequent development of an aggression-victimization tie), while controlling for individual and other dyadic and network properties at the first time point of our study. The TERGM is an extension of an ERGM, which specifies the probability of a set of network ties, Y, conditional on a set of actors and their characteristics:

$$P(Y = y|\mathbf{X}) = \exp[\theta^T \mathbf{g}(y, \mathbf{X})]/\mathrm{k}(\theta). \tag{1}$$

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(θ) is a normalizing constant (see Hunter et al. [2008] for more details). Coefficients in our temporal TERGMs 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, same grade ties), as well as the structure of the network at the initial time point. TERGMs are used to analyze the structural characteristics of social networks and how they change, in discrete observations, over time (e.g., Schaefer et al. 2011; McFarland et al. 2014; McMillan, Felmlee, and Braines 2020). Our models include variables that account for individual-level and structural processes, as well as the state of the aggression network at T1, to predict the T2 aggression network. By controlling for tie stability across the two waves of interest, the TERGM can estimate the degree to which each factor is associated with the formation of new aggressive ties between the two waves of data.

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victim, or friend, we include in our sample students who did not participate in one or both waves but who were current students in that school at both waves and who had provided covariate data at a different wave.

TERGM dependent network.—We construct *aggression networks* (matrices of ties produced by harmful, aggressive behaviors) based on the in-school peer nominations provided by both victims and aggressors. Students were asked to nominate up to five schoolmates who "picked on you or did something mean to you in the past three months," as well as up to five schoolmates "you picked on or did something mean to in the past three months." In both instances, students were instructed to disregard friendly teasing and to focus on significant instances of meanness. The network according to victims and the network according to the aggressors are merged such that an aggressive link from i to j is considered present if either i nominated j as a victim, or j nominated i as an aggressor, or both.[9] This combined *aggression* matrix consists of binary values where $(i, j) = 1$ indicates that i was aggressive toward j (again, according to either i or j or both), and 0 otherwise. In our TERGMs, we model this network at the second time point (spring 2005), controlling for the same network as observed at the first time point (fall 2004).

TERGM effects.—In the TERGM models, our key effects are all dyadic. In addition to collecting aggression network data, students were also asked, at each wave, to nominate up to five of their closest friends. *Friends* is a binary indicator of whether a friendship tie (i,j) existed at T1. We began by testing for differences between sent ($i{\to}j$), received ($i{\leftarrow}j$), and mutual ($i{\leftarrow}{\to}j$) friendships, but since coefficients were nearly identical, we use a maximally symmetrized, friendship network where an (i,j) tie is considered present if either member of the dyad nominated the other.[10] In subsequent models, we further distinguished friends at T1 based on whether the friendship was *dissolved* or *sustained* at the second time point, again using a symmetrized friendship matrix (e.g., if $i{\to}j$ at T1 and $i{\leftarrow}j$ at T2, the friendship was considered sustained, even though the original directed tie was not). We also include a binary measure of whether the pair were *friends-of-friends* at the first time point, meaning that actor i and actor j had a friend in common at T1, but no friendship tie was reported between i and j. Again, friendship has been symmetrized maximally. Finally, we include a binary measure of whether the pair were *disconnected* in the T1 friendship matrix or when no direct paths of any length connect two actors in the friendship network (e.g., one or both students are social isolates). Because aggression is inherently directed, we include three

[9] We combine these networks for several reasons. Prior 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. Additionally, bullying and related forms of aggressive behavior are likely to be underreported by perpetrators. Finally, students who were nominated by many schoolmates as a bully or a victim would be unable to reciprocate all of them because nominations were capped at a maximum of five.

[10] Although only 25%–29% of respondents used all five friend nominations, symmetrizing also to some degree alleviates the likelihood that network data exclude meaningful friendships.

effects to estimate T1 *sent* ($i{\rightarrow}j$), *received* ($i{\leftarrow}j$), and *reciprocated* ($i{\leftarrow}{\rightarrow}j$) aggressive ties separately.

Next, we include measures of *friendship structural equivalence* and *aggression structural equivalence* as correlations (following Breiger, Boorman, and Arabie 1975) to test whether one's structural position at the first time point is associated with experiencing aggression at the second time point. The input for each parameter is a matrix where (i,j) equals the correlation between the rows and columns of actors i and j in either the T1 friendship or aggression adjacency matrices (based on data from both the matrices of sent ties and received ties). In theory, (i,j) can range from -1 to 1, but in the actual data it ranges from roughly -0.1 to 1. This is because the networks included in the study are very large and there was a cap on the number of nominations students could send, making it virtually impossible for two sets of rows and columns to be perfectly negatively correlated. A substantial proportion of students were isolates in the T1 aggression network, and thus (trivially) are perfectly structurally equivalent, so we control for *aggression isolate pairs*.

We also include several controls in our TERGMs. Importantly, social status may confound the effects of friendship and structural equivalence on aggression, so we control for normalized *sender betweenness centrality* and *receiver betweenness centrality*. Betweenness centrality provides a means to quantitatively measure the role each actor plays in bridging the network. It is defined as the percentage of all geodesics (or shortest paths between all possible pairs of nodes) that include the focal node. We control for matching by gender, race, and grade in the aggression network, by including a term for *same gender*, *same race*, and *same grade*. Analytical limitations forced us to collapse all nonwhites into a single category, because while African-Americans comprise a substantial fraction of the sample as a whole, Latinx, Asian and Pacific Islander, and Native American students each invariably represented very small fractions ($< 6\%$) of the student body in the average school. The same grade control was only included in the six high school networks in our sample. This is because the eighth graders in our sample who attended middle schools were only able to nominate fellow eighth graders as friends, aggressors, or victims, while high school students could nominate either ninth or tenth graders. In alternative models, we added controls for node level measures of gender, race, and grade (reflecting node-level variation in the tendency to send and receive ties), but these variables did not alter our main conclusions. Finally, we include a measure for *edges*, which represents the total number of edges (or ties) in the network and a measure for *mutuality*, or reciprocity, of ties. Table 1 provides brief descriptions of all variables.

Meta-analysis.—TERGMs can only analyze the structure of a single social network. As a result, we estimate 14 separate TERGMs, one for each network in our sample. We aggregate our results by applying a two-level random

TABLE 1
DESCRIPTION OF TERGM VARIABLES

Parameter	Description
T1 friendship	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix that is 1 when either actor i and/or actor j sent a friendship nomination during T1 ($x_i \rightarrow x_j$ and/or $x_i \leftarrow x_j$).
Friendship sustained to T2	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix that is 1 when either actor i and/or actor j sent a friendship nomination during T1 and T2.
Friendship dissolved by T2	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix that is 1 when either actor i and/or actor j sent a friendship nomination in T1, but the tie did not exist during T2.
T1 friend-of-friend	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix that is 1 when actor i and actor j have a symmetrized geodesic distance of 2, or are friends-of-friends, but not friends with one another, during T1.
Disconnected in T1	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix that is 1 when actor i and actor j do not belong to the same component of the friendship graph in T1 (i.e. the geodesic distance is infinite).
Reciprocated T1 aggression	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix where 1 indicates that a reciprocated aggression tie occurred between actor i and actor j at T1 ($x_i \rightarrow x_j$ and $x_i \leftarrow x_j$).
Received T1 aggression	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix where 1 indicates that actor i received an unreciprocated aggression tie from actor j at T1 ($x_i \rightarrow x_j$ only).
Sent T1 aggression	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix where 1 indicates that actor i sent an unreciprocated aggression tie to actor j at T1 ($x_i \rightarrow x_j$ only).
Structural equivalence friendship	Dyadic parameter predicting the formation of T2 aggressive ties from a matrix of correlations between actor i and actor j's rows and columns in the T1 friendship adjacency matrix.
Structural equivalence aggression	Dyadic parameter predicting the formation of T2 aggressive ties from a matrix of correlations between actor i and actor j's rows and columns in the T1 aggression adjacency matrix.
Isolate pair	Dyadic parameter predicting the formation of T2 aggressive ties from a binary matrix where 1 indicates that both actor i and actor j were aggression isolates at T1.
Betweenness sent/received	Node-level parameter included to test whether students with greater T1 friendship betweenness send/receive more aggressive ties in the T2 aggression matrix. The measure of betweenness has been normalized to range between 0 and 1.
Same gender/race/grade	Node-level parameter testing for gender/racial/grade-level homophily in the T2 aggression network.
Edges	Structural parameter measuring the probability actor i will be aggressive towards actor j during T2.
Mutual	Structural parameter that accounts for the tendency for aggression ties to be mutual in the T2 aggression network.

NOTE.—Geodesic distance is defined as the shortest path connecting two nodes. T1 = time 1; T2 = time 2.

effects meta-analysis for those TERGMs that converge, produce satisfactory goodness of fit statistics, and exhibit low risk of collinearity.[11] We calculate the sample-wide mean for the coefficient of each TERGM effect by estimating a random intercept model where the level-one variance equals the squared standard error of each effect and the school operates as the second level (following Snijders and Baerveldt 2003). This averaging process accounts for the variation in precision across the different models by giving greater weight to those with estimates that are more precise (Lubbers and Snijders 2007).

HLM of Mental Health Consequences

We examine three well-established adverse outcomes of victimization—anxiety, depression, and school attachment—and test whether consequences vary by victims' relationships to their tormentors. *Anxiety* is a scale (Reynolds and Richmond 1979) of the following items: "I felt sick in my stomach," "I got mad easily," "I had trouble getting my breath [don't count asthma or exercise]," "I was tired a lot," "I worried about what was going to happen," "I worried when I went to bed at night," and "I often worried about bad things happening to me." *Depression* is a scale (Angold, Costello, and Messer 1995) of the following items: "I hated myself," "I was a bad person," and "I did everything wrong." *School attachment* is a scale (Roberts, Hom, and Battistich et al. 1995) of the following items: "Students in this school treat each other with respect," "Students at this school are willing to go out of their way to help someone," and "My school is like a family." For all three scales, response categories consisted of a five-point Likert scale ranging from "strongly agree" to "strongly disagree." We estimate hierarchical linear models of anxiety, depression, and school attachment at T2, controlling for the level of the outcome variable at T1, and include school-level random intercepts.[12]

Our independent variables of interest for these models are the various sources of victimization, partitioned by the victims' relationship to their tormentors: victimization by friends, victimization by friends-of-friends, and victimization by other schoolmates. As before, we maximally symmetrize the friendship network at T1 before calculating each of these variables. Each of these measures uses victimization *indegree*, or the number of incoming victimization ties in each relationship category. Thus, *victimization by friends*

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[11] We assess goodness of fit by comparing the (1) indegree distributions, (2) outdegree distributions, (3) minimum geodesic distance distributions, (4) edgewise shared partner distributions, and (5) triad census distributions of our observed networks with those generated from our TERGMs (following Hunter et al. 2008). We follow recommendations from Duxbury (2018) to test for collinearity across the coefficients of our TERGMs.

[12] Results do not differ substantively when school-level random intercepts are replaced with school fixed effects.

is the number of friends who victimized the respondent in the past three months, *victimization by friends-of-friends* is the number of friend-of-friends (e.g., schoolmates who are not friends themselves, but who share at least one common friend) who victimized the respondent in the past three months, and *victimization by distant schoolmates* is the number of recent (past three months) harassers (of the respondent) who were neither friends with, nor shared any friends with, the respondent. In these models, we again control for between-ness centrality, to account for the likelihood that status in the school social hierarchy is associated with both victimization and the dependent variables. Additionally, we control for *gender*, *race*, *grade*, *single parent home*, and *low parent education* (defined as having no parent who attended college).

RESULTS

Descriptive Results

As shown in table 2, our sample is divided quite evenly by gender (males make up 45.6% of the sample), includes a fair amount of racial diversity, and is evenly distributed by grade level. At T1, roughly 32% of respondents did not have a parent who had attended college and 32% lived in single parent homes. Only a minority of students experienced victimization directly

TABLE 2
ACTOR-LEVEL DESCRIPTIVE STATISTICS

	%			
Male	45.6			
Black	29.9			
Latinx	3.9			
Other race	6.0			
Ninth grade.	33.7			
Tenth grade	31.6			
No parent attended college.	32.1			
Single parent home	32.0			
Victimized by friends	5.0			
Victimized by friends-of-friends . . .	6.1			
Victimized by other schoolmates	19.3			
Friendship isolate	6.2			
Aggression isolate	49.6			
	Mean	SD	Min	Max
T1 depression ($n = 3{,}470$)	1.106	1.268	0	4
T2 depression ($n = 3{,}470$)	1.168	1.268	0	4
T1 anxiety	1.747	1.123	0	4
T2 anxiety	1.768	1.167	0	4
Betweenness centrality	.860	1.190	0	12

NOTE.—All time-varying covariates are observed at T1 unless otherwise indicated. T1= time 1; T2 = time 2; data from 14 schools ($n = 3{,}494$).

by friends: 5% of all students were victimized by friends and 6.1% by friends-of-friends, while another 19.3% were victimized by other schoolmates at T1. However, among aggressive dyads only, friends and friends-of-friends each account for 14% of all aggression, which means that 3% of all dyads account for 28% of all aggressive ties. Finally, a small proportion of adolescents in our sample are friendship isolates (6.2%); that is, they neither nominate, nor are nominated for, friendships. Close to half (49.6%) are aggression isolates, meaning that they are neither aggressive nor victims of aggression. In other words, approximately 50.4% of students were involved in some type of peer aggression, either as perpetrators or victims.

   The aggression network is very sparse, with only a small fraction of all dyads in our sample characterized by aggression (see table 3). However, when aggression does occur, it is more likely to be observed between dyads that previously reported friendships. Almost 2% of T1 friends reported aggression at T2, compared to 0.6% of friends-of-friends, and just 0.1% of other schoolmates. Furthermore, aggressive dyads have substantially higher measures of structural equivalence in friendship and aggression (0.05 and 0.02, respectively) compared to others (0.005 and 0.002, respectively). We further explore the relationship between structural equivalence and the unfolding of aggression in figure 2. Here we see that almost no dyads with a negative

TABLE 3
DESCRIPTIVE STATISTICS FOR ALL DYADS

	%			
Proportion of T2 aggressive ties among:				
T1 friends	1.8			
T1 friends-of-friends	.6			
T1 other schoolmates (geodesic > 2) . . .	.1			
T1 disconnected (infinite geodesic) . . .	.1			
	Mean	SD	Min	Max
T1 friendship structural equivalence for:				
All dyads	.0051	.0747	−.08	1
T2 aggressive dyads[a]	.0454	.1257	−.05	1
T2 non-aggressive dyads	.0050	.0746	−.08	1
T1 friendship ties	.1095	.1469	−.07	.78
T1 friends-of-friends	.1374	.1192	−.06	1
T1 aggression structural equivalence for:				
All dyads[a]	.0019	.0374	−.07	1
T2 aggressive dyads[a]	.0238	.0927	−.04	.93
T2 non-aggressive dyads[a]	.0019	.0373	−.07	1
T1 friendship ties[a]	.0307	.1297	−.04	1
T1 friends-of-friends[a]	.0101	.0774	−.05	1

NOTE.—Data from 14 schools; $n = 2,969,150$. T1 = time 1; T2 = time 2.
[a] Here, the pairs in which both members were aggression isolates ($n = 828,960$) were omitted from the calculation of the descriptive statistic. All measures of friendship and geodesic distance have been symmetrized.
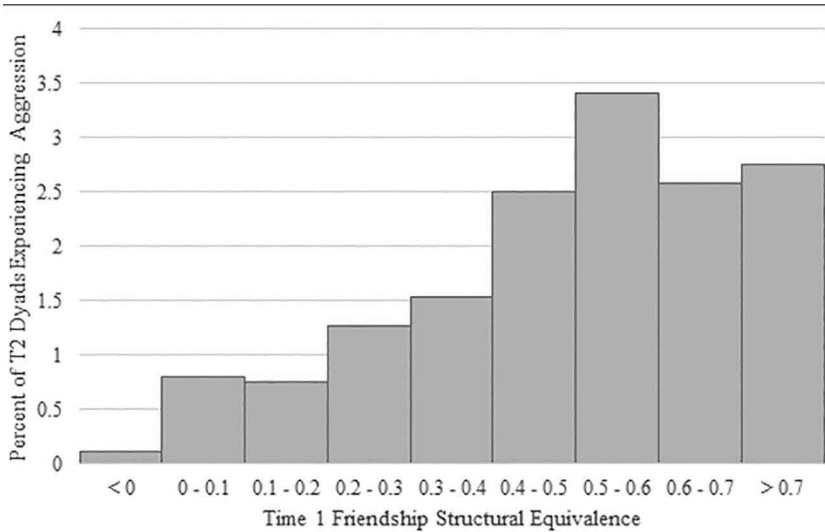
690

Fig. 2.—Percentage of T2 dyads developing aggression by T1 friendship structural equivalence. Dyads in which both members were either friendship isolates ($n = 13{,}084$) or aggression isolates ($n = 829{,}934$) have been removed from the analysis.

friendship structural equivalence measure develop an aggressive-victimization tie. The frequency of aggression generally increases with larger values, with an exception of a peak at the relatively high measures of structural equivalence between 0.5 and 0.6.

TERGM Results: Friend Effects

Our first hypothesis regarding the key role of friendship in peer aggression receives significant support according to a meta-analysis of TERGMs for each of the 14 schools with attribute-based independent variables and the T1 aggression and friendship networks used to account for the formation of aggressive ties at T2 (see table 4, model 1). Friends (at T1) are significantly more likely to be aggressive toward each other (at T2) than they are toward other schoolmates: controlling for nodal and dyadic effects, aggression is more than three times as likely ($\beta = 1.14$; odds ratio $= 3.13$) to occur between friends over time as compared to nonfriends (table 4, model 1).[13]

[13] Models distinguishing between the three possible T1 non-null friendship configurations (sent but not received friendship tie, received but not sent friendship tie, and reciprocated friendship ties) show that all three are positive, statistically significant, and of comparable magnitude ($\beta_{sent} = 1.04^{***}$, SE $= 0.18$; $\beta_{received} = 0.90^{***}$, SE $= 0.15$; $\beta_{reciprocated} = 1.16^{***}$, SE $= 0.13$), so we combine them for simplicity, and because two schools would not converge with them separated. No other coefficients were substantively altered by this choice.

TABLE 4
Meta-analyses of TERGMs

	MODEL 1		MODEL 2		MODEL 3[a]	
	Coef.	SE	Coef.	SE	Coef.	SE
T1 friendship network:						
Friends at T1	1.140***	.075				
Friendship sustained						
to T2			1.340***	.108	1.102***	.103
Friendship dissolved						
by T2			1.028***	.178	.852***	.177
Friends-of-friends	.762***	.077	.686***	.068	.506***	.067
Disconnected	.005	.082	.027	.082	.018	.084
Structural equivalence					1.240***	.202
T1 aggression network:						
Reciprocated aggression . . .	3.947***	.552	4.015***	.605	3.731***	.582
Received aggression	.625	.397	.597	.433	.365	.449
Sent aggression	5.299***	.494	5.354***	.495	5.021***	.486
Structural equivalence					.823*	.319
Isolate pair					−1.886**	.469
Controls:						
Edges	−7.739***	.325	−7.748***	.324	−7.476***	.308
Mutual	3.945***	.561	3.871***	.541	3.697***	.585
Same gender	.256**	.070	.263**	.071	.256**	.074
Same race	.586***	.061	.597***	.060	.593***	.073
Same cohort[b]	.525**	.103	.551	.087	.577**	.107
Betweenness sent	−.121	.194	−.171	.180	−.069	.205
Betweenness received	.342*	.116	.348*	.124	.391**	.120

Note.—Conducted across 14 schools where individual and social network variables during T1 predict aggressive-victimization ties during T2. T1 = time 1; T2 = time 2.

[a] Meta-analysis does not include school 914, which was unable to reach convergence for model 3.

[b] Only included in TERGMs for the six high school networks (#914–19).

* $P < .05$.

** $P < .01$.

*** $P < .001$.

Also as expected, T1 friends-of-friends are more than twice ($\beta = 0.76$; odds ratio $= 2.14$) as likely to victimize each other at T2, compared to more distant schoolmates. Disconnected pairs of students—such as dyads that include at least one social isolate—are no more or less likely to be aggressive than students who were connected by paths greater than two.

As depicted in figure 3, aggression arises between friends (dark red) and friends-of-friends (light red). Both friendship and aggression networks are sparse so their intersection is necessarily so, but aggressive friendship ties, and aggressive links between friends-of-friends occur, and they are scattered throughout the student body. Despite its rarity, aggression between friends and friends-of-friends holds great potential to entangle the many students
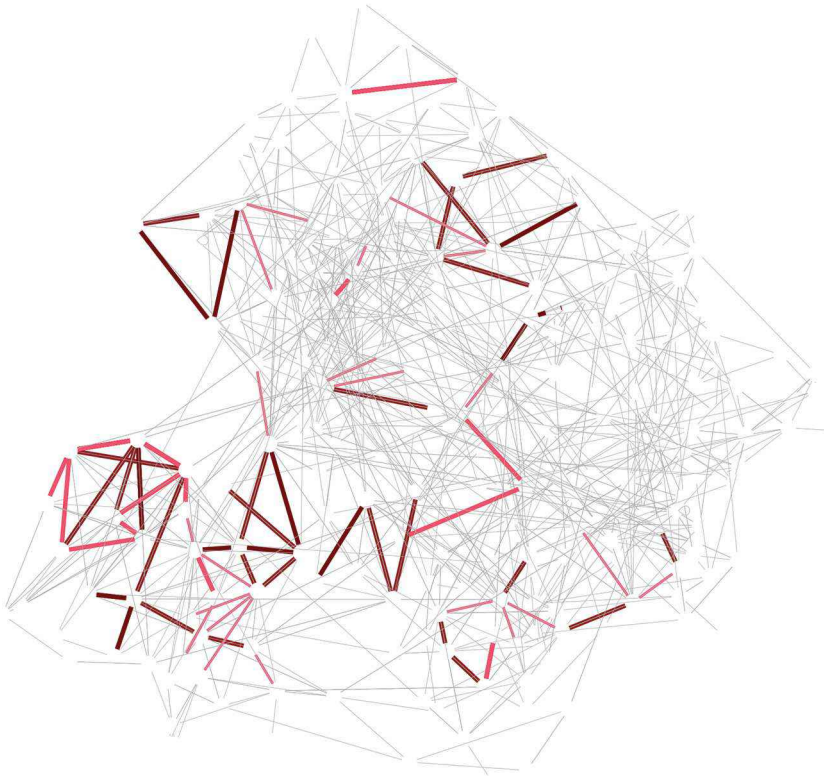
Fɪɢ. 3.—Aggression between friends (dark red) and friends-of-friends (light red). Nodes are transparent to reduce visual clutter. Links are coded gray = friendship only; light red = aggression between friends-of-friends; dark red = aggression between friends.

who are adjacent to these antagonisms: in all but the five largest (and least dense) schools, between 10% and 26% of students are within two friendship links of such a conflict.

Sustained versus Dissolved Friendships

While table 4, model 1 shows a significant association between T1 friendships and T2 aggressive ties, it is possible, perhaps likely, that many of these friendships ultimately succumbed to a preceding betrayal. Alternatively, some aggression may have emerged only after the termination of the friendship, and model 1 does not distinguish between these scenarios.

We anticipate that friendship-ending conflicts are common, and that aggression is likely to emerge between former friends. More importantly, we argue that friendship and aggression are not simply ensuing sequences, but

behaviors that can coincide and be sustained, in the form of "frenemies." Accordingly, we conduct a more robust test of this argument in table 4, model 2, where we distinguish between friendships that dissolve and those that are sustained over the school year, and compare them to students who were not friends at the start of the school year. Consistent with hypotheses 1a and 1b, compared to schoolmates who were not friends, aggression is almost three times ($\beta = 1.03$; odds ratio = 2.80) as likely to arise in friendships that dissolve during the school year, and almost four times ($\beta = 1.34$; odds ratio = 3.82) as likely in friendships that are sustained through the school year (the difference between these two parameters is not statistically significant, however).

Structural Equivalence

Our final model (model 3) tests our structural equivalence hypotheses. We find a significantly higher likelihood of aggression emerging between students who were structurally equivalent in the friendship network at T1: compared to structurally dissimilar students, schoolmates who had identical sets of friends are more than three times as likely to victimize each other ($\beta = 1.24$; odds ratio = 3.46). Structurally equivalent youth may or may not be friends with each other, but crucially, we observe this effect *net* of their relationship to one another. Whether or not they are friends themselves, youth with many friends in common are likely to victimize each other (e.g., from fig. 1, aggression is more likely between i and j than it is between k and l). Moreover, we tested for interaction effects between the structural equivalence measure and relationship (friend or friend-of-friend) and found no evidence that the effect of friendship structural equivalence varies significantly by relationship.

We also find support for our hypothesis regarding the role of structural equivalence in aggression. Aggression structural equivalence at the first time point is significantly and positively associated with direct instances of aggression at the second time point. A pair of students who victimized, and were victimized by, the same schoolmates are more than twice as likely as others to subsequently target each other ($\beta = 0.82$; odds ratio = 2.28), after accounting for all controls in the model, including T1 friendship and aggression. This finding implies that youth engaging with similar sets of perpetrators and/or victims, are more prone to target each other.

In addition to our hypothesized effects, both individual and dyad level controls contribute significantly to the observed pattern of ties in the aggression/victimization network at T2. Reciprocity is ubiquitous in affective networks (e.g., liking, disliking, friendship) (Gouldner 1960; Moreno 1934), but aggression, like advice-seeking, is often thought of as unilateral, arising from imbalances of power. For bullying, which requires power imbalance (Olweus 1993), this is true by definition. Instead, we find that victims of aggression are significantly more likely ($\beta = 3.73$ to 4.02; odds ratios = 40.3 to

51.6)[14] to retaliate against their tormentors than they are to target a school-mate who has not harmed them. Less surprising, we also find lingering effects of the T1 aggression network, where a "sent" T1 aggression tie, reciprocated or not, is significantly associated with a sent T2 tie (sent ties: $\beta = 5.30$; odds ratios = 200.3; mutual ties: $\beta = 3.95$; odds ratios = 49.4). We find no evidence of delayed retaliation, as T1 victimization, net of T2 victimization, does not significantly increase the likelihood of T2 aggression.

The well-known tendency toward homophily in networks of positive ties (e.g., McPherson, Smith-Lovin, and Cook 2001) supports contradictory expectations regarding aggression. The naïve expectation is that aggression emerges in the absence of friendship and is thus heterophobic (e.g., more likely to occur in pairs of youths who are different gender, race, etc.). Instead, we find that aggression is significantly more likely to occur between youths of similar demographic backgrounds. Specifically, students of the same gender, race, and grade are 30% ($\beta = 0.26$; odds ratios = 1.30), 80% ($\beta = 0.59$; odds ratios = 1.80), and 70% ($\beta = 0.53$; odds ratios = 1.70) more likely to target each other, respectively. This may be expected, considering that friendships are segregated by gender, race, and grade, but what is remarkable is that the tendency to victimize similar peers remains *even after controlling for friendship distance*.

Finally, betweenness centrality is not significantly associated with sending more aggressive ties. Consistent with earlier work documenting the downsides of high status (Faris and Felmlee 2014), however, adolescents with high friendship betweenness centrality in the first time period are more likely to be victimized in the second time period. We also tested squared terms for receiver and sender betweenness but, while negative, neither of the squared terms reached statistical significance. Additionally, we included the absolute difference in betweenness between sender and receiver to test whether aggression was more likely to occur between youths of similar social status, as predicted by Gould (2003). It was never significant. See online supplement for these and several other robustness analyses, as well as goodness of fit indicators.

Model Robustness

We conducted a number of robustness checks on our substantive conclusions from the TERGMs. First, we tested for a linear effect of geodesic distance in the friendship network, and we found a significant negative relationship, consistent with our expectations and implying an approximately

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[14] Given the challenges sometimes associated with interpreting odds ratios as relative risks (Davies, Crombie, and Tavakoli 1998), we refrain from providing substantive interpretations of our larger odds ratios.

linear decrease in the likelihood of aggression between pupils as the social distance between them increases. While it is meaningful to document this trend beyond immediate social circles, binary indicators for friends and friends-of-friends are more appropriate for our focus.

Second, at the extremes, structural equivalence is conflated with network closure: friends that are perfectly structurally equivalent form a clique (or a two-clique if they are not friends). However, in our data, perfect equivalence is exceedingly rare: of the more than 2.9 million nonisolate dyads (e.g. all possible pairs of nonisolated schoolmates), only 18, or 0.0006% are perfectly structurally equivalent in the friendship network, and, of the more than 15,000 friend pairs, none were perfectly structurally equivalent.

We also recognize that structural equivalence in the aggression network may have different effects depending on the direction of the relationship. In other words, aggression may be more or less likely to emerge between youths who pick on the same schoolmates, compared to those who are victimized by the same schoolmates. We find that both directions of structural equivalence (sharing common aggressors and sharing common victims) have significant, positive associations with aggression at T2. In addition, we explore whether the effect of friendship structural equivalence varies depending on whether the pair were friends. However, the interaction term was not statistically significant. Concerned that the centrality effect may be sensitive to a particular measure, we also estimate models replacing betweenness with indegree and eigenvector centrality and did not find any substantive differences. Moreover, we test whether these processes are affected by school size, and find that school size is not significant, and after a Bonferroni correction, does not significantly moderate any of our key substantive factors.[15] Because prior research finds evidence of gender differences in the characteristics of friendships (Eder, Evans, and Parker 1995; Rose and Rudolph 2006), we also test for interactions between gender and our focal variables. We find no evidence that girls and boys differ in their likelihood of assailing their friends, structurally equivalent schoolmates, or same-gender peers.

Of course, it is possible that aggression is concentrated within rather than across friendship groups simply because friends spend more time together. Questions about social contact or interaction frequency were only asked about schoolmates whom respondents nominated as friends, and so it is not possible to test whether exposure conditions aggression among acquaintances or more distant schoolmates. This is a limitation typical of network studies and would be more problematic if we were analyzing the *frequency* instead of the *presence* of aggression. Like other analyses of network ties, we

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[15] The only significant interaction was with structural equivalence in the aggression network, suggesting that adolescents in larger schools are slightly more likely to target schoolmates who share victims/aggressors in common.

are forced to assume that each actor in the network (in this case, students in small to medium-size schools ranging in size from 93 to 1,011, with an average size of 454) has sufficient opportunity to forge a tie and that marginal increases in exposure between pairs of students boosts the rate but not the existence of aggression between them. This appears to be the case, at least among friends: none of our indicators of exposure—having ever been to each other's houses, spending time together outside of school in the past week, or having met each other's parents—is associated with the likelihood of aggression (see app. A).

Finally, we also analyzed our data using stochastic actor oriented models (SAOMs) in RSiena (Snijders, van de Bunt, and Steglich 2010). We specified multivariate network models for the same two time points, with one key difference being that the formation (at T2) of both friendship and aggressive ties were modeled as dependent outcomes. We also controlled for a range of structural effects, including transitive triplets, three-cycles, indegree (or popularity), and outdegree (or activity), in both dependent networks. We focused on the direct effect of T1 friendship ties on T2 aggression ties, and found significant, positive effects in all but one school. Meta-analysis of all 14 schools found that aggression is nearly eight times more likely to emerge at T2 between students who were friends at T1 ($\beta = 2.07$; odds ratio = 7.9).[16] Because of convergence problems with more complex SAOMs, we present our TERGM results.

Mental Health Consequences of Victimization

Finally, we consider whether well-established mental health consequences of victimization—anxiety, depression, and school attachment—vary according to the victim's relationship to their tormentor. Specifically, we test whether victimization by friends is more distressing than victimization by other schoolmates. We estimate random effects models of anxiety, depression, and school attachment at T2, with school-level random intercepts, and control for the level of the outcome at T1, as well as social network centrality, gender, race (white, African-American, Latinx, and other minorities), grade, parent education (no parent attended college), and single parent home (control variables not shown) (see table 5). As expected, we find that victimization by friends is associated with significant increases over time in both depression (0.20) and anxiety (0.16), and significant decreases in school attachment (−0.14). Victimization by friends-of-friends (not shown) is not associated

[16] Results for the effect of aggression on friendship were not as strong or consistent across schools, but meta-analysis of the 14 schools found that friendships are more than twice as likely to form between agonistic pairs of students ($\beta = 0.80$; odds ratio = 2.3) as peaceful ones.

TABLE 5
Random Effects Regression of Mental Health Outcomes
on Victimization, by Source

Victimization by	Depression		Anxiety		School Attachment	
	Coef.	SE	Coef.	SE	Coef.	SE
Friends	.197*	.086	.161*	.075	−.143*	.070
Distant schoolmates .	.082*	.032	.076**	.028	−.017	.027
Average RMI	.06		.06		.00	
Largest FMI	.24		.18		.00	
F (13).	63.76***		89.66***		93.61***	
N	3,497		3,516		3,370	

Note.—Controls (not shown): outcome at T1,victimization by friends-of-friends (not significant in any model), betweenness centrality, race, gender, grade, single-parent home, parent education.

* $P < .05$.
** $P < .01$.
*** $P < .001$.

with increases in any of these outcomes, though victimization by other schoolmates is associated with increased anxiety and depression. While the coefficients for victimization by friends are between 2.4 and 8.4 times as large as those for victimization by other schoolmates, these differences in magnitude did not reach statistical significance (although the comparison for school attachment was marginally significant at the $P < 0.10$ level). So while we can conclude that victimization by friends is distressing, it is not significantly more so than victimization by other schoolmates.

DISCUSSION

Aggression and bullying ensnare millions of American teens annually, and our study reflects this, with half (50.4%) of the students in our data involved as either aggressors or victims or both. Conventional understandings of their behaviors point to reactive, maladjusted responses to psychological deficiencies, but, we argue, much of this cruelty is actually tactical, intended to boost status and vanquish rivals—who are disproportionately found within their own social circles, especially among their friends and friends-of-friends. To the extent that aggression is socially instrumental, we should anticipate higher rates of aggression between friends, for they can become stepping-stones on the path to popularity.

In one of the rare studies based on longitudinal network data for both friendship and aggression, our results confirm these expectations, remain robust to alternative models, and demonstrate the pervasive influence of social

network connectivity on the aggression and bullying patterns in these schools. We find that these types of harmful, aggressive actions toward victims are more likely to evolve over time between adolescents who are linked by the bonds of friendship, and this is the case regardless of whether the friendship is mutual or unilateral. It is true of friendships that end as well as those that are sustained, providing compelling evidence that amity and animosity do not only alternate in sequential phases but can coincide. Not surprisingly, at least to anyone who has had a "toxic friendship," we find that teens who are betrayed and attacked by their friends experience significant increases in anxiety and depression and significant declines in their attachments to school.

Of course, victimization risks are not confined to friends, but remain relatively elevated until social distances—measured in terms of links separating two students in their school's social network—become large. Friends-of-friends, for example, harass and torment each other at much higher rates than do more distant schoolmates. Friends and friends-of-friends together account for 3% of all dyads in our sample, but 28% of all aggressive dyads. Beyond social distances of two friendship links, our results suggest an approximately linear decline in the rate of aggression. Moreover, propinquity does not appear to account for the influence of close ties on aggressive behavior. Measures of increased social contact and interaction for two friends either does not effect, or even reduces, the likelihood of aggression occurring between them.

Processes internal to the friendship pair also contribute to aggression. Discrepancies in emotional closeness portend aggressive acts, suggesting that greater risk emanates among strained friendships rather than fond ones. Such asymmetries in emotional investment lead to power differentials in a relationship (Waller 1938), which in turn likely motivate, and facilitate, bullying.

Direct network connectivity is not the only key social network component shaping school aggression and victimization. Friendship structural equivalence at one point in time also significantly relates positively to the likelihood of one young person attacking another at a later time point either verbally, physically, or relationally. In other words, pairs of young people who display similar, rather than dissimilar, patterns in their choices of friendships, and in being chosen as friends, remain at heightened susceptibility to one person subsequently harassing the other. Aggression also is more prone to develop between those who harmed similar targets in the past and among those who were victims of the same bullies. In addition to social cohesion, in other words, similar positioning in the social structure generates hostility, due at least in part, we argue, to the tendency of actors to occupy comparable positions in the school social hierarchy.

The findings reported herein highlight the essential, social, and contextual nature of aggression and bullying within school systems. Whereas theoretical

treatises on bullying can focus on the individual and familial characteristics that drive these behaviors, our findings emphasize the social dynamics that unfold within school-based, social networks. Friendship network structural equivalence, aggression network structural equivalence, and measures of friendship network connectivity, for example, all significantly shape the development of aggression. Social network homophily also influences the propensity to engage in harmful, deleterious social acts, with young people often picking on those of the same gender, same race, and those within the same grade. Furthermore, connections in the social network of aggression also affect subsequent aggression. In particular, the chances of a harmful act at T2 are heightened in cases in which each person in a dyad initially reciprocated aggression, and when one attacked the other. Those who were neither aggressors nor victims at the beginning of the study are significantly less likely to later engage in aggression. Taken together, these results demonstrate that analyzing information on the characteristics of both friendship and aggression networks enhances our ability to better predict destructive, youth behavior.

Fundamental group processes likely contribute to the instigation of aggressive-victimization ties over the course of our study. As demonstrated in earlier research (e.g., Faris 2012; Faris and Felmlee 2011, 2014), competition for status, recognition, and esteem between those who occupy similar positions within the social hierarchy represents one such process that may account for the substantial effect of structural equivalence. Individuals with similar structural locations within the network are apt to find themselves clashing for the same outcomes and, thus, have particularly strong motivations to socially embarrass, verbally wound, or physically harm the other. Individuals closer in the friendship network, furthermore, may have greater reason than those located at increased distances to target one another. Such adolescents are often competing for the same roles in social clubs and athletic groups. Research on cyber aggression corroborates such an argument and suggests that those closely tied also often vie for the same romantic partners (Felmlee and Faris 2016).

Within sociology, social status earns a long-standing reputation as a core theoretical construct (Weber 1947) encompassing more than socioeconomic dimensions (e.g., occupational prestige, education, income). Demographic characteristics, such as gender and race, also serve as indicators of social status and play a key role in numerous social theories like expectations states (e.g., Berger, Conner, and Fişek 1982; Correll and Ridgeway 2003), critical race theory (Delgado and Stefancic 2017), and intersectional perspectives (e.g., Collins 1999). Our use of social status emphasizes the incipient dimensions of respect and esteem that arise within group interaction and are central to adolescents (e.g., Coleman 1961) and harken to early theories of group behavior (Bales 1970; Homans 1950; Simmel 1950), as well as the more recent work of Gould (2003). What remains notable about this genre of status is

that it can be manipulated more easily than that associated with demographic or occupational characteristics, and in our case, can be gained through the use of instrumental aggressive tactics.

Yet framing friendships, in particular, as a salient stage for status struggles may be unexpected. Note that as with other types of close relationships, such as marriage and cohabitation, intimacy in friendships brings with it both the potential for great rewards and notable risks. A key friendship norm in both same- and cross-gender friendships is that of trust (Felmlee, Sweet and Sinclair 2012), but the associated perils include that trust can be broken, loyalties ignored, and confidences betrayed. At the same time, our study should not be construed as an indictment of friendship. Although the propensity and risk for aggression heighten among friends, it is important to note that not all friends are cruel to each other; in fact, the vast majority are not (over 98%). Presumably most friends engage in enjoyable, supportive interactions rather than cause serious angst. Such individuals likely compete in various domains and yet fail to respond aggressively. Perhaps these young people avoid direct competition by pursuing success in separate, rather than joint, academic, social, and romantic contexts. In addition, they may choose alternative paths to increased status and esteem, such as engaging in prosocial rather than antisocial behavior, which can also elevate social standing (Guinote et al. 2015). The processes by which such youth avoid antagonizing each other are deserving of further research.

In our analyses, friends, friends-of-friends, and those with friends in common, often appear to become "frenemies" as the result of one victimizing the other. We conclude first, and foremost, that network ties cannot always be distinguished as either solely positive or negative in nature, as assumed typically in the network literature. The supposed positive ties of friendship, for example, can result in serious harm, triggering subsequent anguish and depression on the part of the victim. Does that mean that the friendship tie is negative rather than positive? Instead, it seems likely that the friendship simultaneously contains both positive and negative elements. Second, a network connection between two individuals could be positive in one direction and negative in the other. For example, in an aggression-victimization relationship, the aggressor often benefits from such a relationship (a positive tie), whereas the victim suffers (a negative tie). Thus, it becomes difficult to label adolescents involved in aggression as having a solely negative relation. Similar complexities arise in studies of international conflict networks, where nation states that share the same allies and enemies can be both allies and enemies at the same time (Maoz et al. 2007). These findings call for greater attention to the conceptualization of positive and negative ties in network studies and in extensions of classic notions of balance.

Our findings align more generally with social science research and theory recognizing that close social ties have the potential to both enhance and harm

our well-being. Social relationships can improve or worsen people's mental health, health habits, and physical health, for example, with effects that accumulate over the life course (Ertel, Glymour, and Berkman 2009; Umberson and Montez 2010). More specifically, marriage and intimate relationships provide numerous benefits for health and lessen mortality risks (House, Landis, and Umberson 1988), but strain in marriages hastens deterioration in health, especially as people age (Umberson et al. 2006). As far back as Durkheim ([1897] 1951), social integration also is linked to lower suicide rates. At the same time, suicide attempts on the part of friends and family members significantly increase youth's suicidal thoughts and suicide attempts (Abrutyn and Mueller 2014), pointing to the complex connection between social ties and these life-threatening behaviors. Moreover, friendship networks can dampen adolescents' tendency toward delinquency or cause it to escalate, depending on the network's relative inclination to engage in delinquent acts (Haynie 2002). Close relationships, idealized for their numerous gratifying properties, therefore, can display an understudied, dark side (Spitzberg and Cupach 1998), and this can occur in multiple contexts.

Our study is one of the first to employ a variation of a temporal exponential random graph model to examine change in aggressive patterns in a number of schools over time. This type of modeling allows us to examine simultaneously the effects of a number of individual, dyadic, and structural network characteristics longitudinally, providing particularly robust evidence that social dynamics play an important role in shaping future patterns of aggression. At the same time, this research has its limitations. The sample of schools, although larger than that used in most network studies of aggression, is concentrated in one region of the country. In addition, patterns of aggression may evolve differently, depending on the type of aggressive behavior, whereas exploring such variations were beyond the scope of this article. Further study is needed as well to explore in greater detail the roles of race and gender, which are apt to differ by genres of aggression and school context. Convergence and collinearity problems also prevented us from investigating additional, possible structural, network characteristics, and these issues deserve attention in future research.

CONCLUSION

Our friends change us, aid and sustain us—indeed, they keep us alive. But they also hurt and betray us, at higher rates than others, and their cuts are deep. They introduce us to their own friends, who offer relatively few benefits and nearly as many risks. It would seem that the adage to "keep your friends close, and your enemies closer" is unnecessary, for they are already nearby. So what can be done?

Unfortunately, most bullying prevention programs do not work, at least not in randomized controlled trials (Smith et al. 2004; Merrell et al. 2008; Ttofi and Farrington 2011; Polanin, Espelage, and Pigott 2012). Those that do typically do so modestly, with effect sizes of statistical but not practical significance (e.g. Ferguson et al. 2007) and often only among younger children (Yeager et al. 2015). The reason for the typically low success rates, we believe, is that aggressive behavior accrues social rewards and does so to a degree that leads some to betray their closest friends. Even the most successful prevention programs are unable to alter the aggressive behavior of popular bullies, who use cruelty to gain and maintain status (Garandeau, Lee, and Salmivalli 2014). Most programs focus on remedying dynamics such as emotional dysregulation, poor conflict management, and empathy deficits, factors that may explain only a portion of aggressive behavior. These efforts may reduce "normative targeting" of those who violate one or more of myriad unwritten rules governing adolescent fashion, gender expression, physical appearance, sexuality, and so on—in short, the socially vulnerable. But unless they disrupt the popularity contests ubiquitous in secondary schools, they are unlikely to improve conditions for those trying to reach the next rung on the social ladder, not to mention those they step on—who are often their own friends.

One such strategy entails coopting status contests for prosocial ends by identifying high-status youths and changing their behavior in the hopes that they in turn influence their peers. This has shown promising results for suicide (Wyman et al. 2010; Whitlock, Wyman, and Moore 2014; Wasserman et al. 2015; Wyman et al. 2019) and now bullying prevention (Paluck, Shepard, and Aronow 2016). Matzmichim, Israel's largest antibullying NGO, uses a series of interventions to subtly elevate the status of "uplifters" and has brought their program to scale, having reached over 70,000 Israeli secondary students to date.[17] "Realist" approaches like these redirect hierarchies instead of dismantling them, implicitly accepting that the struggle for status is intrinsic to group life.

Of course, some hierarchical differentiation is inevitable, but it need not come at such expense—for victims most of all, but even for their socially ambitious aggressors, who trade affection for prestige, solidarity for status. It is lonely at the top, but also on the ascent, so we hope prevention efforts also consider strategies to leverage these trade-offs in order to subvert hierarchies and perhaps dismantle them altogether. Current research on the Contexts data used here offers reason for optimism, documenting a virtuous cycle whereby youths who retain more friends over time develop stronger life goals

[17] See http://www.matzmichim.org.il/en/ for more information.

and deprioritize status, which subsequently reinforces those friendships and increases retention, resulting in steady declines in instrumental aggression (Faris 2020; Faris and Felmlee 2018). An even sharper decline (to less than half of peak levels) occurs in the middle of twelfth grade, when the end of high school and its attendant popularity contests is finally in sight. Yet the myopia of adolescence leads too many to struggle for too long, leaving scars that last well past graduation. Strategies that help adolescents forge strong, enduring friendships are worth pursuing for their own sake but will also have the effect of dampening status striving and the harm accompanying it. As Charlotte Brontë said, "I can be on guard against my enemies, but God deliver me from my friends!" She is right in that our friends are the problem, but we believe they also hold the solution.

APPENDIX A

Propinquity Analysis

One trivial explanation for higher rates of aggression between friends is that they spend more time together. It is useful to distinguish between two types of propinquity: voluntary (freely choosing to spend time together) and involuntary (e.g., taking the same classes, riding the same bus, and the like). Complete data on both forms however, is too cumbersome to collect for all pairs of students in even a medium sized school. However, we suggest that there are radically diminishing 'returns' to the marginal hour of exposure per day—clearly aggressors need some amount of time in order to torment their victims, but all students in the small- to medium-size schools in this study likely encounter one another frequently enough to provide ample opportunities for this to happen. We contend that, in such contexts, marginal increases in exposure are likely to affect the frequency, rather than the *presence* of aggression. The study only collected data on some forms of voluntary propinquity, and only for those nominated as friends, so we can offer only a partial test of the propinquity effects.

  Because the resulting network (of aggression that occurred between friends) is too sparse to be modeled in the TERGM framework,[18] we estimate a dyad-independent logit models of the presence of an (i,j) aggressive tie at T1 between mutual friends,[19] conditional on the following exposure variables, which are all maximally symmetrized, binary indicators of whether respondents:

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[18] Of the 5,828 mutual friend pairs at T2, only 1.8% were also aggressive, and as a result most of the 14 school networks only contain a handful of aggressive friendships.

[19] Because it is more likely to detect propinquity effects, we use a cross-sectional test (at T1, although results are substantively the same at T2). Longitudinal models of ties at T2, conditional on ties at T1, showed no significant effects beyond reciprocity.

(a) *had ever been to their friend's home or had their friend over to their home*; (b) *went somewhere with their friend outside of school in the past week*; (c) *had met their friend's parents*; (d) *had their parents meet their friend*; (e) *had their parents meet their friend's parents*. We also consider the *level of emotional closeness* (*somewhat close or not at all close*, with very close as the base category) that ego feels for alter, and vice versa, as well as *closeness difference* (in model 2), defined as the closeness ego feels for alter (values are 1, 2, or 3 for not very, somewhat, and very close, respectively) minus the closeness alter feels for ego. The sample for the exposure analysis is a subsample of that used in the TERGM and includes 5,828 mutual friend pairs at T1. Of these, between 1% and 2% were also aggressive to each other, and most had hung out together in the past week, been to each other's homes, met each other's parents, and were close friends (table A1).

TABLE A1
DESCRIPTIVE STATISTICS FOR MUTUAL FRIEND DYADS ($n = 5,828$)

Mutual Friend Dyads	%
Aggression at T2	1.8
Aggression at T1	1.1
Been to each other's home	76.2
Hung out outside of school	62.8
Parents met friend	87.4
Parents met friend's parents	78.5
Very close friends	68.2
Somewhat close friends	31.0
Not at all close friends	.8

So while we cannot determine whether overall propinquity explains differences in aggression rates between friends versus non-friends, we can determine if, among friends, greater exposure is associated with higher rates of aggression. Our results suggest that it is not (table A2). We find that, among friends, those who have been to each other's homes, spent time together outside of school, or met each other's parents were either no more, or significantly *less* likely to do something mean to each other. Rather, it appears that aggression is often retaliation—i is many times more likely to aggress against j if j also aggressed against i—or driven by affection deficits, as i is 1.66 and 3.8 times more likely to victimize j when i feels somewhat (as opposed to very) close to j and when j does not feel at all (as opposed to very) close to i, respectively. Similarly, table A2, model 2 shows that students are significantly less likely to aggress in friendships in which their emotional investment is not fully reciprocated. These results suggest that aggression between friends arises from the emotional dynamics of the relationship rather than from how often (or where) they spend time together.

TABLE A2

Dyad-Independent Logit of Aggression between Mutual Friends

	MODEL 1		MODEL 2	
	Coef.	SE	Coef.	SE
Alter victimized ego in fall	3.251***	.269	3.213***	.266
Been to each other's home	.255	.333	.225	.333
Hung out outside of school.	.075	.249	.049	.244
Parents met friend	.306	.395	.321	.395
Ego met friend's parents	−.072	.386	−.121	.390
Parents met friend's parents.	−.699*	.335	−.700*	.335
Ego feels somewhat close to alter.	.508*	.230		
Ego does not feel close to alter	.048	1.079		
Alter feels somewhat close to ego.	−.401	.251		
Alter does not feel close to ego	1.348*	.656		
Closeness difference (ego-alter).			−.378*	.185
Constant	−4.361***	.364	−4.211	.322
LR χ^2 (10)	111.08		105.05	
Log likelihood.	−448.84		−451.85	

Note.—$N = 5{,}992$.

* $P < .05$.

** $P < .01$.

*** $P < .001$.

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