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Violent Peers, Network Centrality, and Intimate Partner Violence Perpetration by Young Men

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A B S T R A C T

Purpose: To measure the association between affiliation with violent peers in adolescence and intimate partner violence (IPV) perpetration by men in early adulthood, and how peer network structure influences the strength of this association.
Methods: Using the National Longitudinal Study of Adolescent Health, we analyzed a cohort of male subjects, originally in grades 7–12, reporting on sexual relationships 7 years later. At baseline, peer network violence was estimated as the average of network members' reports of their frequency of fighting during the past year, and centrality (number of friendships) was measured. Logistic regression was used to estimate associations between peer network violence, network centrality, and perpetration of IPV in recent intimate relationships.
Results: The probability of IPV perpetration was 37% for young men with a large number of friends (>13) engaging in an average of six to seven fights in the past year. However, young men in small- (<6 friends) or medium-sized peer networks (6–13 friends) with these same levels of violence had probabilities of IPV perpetration between 5% and 7%.
Conclusions: School-based interventions that target fighting by male subjects can reduce risk of IPV perpetration later in life.

IMPLICATIONS AND CONTRIBUTION

This research is the first nationally representative study showing that boys embedded in large, violent friendship networks are more likely to perpetrate IPV in early adulthood. Interventions targeting violent groups of boys could reduce the risk of IPV perpetration in early adulthood.

One in four women in the United States is a victim of intimate partner violence (IPV) each year [1,2], and approximately 22% of nonfatal and 30% of lethal victimizations of U.S. women are perpetrated by intimate partners [3]. Women are >4 times more likely than men to be victims of nonfatal IPV, and almost all of this violence involves male perpetrators [4,5]. Partner violence can be part of a cycle of frequent victimization, with devastating effects on women [1,6], including time lost from work, physical injury, and adverse mental health outcomes [1,4,7,8]. The total costs of IPV exceed $5.8 billion each year [9].

Preventing IPV against women is critical from a public health standpoint, and epidemiologic research on the precursors of IPV perpetration by young men supports primary intervention efforts. Studies have shown that IPV perpetration in adolescence depends on multilevel factors, including characteristics of the family, the environment (i.e., schools and peers), and the adolescents themselves [10,11]. Childhood exposure to family violence, low socioeconomic status, poor education, and low social support increase the risk of IPV perpetration later in life [10–13]. Unfortunately, interventions that target family and individual risk factors are difficult to develop and implement. However, factors in the environment, particularly the influential role of peers, may be a promising avenue for intervention. The small number of studies focused on peer influence consistently show that young men who have friendships with violent or delinquent peers have increased risk for perpetration of IPV [10–15].

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Peer influence has drawn significant attention in research on violent and criminal behavior more generally [16] but is largely overlooked in the IPV literature. According to social learning theory, attitudes and behavior patterns promoting aggression and crime are taught, reinforced, and enforced through interactions among peers [17,18]. During adolescence, peers are particularly important socialization agents for aggressive behaviors. Cross-sectional studies have found that IPV perpetration is high among adolescent boys with delinquent peers [12–14]. The influence of peers during adolescence also appears to persist through early adulthood. In one study based in Oregon, male aggression toward female partners in early adulthood was influenced by the behaviors and attitudes of friends during adolescence [15]. In another study, urban youth with school peers who stole, used drugs, drank alcohol, and carried weapons were at risk of perpetrating dating violence 6 years later [11]. Despite the importance of these findings, these previous studies have limited generalizability, rely on perceptions of peers rather than actual peer behavior, and mostly focus on short time frames (except two longitudinal studies) [11,15].

The strength of peer influence may also depend on the structure of the social networks [19–21]. In one study focused on peer network structure and IPV perpetration among men, respondents embedded in small, dense, and mostly male networks had slightly elevated levels of IPV perpetration in comparison with those in popular networks (19% vs. 13%) [22]. However, this study neither distinguished the effects of network density, network size, and peer delinquency, nor did it control for confounders.

The extent to which peers influence adolescents' use of violent acts may depend on the pathways through which information about delinquency is transmitted and reinforced. A key network structure associated with interpersonal influence is centrality [20,23]: the extent to which actors are centrally located in networks. In the context of adolescent peer networks, network centrality can be operationalized simply as nodal degree [23,24]: the number of friends an adolescent has [22]. Individuals who are more central in friendship networks tend to receive more information and feedback from peers. To the extent that these messages are homogenous, one would expect that individuals who are more central will be subject to greater peer influence. Figure 1 presents a conceptual diagram of network centrality, peer violence, and the IPV perpetration. Adolescents embedded in large networks of violent peers are at risk of being socialized into violence. This is because large homogenous networks act as a key context for social learning.

To understand the influential role of violent peers on IPV perpetration, we conducted a systematic longitudinal analysis of

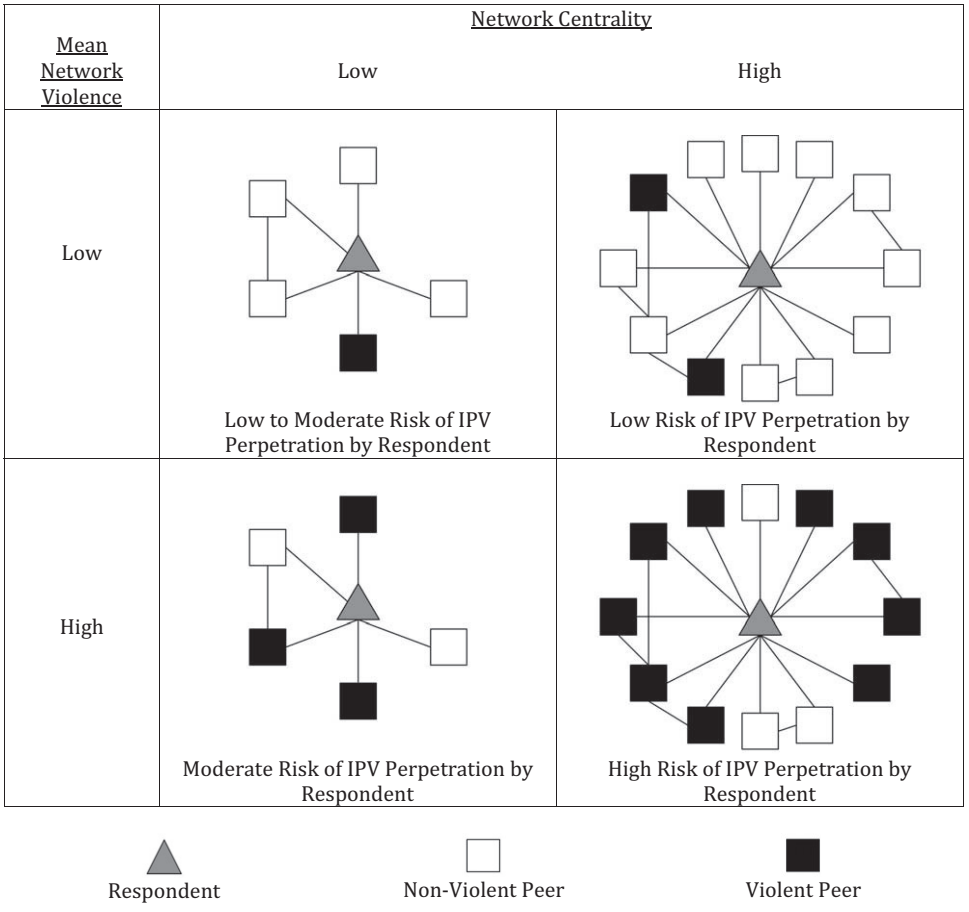

Figure 1. Conceptual diagram of the relationship between mean network violence, network centrality, and intimate partner violence perpetration risk in male adolescents.

IPV perpetration using nationally representative data. We measured actual peer violence within respondents' friendship networks, as reported by the friends themselves, as opposed to relying on adolescents' perceptions of their friends' behaviors. In addition, following theoretical models of peer influence, we characterized network centrality for every respondent. Our research objectives were to describe how the presence of violent peers in adolescents' social networks is associated with IPV perpetration in early adulthood and whether network structure matters. We tested the following hypotheses: (1) having a violent peer network increases the likelihood of perpetrating IPV in adulthood, and (2) the strength of the peer network effect on IPV perpetration depends on respondents' network centrality.

Methods

Data were drawn from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative longitudinal study, with four waves of data collection (1994–2008), of adolescents originally in grades 7–12. Using a multistage cluster sampling design, in wave I, 80 high schools and their feeder junior highs, 132 schools in total, in the United States were randomly selected. In 1994–1995, all students in attendance at these schools were administered the wave I in-school survey (N = 90,118), which gathered extensive information on friendship networks. In 1995, 20,745 adolescents were randomly selected for wave I in-home interviews (79% response rate) to gather respondents' individual-level characteristics, their health and health-related behaviors, as well as contextual data on the respondents' families, neighborhoods, schools, social networks, and intimate relationships. For wave III, 15,197 of the original wave I in-home respondents were reinterviewed again in 2001–2002 (76% response rate).

Because this study examines IPV perpetration against women by men during early adulthood, we focused on wave III male respondents who were no longer in a K-12 school setting and also reported a recent important heterosexual partnership. We did not examine same-sex relationships because questions about IPV perpetration were restricted to a sample of primarily opposite-sex partnerships. The analytical sample (n = 2,993) excluded 736 cases (19%) with missing data in either the in-school or in-home wave I surveys. Table 1 presents unweighted descriptive statistics for independent variables in this analysis.

Table 1
Unweighted descriptive statistics of independent variables (n = 2,993)

Variables	Mean/ proportion	SD
Mean network violence	.73	.59
Network centrality		
0–5	31%	
6–13	56%	
>13	12%	
Demographic and personal characteristics		
Race/ethnicity		
White	58%	
Black	17%	
Hispanic	15%	
Asian	7%	
Other	2%	
Age (in years)	16.35	1.64
Family structure		
Two biological parents	57%	
Stepparent	11%	
Single mother	21%	
Other	12%	
Parents' education (in years)	13.31	2.38
Religiosity	2.85	1.03
Took virginity pledge	10%	
Fight in past 12 months	41%	
Network density	.28	.15
Relationship characteristics		
Relationship duration (in years)	2.09	2.11
Relationship duration (logged)	.93	.63
Age difference (in years)	−.19	3.46
Race difference	21%	
Education difference (in years)	−.48	2.41
Marital status		
Noncohabiting	57%	
Cohabited	26%	
Married	16%	
Nonexclusive partner	13%	
Duration to relationship start since wave I (in years)	4.48	2.27

Dependent measure

Perpetration of IPV. Wave III included items from the revised Conflict Tactics Scale [25]. We constructed a binary measure indicating the perpetration of (*i*) threats of physical violence, pushing or shoving, or throwing objects that could hurt; (*ii*) slapping, hitting, or kicking; and/or (*iii*) fighting that resulted in injury in respondents' most recent important partnership during the previous year. This measure has been used previously [26].

Measures of network composition and structure

Mean network violence. The level of violence found within a respondents' peer network was measured by the mean value of responses (0 = never, 1 = 1–2 times, 2 = 3–5 times, 3 = 6–7 times, 4 = >7 times) from all network members to the following question: "In the past year, how often have you gotten into a physical fight?"

Network centrality. Drawing on social network analysis [23,24], we operationalized network centrality as nodal degree, which is the number of friendship ties for each respondent. This measure corresponded to the size of the respondent's friendship network, based on combining the number of friendship nominations made by and received by the respondent. Respondents were allowed to nominate up to five male and five female friends.

Network density. Network density is the proportion of friendships, of all possible friendship ties, in the friendship network for each respondent [24]. Network density has been controlled for in previous studies of peer influence and IPV [22].

Demographic and personal characteristics

We controlled for a number of wave I demographic and personal characteristics that may act as confounders, including race/ethnicity, age, family structure, parental schooling, and religiosity [26,27]. Race/ethnicity was categorized as white, black, Hispanic, Asian, and other. Age was measured in years using respondent's self-reported date of birth. Family structure was categorized as two biological parents present in the household, stepparent(s), single biological mother, and other (e.g., single

father, living with grandparents). Parental education was constructed as a summated scale of the years of education of respondent's father and mother ($\alpha = .74$). Religiosity was described using a 2-item summated scale ($\alpha = .81$), constituted by the frequency of religious service attendance in the past year and the importance of religion in the respondent's life. Also included was a binary measure specifying whether the respondent had taken a public or written pledge to remain a virgin until marriage.

Previous violence

Selection is a particular concern in social network research [28]. An observed association between peer network violence and IPV perpetration may reflect the tendency of violence-prone individuals to engage in IPV and to form friendships with violent peers. Individuals prone to IPV perpetration, such as those with a history of violence, including previous IPV perpetration, may tend to form friendships with peers who are also involved in violence. We controlled for selection by including previous violence as a baseline measure of participant violence. Previous violence was collected in wave I as a binary measure of whether the respondent had been involved in a physical fight with strangers, friends, acquaintances, family members, or dating partners during the previous year.

Relationship characteristics

We controlled for previously identified relationship determinants of IPV perpetration, including relationship duration; marital status; differences in age, education, and race in partnerships; and nonexclusive relationships [26,29]. All these measures were taken from wave III. Relationship durations were not directly available. Start and end dates were collected but have questionable accuracy, and approximately half the subjects had missing responses. To minimize recall bias and missing data, for those in sexual relationships, we constructed duration from either date of first intercourse to date of last intercourse (previous relationships) or date of first intercourse to date of the interview (current relationships). For those in nonsexual relationships, we used start and end dates or dates of interview, if available. Differences in age and years of education were calculated between respondents and their reported partners. A binary measure indicated relationships involving interracial partners. Marital status indicated whether the couple solely dated, had ever cohabited, or were ever married. To measure nonexclusivity, we assessed whether a respondent's partner had sex with another individual during their relationship. Finally, we included a measure of the time that elapsed between wave I and the start dates of respondents' most-recent important relationships.

Analyses

Descriptive statistics were used to measure mean network violence, network centrality, and the prevalence of IPV perpetration. We used logistic regression to examine factors associated with the likelihood of IPV perpetration by young adult males in their most-recent important relationships. The logistic regression reported adjusted odds ratios (OR): the ratio of the probability of the perpetration of IPV by the respondent to the probability of being in the "no violence" category. To assess the impact of missing data on our results, we imputed values using sequential regression multivariate imputation and re-estimated the logistic regressions (results available on request). Missing data did not change the pattern of results. Sampling weights were incorporated into the logistic regression model to adjust for unequal probabilities of selection, and we used survey-corrected standard errors. We estimated predicted probabilities by setting continuous and nominal control variables to their mean and modal values, respectively. All analyses were conducted using Stata (StataCorp, College Station, TX).

Results

At baseline, 68% of 2,993 middle and high school boys reported having six or more friends in their peer network. The overall mean level of network violence was .73 (Table 1). The average density of respondents' friendship networks in our sample was .28, or, on average, 28% of all possible ties within peer networks were reported by friends. Respondents were, on average, 16 years old, and a majority were white (58%), were raised in two-parent households (57%), and had parents with a mean educational attainment of >13 years. Ten percent of respondents had taken a virginity pledge, and 41% engaged in fighting during the year before wave I.

Participants' most-recent important relationships started, on average, 4.5 years after wave I, and the mean relationship length was 2 years. Twenty-one percent of respondents were in interracial relationships, and with female partners who were slightly younger and less educated. The majority of the partnerships were noncohabiting relationships (57%), and 13% of partners had another sex partner during their relationship.

Table 2 presents prevalence of IPV perpetration in recent wave III relationships by characteristics of their wave I peer networks. Overall, 14% of most-recent important relationships involved IPV perpetration in the past year by men between the ages of 18 and 26 years. Perpetrators of IPV tended to be embedded in more violent peer networks (17% vs. 13%; $p < .05$); yet, those in larger peer networks did not have lower levels of IPV perpetration (17% for those with <6 friends vs. 12% for those with >13; $p \geq .10$). In contrast, in peer networks with low levels of fighting (network violence levels between 0 and 1), the prevalence of IPV perpetration was highest in small networks and lowest in large networks (17% vs. 8%), whereas IPV perpetration was most prevalent among respondents embedded in large networks where fighting was relatively more common (23%).

Table 3 presents the relationship between respondents' wave I network characteristics and perpetration of IPV in wave III, adjusted for demographic, personal, and relationship characteristics. Mean network violence was nonsignificant ($p > .05$), but

Table 2
Prevalence of IPV perpetration in the past year among young men, by network centrality and mean network violence (n = 2,993)

Variables	Centrality			
	0–5	6–13	>13	Total
Network violence: 0–1				
IPV perpetration	17%	12%	8%	13%
N	583	1,161	292	2,036
Network violence: ≥1				
IPV perpetration	17%	15%	23%	17%
N	356	520	81	957
Overall				
IPV perpetration	17%	13%	12%	14%
N	939	1,681	373	2,993

IPV = intimate partner violence.

Table 3
Multivariate logistic regression of IPV perpetration during the past year among young men in their most-recent important relationships at wave III (n = 2,993)

Variables	Adjusted OR	SE	95% CI
Mean network violence	.83	.13	.61–1.14
Network centrality (0–5)			
6–13	.58	.16*	.34–.99
>13	.23	.11**	.09–.59
Network violence × 6–13	1.38	.39	.79–2.41
Network violence × >13	3.76	1.65**	1.58–8.96
Race/ethnicity (white)			
Black	2.08	.40**	1.41–3.06
Hispanic	.72	.16	.46–1.12
Asian	.94	.39	.42–2.13
Other race	1.85	1.12	.56–6.11
Age (in years)	.91	.04*	.84–.99
Family structure (two biological parents)			
Stepparent	.88	.23	.52–1.49
Single mother	.94	.20	.62–1.44
Other	.94	.23	.58–1.53
Parents' education (in years)	.91	.03*	.85–.98
Religiosity	1.10	.08	.96–1.26
Took virginity pledge	1.80	.47*	1.08–3.01
Fight in past 12 months	1.32	.20***	.97–1.78
Network density	1.08	.64	.33–3.49
Relationship duration (logged)	2.02	.44*	1.31–3.13
Age difference (in years)	.94	.02*	.89–.98
Race difference	.92	.20	.60–1.42
Education difference (in years)	.90	.02**	.85–.94
Marital status (noncohabiting)			
Cohabited	2.69	.61**	1.71–4.22
Married	2.20	.52*	1.38–3.51
Nonexclusive partner	2.28	.46**	1.54–3.40
Duration to relationship start since wave I (in years)	1.01	.06	.90–1.13
Likelihood ratio χ^2 (*df*)	184.29	26**	
Bayesian criterion	2,156.74		

Two-tailed test.
* $p < .01$.
** $p < .001$.
*** $p < .05$.

the main effects of network centrality—having 6–13 ($p < .01$) and >13 friends ($p < .01$) compared to having <6 was associated with decreased odds of IPV perpetration. The interaction between having >13 friends and mean network violence was statistically significant, with an OR >3 ($p < .01$). This confirms that the association between network centrality and IPV perpetration depends on the level of violence in friendship networks, even when controlling for a host of other factors, including the respondents' previous violence.

This relationship can be seen in Figure 2, which shows the predicted probabilities of IPV perpetration by mean network violence stratified across the three categories of network centrality. Mean network violence was not associated with an increased probability of IPV perpetration when respondents had 0–5 or 6–13 friends. Respondents with a large number of friends (>13) had the lowest probability of violence when the mean network violence was 0, compared with those with 0–5 and 6–13 friends (.02 vs. .08 and .05). However, the probability of IPV perpetration for respondents who had a large number of friends engaging in fighting, such as a mean network violence of 3, was .37, which far exceeded the probabilities for those with 0–5 (.05) and 6–13 friends (.07) at the same level of network violence. Thus, controlling for other factors, respondents embedded in large networks that engaged in fighting during adolescence were significantly more likely to perpetrate IPV against their intimate partners in early adulthood.

Table 3 also shows that a number of other covariates were associated with IPV perpetration. Compared with white respondents, African American men were 2 times more likely (OR = 2.08, 95% confidence interval [CI] = 1.41–3.06) to report IPV perpetration, whereas age and parents' education are associated with lower odds. Respondents who reported taking a virginity pledge were almost 2 times more likely (OR = 1.8, 95% CI = 1.08–3.01) to perpetrate IPV. Finally, a number of partnership characteristics were associated with IPV perpetration. Respondents with older and more educated partners were less likely to engage in IPV, whereas relationship duration, cohabitation, and marriage had higher odds. Finally, sexual nonexclusivity by partners was associated with a 2.3 times increase in the odds of IPV (OR = 2.28; 95% CI = 1.5–3.4).

Discussion

In this research, we found that individuals with violent friends in adolescence had higher risk of IPV perpetration in early

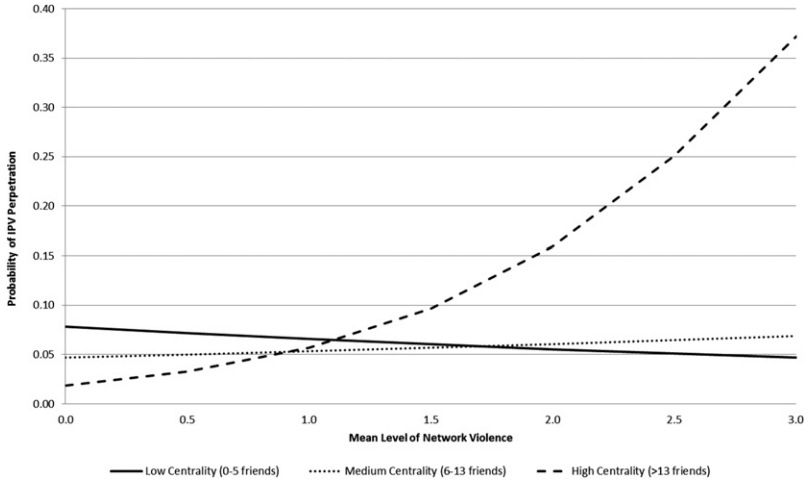

Figure 2. Predicted probabilities of intimate partner violence perpetration, by mean network violence and network centrality.

adulthood, but only if the friendship networks were large. Violence in small- or medium-sized networks did not increase the risk of IPV perpetration. Conversely, individuals embedded in large networks of nonviolent friends were the least likely to perpetrate IPV in adulthood.

A substantial body of research on social learning suggests that friends can be a significant conduit for information about violence-supported norms and gender roles as they relate to IPV [30]. Affiliating with friends who engage in delinquent behaviors, particularly peers who abuse their dating partners, is associated with increased risk of violence against intimates [12,31,32]. Our findings support this notion, as we measure fighting across multiple contexts with peers, family members, acquaintances, and even dating partners. Notably, however, we found that the most common form of fighting found in our sample at baseline was fighting with peers or acquaintances [50%]; this suggests that peer-on-peer aggression can have an impact on dating relationships later in life. Friends who are aggressive in nonromantic contexts may model and enforce aggressive behaviors for young men in all interpersonal relationships, including intimate partners. Our findings are particularly important for youth who are just beginning to form or are yet to form dating relationships and also are potentially exposed to high levels of aggression by their peers in early adolescence.

Our research delved deeper to understand how the structure of friendships (centrality or network size) influences the processing and sharing of information among peers. We found that peer network characteristics are critical effect modifiers, with the strength of peer influence ultimately dependent on the structure of friendship networks. If peer networks consist of large (i.e., $>$13 friends) homogenous groups (i.e., most friends are either violent or nonviolent), then peer effects on the likelihood of IPV are substantial. In short, violent behaviors are most likely to be learned and reinforced in large violent peer groups.

To our knowledge, only one previous study has focused on peer network structures as a mechanism for influencing IPV perpetration by young men. Casey and Beadnell [22] examined associations between four types of peer networks and IPV perpetration. They classified these networks by various factors, such as density, size, gender composition, and delinquency of friends. As an exploratory study, this research neither isolated the effects of specific network characteristics on IPV perpetration nor controlled for confounders.

Our research findings highlight possibilities for intervention. We propose that intervention programs begin at middle school, target multiple types of violent behaviors within the context of both peers and dating relationships, and be peer based. Adapting DeKeserdy's peer support models [32,33], peer-based interventions can promote positive attitudes toward both women and peers, thus decreasing likelihoods of both IPV and peer aggression. Schools are an ideal setting for antidating violence programs, which can dovetail with current practices and policies aimed to reduce delinquency and peer-on-peer violence [34]. A few high school and fewer middle school dating violence programs have been evaluated with promising results of effectiveness [35–39]. Combining elements of dating violence interventions with programs directed toward reducing peer-on-peer aggressive behaviors may be an efficient strategy for reducing multiple forms of violence.

Finally, this study raises several additional research questions. We found that young men who took virginity pledges were 1.8 times more likely to perpetrate IPV than nonpledgers. Pledging may be a proxy for more patriarchal beliefs, which have been linked to violence against women [40]. Alternatively, jealousy is a known determinant of IPV [29]. Our finding may reflect the strong beliefs about monogamy among pledgers who may be reacting to perceived breaches of these expectations. Future research is needed to understand this compelling finding.

There are a number of limitations to our study. We only measured physical IPV that is likely to result in injury and excluded forms of sexual violence, which warrants separate investigation. We are also limited in our ability to make causal inferences. Although we accounted for respondents' fighting at wave I, it is not clear whether this effectively controlled for the tendency of individuals prone to IPV to form friendships with peers who engage in fighting (selection). There may be unobserved heterogeneity that is linked to both friendships with violent peers and IPV perpetration. In addition, other network characteristics, such as stability of friendships or the formation of new friendships since wave I, were not considered. However, our goal was to examine how friendships in middle and high school impact perpetration of IPV in early adulthood. The types of friendships formed and maintained in wave II may have been impacted by earlier peer networks, and as such, may serve as intermediates along the causal pathway to IPV perpetration. In this case, controlling for wave II peer networks would attenuate results.

Conclusion

Our research is the first national study linking violent peer networks in adolescence and IPV perpetration in early adulthood. It is also the first to highlight the long-lasting influential role of peer network composition and size. Our study has important implications for preventing IPV through antiviolence school-based policies and practices. Given the limited resources available to schools, interventions can be developed to efficiently target aggressive behavior in multiple contexts. Policies and programs aimed at preventing peer aggression can be combined with dating violence programs to reduce the potential for IPV perpetration later in life.

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