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**ORIGINAL ARTICLE**

# Social networks and violence victimization and perpetration among youth: A longitudinal analysis

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**Abstract**

Interpersonal violence (IV) is a serious concern for adolescents in the United States that has devastating impacts for individuals and communities. Given the increased importance placed on friendships during adolescence, the purpose of the current study was to examine the extent to which IV experiences cluster within youths' friendship networks. Participants were students ( $N = 1303$ ) in grades 7th to 10th who completed surveys at the beginning and end of an academic year. Results showed that friends' average perpetration (i.e., the percentage of the friends they nominated who perpetrated IV) was strongly associated with likelihood of individual perpetration at baseline but not at the follow-up. For victimization, friends' average report of victimization (i.e., the percentage of the friends they nominated who were victimized) was associated with higher likelihood reporting of victimization (at both baseline and follow-up). Although future research is needed to understand explanatory mechanisms underlying these findings, it is possible that the effectiveness of prevention initiatives may be enhanced by incorporating peer group information.

**KEYWORDS**

bullying, dating violence, interpersonal violence, sexual assault, social network analysis, youth

**Highlights**

- This study examined how victimization and perpetration cluster within adolescents' social networks.
- Utilization of social network analyses allowed us to understand interactions between youth and their peers over time.
- Longitudinal findings provide support for the importance of victims' peer networks over time.

**INTRODUCTION**

Interpersonal violence (IV)—which includes bullying, sexual harassment, dating violence, and sexual assault—is a serious public health issue among adolescents in the United States and has detrimental outcomes for victims and communities (Edwards, 2018; Kann et al., 2018; Swearer et al., 2001). Research suggests that most incidents of IV are perpetrated by a peer and/or dating

partner and someone known to the victim (Lawyer et al., 2006; Turner et al., 2011). Key theories of IV have focused both on social processes, especially social learning theory (Pusch, 2022), and theories of adolescent development to understand perpetration but also victimization. A synthesis of developmental theories highlights IV in adolescence as primarily a relational and social issue and stresses the interpersonal environment (Exner-Cortens, 2014). Indeed, across developmental theories,

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adolescence is a time when interpersonal relationship skills are further developed and tested both through friendships and in romantic relationships (Exner-Cortens, 2014). Therefore, it is surprising that little research has examined the degree of connectivity of IV victimization and perpetration within adolescents' social networks over time using social network analyses (SNA) specifically. The purpose of the current study was to explore how IV victimization and perpetration cluster within adolescents' social networks over time using a sample of 7th to 10th grade students.

## Adolescence and peer influence

Adolescence is a period marked by transitions in social dynamics in which the formation of peer relationships become paramount in shaping adolescents' attitudes and behaviors (Andrews et al., 2002; Berger et al., 2019; Potard et al., 2008). Peer relationships serve as an essential context for adolescent development and contribute significantly to their overall socialization. Many theories about development suggest that adolescents may use interpersonal relationships to validate or define themselves (Exner-Cortens, 2014). Theories of adolescent development can also explain conformity to group norms as an adolescent's attempt to gain social acceptance and affirmation and avoid social isolation (Exner-Cortens, 2014).

Peer influences on risk behavior, including sexual violence and other related forms of IV become especially salient during adolescence (Maxwell, 2002). For example, researchers found that peer group levels of homophobic name-calling were predictive of individual-level homophobic name calling (Birkett & Espelage, 2015). Youth have also been found to be at a lower risk for dating violence when their friends held more prosocial beliefs (Foshee et al., 2013). In an international review of risk factors for adolescent dating violence, Leen et al. (2013) identified peer influence and attitudes toward violence as the two most extensively evidenced risk factors in literature. Considering the importance of peers in shaping behavior (Hecter & Opp, 2001; Legros & Cislighi, 2020), adolescence is a key developmental stage for preventing IV to promote the healthy transition into adulthood (Hamburg & Takanishi, 1989). This paper posits that understanding adolescent development and peer influence processes can further explicate characteristics concerning IV perpetration and victimization within peer groups and among the individuals who make up those groups.

## Social learning theory, social norms, and IV perpetration

While similarities exist, there are distinct ways that adolescent relationships are affected by IV perpetration

and victimization (Turanovic & Young, 2016). A key theory in understanding IV perpetration, particularly intimate partner violence among adults, is social learning theory. This theory posits that violence is a learned behavior that is modeled by witnessing its use in the family or among peers. A recent meta-analysis, for example, found key factors related to this theory (expectations of utility of violence and peer use of violence) as significant factors in teen dating violence perpetration (Pusch, 2022). From a social network perspective, this theory would suggest that IV would cluster in social networks such that any one adolescent would be more likely to report their own IV perpetration if they are in a social peer network with others who also report IV perpetration.

Another facet of social learning theory focuses on social norms, the unwritten, shared rules that are features of social groups (Hecter & Opp, 2001; Legros & Cislighi, 2020). Social norms can promote or detract from the well-being of both the group and its individual members (Bass et al., 2022). Social norms consist of descriptive and injunctive norms that are unique to each group. Descriptive norms are often used to assess perceptions of how frequently a behavior occurs while injunctive norms are often used to consider the perception of approval for a behavior (Bell & Cox, 2015). For example, an adolescent's perception of the frequency of IV perpetration among their peer group would be considered a descriptive norm while their perception of how approving their peer group would be of IV perpetration would be considered an injunctive norm. Further, while adolescents demonstrate the tendency to befriend peers who share similar interests, characteristics, beliefs, and/or experiences (McPherson et al., 2001; Veenstra et al., 2013), they are also influenced by their peer groups and thus their behaviors and attitudes tend to become more similar to their perception of their peer group's norms over time (Sentse et al., 2013).

For adolescents, perpetration of violent behaviors at an individual level is related to exposure to contexts where violence is prevalent and normalized. Previous research suggests that youths' perceptions of peers' attitudes toward and engagement in IV can impact risk for IV perpetration and their engagement in prevention actions (Deming et al., 2013; Kilmartin et al., 1999). For example, youth who perceive their peers as accepting of IV and/or directly observe their peers engaging in IV hold more accepting attitudes toward IV, which increases their risk to perpetrate IV (Deming et al., 2013; Kilmartin et al., 1999; Swartout, 2013). Youth who perpetrate violent behaviors may find friendships with others who also engage in violent behaviors attractive (Turanovic & Young, 2016). Therefore, adolescents who perpetrate IV may seek out peers who demonstrate acceptance of IV perpetration or who also perpetrate IV resulting in violence behaviors clustering within peer networks (Collibee et al., 2021).

## Homophily, stigma theory, and IV victimization

While IV victimization also tends to cluster within social networks, social learning theory is less helpful for understanding victimization as it is not a learned behavior (Turanovic & Young, 2016). Instead, homophily and stigma theory can provide an understanding of victimization clustering within adolescent social networks and may further help explicate why an SNA may be helpful for understanding adolescent victims. Homophily describes the similarities which characterize friendship networks and often result in homogenous networks (McPherson et al., 2001; Wallace & Ménard, 2017). Previous research has used a social network approach and found homophily among adolescent victims was primarily indicative of peer avoidance (Turanovic & Young, 2016). The avoidance mechanism for homophily posits that victimization can lead to stigmatization and social exclusion which results in victims settling for friendships with other victims (Turanovic & Young, 2016).

While there are similarities between peer responses to IV perpetration and victimization, there are differences as well (Turanovic & Young, 2016). Specifically, victims of IV may be treated differently than those who perpetrate IV. The consequences victims experience in their social networks may be explained by Goffman's (1963) stigma theory. Rejection and avoidance are common responses to many types of IV victimization (Faris & Felmlee, 2014) and, therefore, a reduction in the number of friendships and/or a decrease in friendship networks is a common result of violence victimization (Tomlinson et al., 2021; Wallace & Ménard, 2017). This reduction in social connection is due to the stigma associated with violence victimization and results in fewer options for forming friendships and leads victims to eventually create friendships with others who have also experienced victimization (Turanovic & Young, 2016). However, choosing peers who have also experienced IV may offer social benefits as these peers may be less concerned with the stigma associated with victimization than other peers (Link & Phelan, 2001) and may be able to relate to other victims' experiences (Repper & Carter, 2011). Consequently, violence victimization tends to cluster within vulnerable social groups including those that are already socially marginalized, though investigation using SNA is limited.

## Use of SNA

Social network methods span many fields including public health, medicine, communication, sociology, and anthropology and are used to gather information about health, support, and behaviors from friends, relatives, and other important people (Valente, 2015). With SNA, individuals identify others who make up their social

network. This network data can provide us with an in-depth view of individual, organizational, community, and system behaviors (Valente, 2015). The purpose of SNA is to examine the patterns of individual and group behaviors through the lens of social relationships (Borgatti et al., 2013; Valente, 2010; Wasserman & Faust, 1998). SNA can also provide an objective perspective on the relationships between individuals and their social networks (Fujimoto & Valente, 2012; Lakon & Valente, 2012; Petering et al., 2016) and has been previously used to examine IV. For example, Foshee et al. (2013) used SNA and found that adolescents (7th to 9th grade) who had a greater number of friends reporting dating violence perpetration were more likely to report dating violence perpetration. Furthermore, Jewell et al. (2015) revealed homophily of IV perpetration such that 9th-grade students perpetrated similar amounts of IV as their friends. Since peers can promote risky behaviors (Doom et al., 2017) and enhance protective factors during adolescence (van Rijsewijk et al., 2016), the current study utilized SNA to explore victimization and perpetration behaviors among the social networks of youths.

As described above, understanding social networks is vital when exploring adolescent and peer behaviors. However, adolescents' social networks are not always stable, and it is important to recognize that their composition changes over time (Veenstra & Dijkstra, 2011). In social norms research, cross-sectional survey methods have been widely utilized. For example, in a recent content analysis, Shulman et al. (2017) identified 626 studies published between 1980 and 2015 that utilized survey/questionnaire methodology to capture information about social norms. In that sample, only 163 studies (about 26%) used longitudinal methods and the other 463 studies utilized cross-sectional designs. While beneficial, the abundance of cross-sectional research limits the understanding of how social norms and group dynamics change over time (Shulman et al., 2017). This is problematic as theories of adolescent development point to the importance of peer influence and changes in the composition and purpose of adolescent networks over time (Exner-Cortens, 2014). In the current study, we use a longitudinal design with two waves of data to address this gap in literature, further understand how individual and peer behaviors are associated and examine changes in reported behaviors over time.

## The current study

During adolescence, youth become increasingly concerned with engaging in behaviors and holding attitudes that are seen as socially acceptable because it allows them to feel secure within their social group and avoid isolation (Shulman et al., 2017). Given that literature

overwhelmingly points to high rates of peer victimization and perpetration among adolescents (Waterman, 2023), and that there is support for IV perpetration and victimization clustering within adolescent social networks, there is an urgent need to examine the experiences of IV perpetration and victimization among adolescents and their social networks. Further, this is important given that many youths are both victims and perpetrators rather than a victim only or a perpetrator only (Sessarego et al., 2021). Since most research investigates either victimization or perpetration only, the current study will enhance the understanding of IV among adolescents by examining both victimization and perpetration within peer networks. In simultaneously considering victimization and perpetration, the current study extends existing literature by enhancing the understanding of IV among adolescent peer networks.

Furthermore, previous research has mostly focused on one type of IV victimization or perpetration (e.g., bullying) and has not comprehensively measured multiple forms of IV despite research documenting that bullying, sexual harassment, dating violence, and sexual assault co-occur (Hamby & Grych, 2013; Wilkins et al., 2014). To help address this gap in literature, the current study will examine multiple types of IV victimization and perpetration. Finally, most previous research has been cross-sectional which hinders our ability to understand the extent to which network membership predicts experiences of interpersonal victimization and perpetration over time. In the current study, we tested the hypothesis that individual reports of perpetration would cross-sectionally (i.e., at baseline in the same wave) and prospectively (i.e., from the previous wave) be associated with individual self-reports of perpetration and victimization. For this study, the SNA provided a detailed understanding of victimization and perpetration experiences of individual youth and their peer groups. The aim of the current study is to test the hypothesis that there will be similarity in the IV victimization and perpetration experiences in youths' social networks over time.

## METHOD

### Participants

Participants were 1303 students in grades 7 to 10 across eight public schools in a district in a small city in the Northern Great Plains region of the United States. Intensive recruitment procedures were used to send guardian consent forms via their students from school, mailings, email, phone call, and home visits. Seventy-eight percent of students returned their consent forms, 81.8% of those students received guardian consent to participant, and 83.6% of students who received permission from their guardians took the survey. See Table 1

for participant demographic information. There were slightly more females, 57.1%, and the average age was 13.5 years (standard deviation [*SD*] = 1.19). Approximately 10% reported sexual minority status (i.e. bisexual, lesbian, gay, or something else) and a majority, 83.4% were White. These data are part of a larger multiple baseline study to evaluate a youth-led sexual violence prevention project, launched after Wave 2 (W2). The current study uses data from Fall 2017 (Wave 1 [W1]) and Spring 2018 (W2).

### Procedures

Written parental consent and student assent were required for youth to complete the survey. The survey was administered on computers in school by trained research staff. Students who missed the in-school survey were given the option of taking it online at home. Students received a small incentive (e.g., fruit snack) and were entered to win one of 20, \$100 gift cards at W1 and \$150 at W2. Further, it is important to note that we did not include data from any students who did not consent/assent. We were able to calculate the number of friends named, including both participants and nonparticipants, but this information does not contain any identifying information. These nominations to nonparticipants were flagged with dummy ID numbers. The exposure

**TABLE 1** Demographic characteristics of the sample (*N* = 1303).

Female	57.10%
Heterosexual/straight	89.10%
Gay	0.92%
Lesbian	1.07%
Bisexual	6.22%
Something else	2.69%
Race/ethnicity	
White	83.40%
African American	4.40%
Native American	15.30%
Hawaiian Pacific Islander	1.70%
Asian American	3.10%
Hispanic/Latinx	10.70%
Average age	13.50 years ( <i>SD</i> = 1.19)
Average out degree	5.80
Average in degree	3.13

*Note:* Respondents could have chosen more than one ethnic category. Out degree and in degree are network measures of connection. Out degree is the number of friends named and in degree is the number of friendship nominations received. Abbreviation: *SD*, standard deviation.



calculations were derived only from consenting/assenting students. Also, we used a trusted broker methodology for data collection which means we, the researchers, never saw student names.

## Measures

### Covariates

Due to their documented impacts on victimization and perpetration among youth and their peer groups, participants' sex assigned at birth, age, sexual orientation, and race/ethnicity were included in this study as covariates. When utilizing an SNA, it is important to consider attributes such as these that may reasonably impact a network (Valente, 2010). Sex assigned at birth was coded such that 0 = *female* and 1 = *male*. For sexual orientation, participants were asked whether they identified as 0 = *heterosexual/straight*, 1 = *gay*, 2 = *lesbian*, 3 = *bisexual*, or 4 = *something else*. Due to the sample being predominately White (non-Hispanic), participants were coded into two categories based on their race/ethnicity (0 = *Hispanic, African American, Native American, Hawaiian Pacific Islander, and/or Asian American* or 1 = *White non-Hispanic*).

### Social network nominations

Youths were asked to list up to seven best friends in grades 7 to 10 within the school district. We chose the best friend wording given research suggesting youth identified as best friends have the most influence on behavior (Valente et al., 2013). Student names were all programmed into the survey based on the roster provided by the district. If a student entered a best friend's name that did not automatically generate a match from the roster, the survey was programmed so that it would record a text entry of the student nomination, which was later matched to the roster when possible. Students named an average of 5.8 friends (out degree) and were named by others an average 3.13 (in degree) times. Normally, the out and in degree score averages are identical as every outgoing tie is an incoming one, but in this case, we calculated out degree on ties to nonrespondents who would not generate the corresponding in-degree tie.

## IV

We used several measures to assess for a wide range of IV victimization and perpetration experiences during the past 6 months, all with response options 1 = *yes* or 0 = *no*. We used mirror items to assess for both victimization and perpetration experiences. Participants

received a total of eight binary scores (1 = *yes* or 0 = *no*) at each survey wave: victimization of sexual violence, bullying, harassment, and any victimization; perpetration of sexual violence, bullying, harassment, and any perpetration.

**Sexual violence.** Items were combined to measure experiences of sexual and dating violence. Four items assessing sexual assault (e.g., "You had sexual activities with someone because she or he was drunk or on drugs?") were drawn from Cook-Craig et al. (2014) measure. One item from the Youth Risk Behavior Surveillance Survey (YRBS) were used to assess dating violence (e.g., "You physically hurt someone you were dating or going out with on purpose [count such things as hitting, slamming into something, or injuring them with an object or weapon]?").

Three items assessing sexual assault were drawn from Cook-Craig et al. (2014) measure that assessed for sexual coercion (e.g., "You had sexual activities with someone because you either threatened to end your friendship or romantic relationship if they didn't or because you pressured the other person by arguing or begging?"), physically-forced sex (e.g., "You had sexual activities with someone by threatening to use or using physical force [twisting their arm, holding them down, etc.]?"), and incapacitated sex (e.g., "You had sexual activities with someone because she or he was drunk or on drugs?"). Three items from the YRBS were used to assess physically forced sexual contact (e.g., "You forced someone to do sexual things that she or he did not want to do [count such things as kissing, touching, or physically forcing someone to have sexual intercourse]?"), sexual dating violence (e.g., "You forced someone you were dating or going out with to do sexual things that they did not want to do [count such things as kissing, touching, or physically forcing someone to have sexual intercourse]?"), and physical dating violence (e.g., "You physically hurt someone you were dating or going out with on purpose [count such things as hitting, slamming into something, or injuring them with an object or weapon]?").

**Bullying.** Two items from the YRBS were used to assess bullying on school property (e.g., "You bullied another person on school property?"), and electronic bullying (i.e., "You bullied another person electronically [count bullying through texting, Instagram, Facebook, or other social media]?") (Centers for Disease Control and Prevention, 2014).

**Sexual harassment.** We used three items from the American Association of University Women to assess for sexual harassment (e.g., "You made sexual comments, jokes, gestures, or looks about/to a person?") and homophobic bullying (e.g., "You said a person was gay or a lesbian, as an insult?"). Regarding scoring, if the student reported yes to any one of these, they were coded "1" and zero otherwise. Additionally, we aggregated across all three behaviors to create a summary

dichotomous indicator if the respondent reported any of the three behaviors.

## Network measures

Out degree is a count of the number of friends each student named, and in degree is a count of the number times each student was named by others. Baseline and follow-up exposure were computed extracting the corresponding victimization and perpetration scores of the friends' named and calculating their average.

## Data analysis plan

For each participant, network exposure terms were calculated such that the average friends' scores on the four victimization and four perpetration measures were

computed (Valente, 2010). For example, a person with two out of four friends who report perpetrating sexual violence would have an exposure of 0.50% or 50%. Cross-sectional (baseline only) and lagged logistic regression were estimated for perpetration and victimization at follow-up as a function of perpetration and victimization at baseline as well as sex, age, sexual minority status, ethnicity/race, out degree, in degree, and friends' average of perpetration and victimization. Out degree and in degree were included to control for being in the network so that positive network exposure results are not a function of being in the network.

We do not apply stochastic actor-oriented models (SAOM) to these longitudinal data for several reasons (Snijders et al., 2010): (1) SAOM application under conditions of missing data are not well developed, (2) Ragan et al. (2022) have shown that estimating peer influences through regression-type models does not provide biased estimates, and (3) SAOM are useful for

**TABLE 2** Individual and friends' average victimization and perpetration scores ( $N = 1303$ ).

	Individual (%)	Average friends	Odds ratio	95% CI	
				Lower limit	Upper limit
<b>Victimization</b>					
W1 sexual violence	7.40 (0.26)	7.30 (0.16)	16.12**	6.28	41.40
W2 sexual violence	7.20 (0.26)	6.50 (0.15)	4.23**	1.46	12.32
W1 bullying	34.30 (0.47)	33.50 (0.30)	1.97*	1.34	2.91
W2 bullying	30.10 (0.47)	31.60 (0.30)	2.65**	1.78	3.93
W1 sexual harassment	32.40 (0.46)	31.00 (0.29)	2.61**	1.74	3.89
W2 sexual harassment	34.50 (0.47)	37.50 (0.31)	3.00**	2.07	4.36
W1 any violence	52.20 (0.50)	46.20 (0.32)	2.22**	1.56	3.15
W2 any violence	54.10 (0.50)	47.70 (0.32)	2.72**	1.91	3.87
<b>Perpetration</b>					
W1 sexual violence	3.20 (0.18)	3.10 (0.10)	0.39	0.01	16.74
W2 sexual violence	3.10 (0.17)	3.80 (0.11)	0.49	0.02	12.81
W1 bullying	10.20 (0.30)	9.70 (0.19)	5.46**	2.62	11.39
W2 bullying	9.80 (0.30)	10.00 (0.20)	2.82*	1.26	6.30
W1 sexual harassment	19.90 (0.40)	21.00 (0.26)	4.42**	2.72	7.20
W2 sexual harassment	25.20 (0.43)	26.00 (0.28)	2.13**	1.36	3.32
W1 any violence	28.90 (0.45)	25.90 (0.28)	3.54**	2.35	5.36
W2 any violence	35.10 (0.47)	30.60 (0.29)	1.99**	1.34	2.96

Note: \* $p < .05$ ; \*\* $p < .01$ . W1 was taken at the beginning of the academic school year (Fall 2017) and W2 was taken at the end of the academic school year (Spring 2018). Any violence includes sexual violence, bullying, and sexual harassment.

Abbreviation: CI, confidence interval.

demonstrating structural tendencies such as reciprocity and transitivity but we are not interested in those aspects of these data, wishing to focus on whether victimization and perpetration behaviors cluster within friendships. We replicated analyses including school as clustering variable with no noticeable effect on the results and thus find within school clustering is not responsible for the associations reported here. We choose to report the nonclustering results to report beta coefficients which are intuitive measures of the magnitude of associations and can be compared within equations.

## RESULTS

Rates of interpersonal victimization and perpetration for the overall sample were similar to the average rates of victimization and perpetration of the participants' friends (Table 2). For example, at wave one, 7.4% (*SD* = 0.26) of respondents reported sexual violence victimization and the average among their friends was 7.3% (*SD* = 0.16) with an odds ratio association of 16.12 ( $p < .01$ ). Similarly, for bullying victimization at wave one, 34.3% (*SD* = 0.47) reported it whereas the average for their friends was 33.5% (*SD* = 0.30) with an odds ratio of 1.97

( $p < .01$ ). This pattern is similar for all eight outcomes at both waves. To calculate the odds ratios, logistic regression was used (i.e., regressing W1 individual sexual violence on average friends' W1 sexual violence).

A second observation from this table is that the bivariate association between individual behavior and friends' average is positive and statistically significant for all outcomes except sexual violence perpetration. Also, the *SDs* for individual rates are larger in all cases than the friends' averages in part because the individual rates are for the sample whereas the friends' averages are reports from one to five people. Additionally, the sample variance (individuals) is across a more heterogenous group whereas the friends' average is across a more homogenous group.

Table 3 reports the association between victimization and perpetration outcomes at wave one and demographic characteristics, out- and in-degree, and friends' averages. For every outcome other than sexual violence perpetration, friends' averages are strongly associated with individual reports controlling for covariates. For example, friends average sexual violence victimization and individual reporting of it had an adjusted odds ratio of 9.01 ( $p < .01$ ). This indicates that those with higher rates of exposure to sexual violence victimization (individuals with all of their friends reporting sexual violence victimization)

**TABLE 3** Associations as adjusted odds ratios between baseline sexual victimization and bullying and sociodemographic characteristics and exposure to peers' behaviors ( $N = 1303$ ).

	Victimization		Sexual harassment	
	Sexual violence	Bullying	Sexual harassment	Any victimization
Male	0.51** (0.31, 0.85)	0.66** (0.52, 0.85)	0.61** (0.47, 0.80)	0.84 (0.66, 1.06)
Age	1.38** (0.14, 1.69)	1.05 (0.94, 1.17)	1.34** (0.120, 1.50)	1.25** (1.12, 1.38)
Sexual minority	1.23* (1.04, 1.47)	1.39** (1.23, 1.57)	1.19** (1.05, 1.34)	1.45** (1.26, 1.66)
White	0.72 (0.44, 1.16)	0.98 (0.74, 1.31)	1.10 (0.81, 1.48)	0.75* (0.57, 0.99)
Out degree	1.05 (0.91, 1.22)	1.00 (0.93, 1.09)	0.99 (0.92, 1.08)	0.97 (0.90, 1.05)
In degree	1.01 (0.93, 1.11)	0.98 (0.94, 1.03)	1.02 (0.97, 1.07)	1.02 (0.97, 1.06)
Baseline exposure	9.01** (3.34, 24.36)	1.61* (1.08, 2.40)	2.02** (1.33, 3.08)	1.84** (1.28, 2.66)
	Perpetration		Sexual harassment	
	Sexual violence	Bullying	Sexual harassment	Any perpetration
Male	0.65 (0.34, 1.26)	1.16 (0.79, 1.69)	1.73** (1.29, 2.33)	1.60** (1.24, 2.07)
Age	1.07 (0.82, 1.41)	1.11 (0.94, 1.32)	1.49** (1.30, 1.70)	1.36** (1.21, 1.53)
Sexual minority	0.94 (0.68, 1.31)	1.10 (0.92, 1.32)	1.15 (0.99, 1.32)	1.06 (0.93, 1.21)
White	0.90 (0.44, 1.83)	0.77 (0.51, 1.17)	1.33 (0.93, 1.91)	0.91 (0.68, 1.22)
Out degree	1.13 (0.91, 1.41)	1.20** (1.05, 1.38)	1.10 (0.99, 1.21)	1.10* (1.01, 1.20)
In degree	0.91 (0.79, 1.04)	0.96 (0.89, 1.04)	1.03 (0.97, 1.09)	1.01 (0.96, 1.06)
Baseline exposure	0.45 (0.01, 19.60)	5.55** (2.54, 12.11)	3.19** (1.92, 5.32)	2.66** (1.73, 4.10)

Note: \* $p < .05$ ; \*\* $p < .01$ . Out degree and in degree are network measures of connection. Out degree is the number of friends named and in degree is the number of friendship nominations received. Any violence includes sexual violence, bullying, and sexual harassment (95% confidence intervals).



**TABLE 4** Associations as adjusted odds ratios between increased sexual victimization and bullying and sociodemographic characteristics and exposure to peers' behaviors ( $N = 1303$ ).

	Victimization				Perpetration			
	Sexual violence	Bullying	Sexual harassment	Any victimization	Sexual violence	Bullying	Sexual harassment	Any victimization
Baseline	10.45**	8.62**	7.48**	9.50**	5.07**	16.5**	11.3**	9.11**
Male	0.25**	0.78	0.94	1.04	0.55	1.14	1.62**	1.64**
Age	1.12	0.99	0.95	0.88*	1.10	0.85	0.98	0.99
Sexual minority	1.26*	1.01	1.16 <sup>†</sup>	1.24**	0.96	1.10	0.96	0.95
White	1.30*	1.05	1.28	1.15	1.03	0.79	1.01	0.89
Out degree	1.23*	1.07	1.03	1.05	0.97	1.00	1.06	1.05
In degree	0.92 <sup>†</sup>	0.99	1.06*	1.01	0.96	1.04	1.02	1.02
Baseline exposure	2.00	1.17	2.39**	2.02**	2.12	0.75	0.81	1.35
Follow-up exposure	1.29	1.81*	1.48 <sup>†</sup>	1.66*	0.6	2.26	1.75 <sup>†</sup>	1.45

Note: Out degree and in degree are network measures of connection. Out degree is the number of friends named and in degree is the number of friendship nominations received.

<sup>†</sup> $p < .10$ .

\* $p < .05$ ; \*\* $p < .01$ .

were nine times more likely (than an individual with no friends reporting sexual violence victimization) to report sexual violence victimization themselves.

Table 4 reports lagged models which control for baseline reporting as well demographic characteristics and in and out degree. Increased reporting (i.e., higher rates of reporting at W2 compared to rates of reporting at W1) of sexual violence victimization and perpetration were associated with increased friends' average reports for sexual victimization bullying and harassment, and marginally for sexual harassment perpetration. Increased reporting of any sexual violence victimization was associated with baseline friend rates as well increased friends' rates. Specifically increases in friends' sexual victimization bullying was associated with increased individual sexual victimization bullying with an adjusted odds ratio (AOR) of 1.81 ( $p < .05$ ). For victimization sexual harassment, friends' average report of victimization at both baseline (AOR = 2.39,  $p < .01$ ) and follow-up (AOR = 1.48,  $p < .10$ ) were associated with increased reporting of victimization. For any victimization, friends' average report of victimization at both baseline (AOR = 2.02,  $p < .01$ ) and follow-up (AOR = 1.66,  $p < .05$ ) were associated with increased reporting of any victimization. For perpetration, increased sexual violence perpetration was not associated with friends' behaviors other than a trend for friends' sexual harassment perpetration (AOR = 1.75,  $p < .10$ ).

## DISCUSSION

The purpose of the current study was to test the hypothesis that there would be similarity in the IV victimization and perpetration experiences in youths' social networks using a

longitudinal design. The utilization of SNA in this study allowed us to understand the interactions between youth and their peers and highlighted how those interactions influence behavior over time. We found that rates of interpersonal victimization and perpetration were similar between individuals and their friends. We also found that average rates of interpersonal victimization and perpetration were strongly associated with individual reports for every outcome besides sexual violence. Overall, our hypothesis was largely supported, except that friends' perpetration at W2 was not associated with individual perpetration when controlling for W1 perpetration. The longitudinal findings add to current literature by providing support for the importance of peer networks over time, specifically for victimization experiences.

These cross-sectional and longitudinal victimization findings are consistent with current literature which suggests that youth who affiliate with peers who perpetrate any form of IV are more likely to report personal experiences with IV (Deming et al., 2013; Kilmartin et al., 1999; Swartout, 2013). Further, consistent with homophily principles and stigma theory, our results indicate that increases in friends' victimization experiences were associated with an increase in participants' reports of victimization. Given their ability to shape IV victimization and perpetration behaviors (Deming et al., 2013; Kilmartin et al., 1999; Swartout, 2013), results of the current study may suggest the need for a social network approach to prevention. Violence prevention training within adolescent social networks could be used to address behaviors adolescents may learn from their peers and target at-risk groups that may form as a result of stigma related to victimization experiences. This, however, assumes that youth are

aware of their peers' perpetration and victimization experiences. An alternative explanation is that high risk behaviors, that are robust predictors of interpersonal victimization such as drinking clustering within peer networks (Burk et al., 2012). As such, it is likely that youth and their friends who are engaging in high-risk behaviors (e.g., binge drinking) are both more likely to experience victimization and/or perpetration, thus explaining why IV clusters within networks. Results of the current study highlight the need for future research to further explore the nuances of these relationships and show that SNA may be a valuable tool for this work.

Future research is needed to replicate and better understand the finding that W2 perpetration was not predicted by W1 perpetration. It is possible that this finding is due to the low base rates of perpetration in general. However, further exploration may be especially important for sexual harassment perpetration as a trending relationship between increased reports of sexual harassment perpetration among friends and participants was found in the current study.

Another explanation could be due to instability in peer group structures such that youth who are perpetrating IV may be less likely to have stable friendships. Other possibilities include adolescents realizing that perpetration is inappropriate and, therefore, report it less reliably; or that students redefine for themselves what it means to be a perpetrator. It is also likely that there are many situational factors that influence perpetration among adolescents and that contribute to instability across short time increments.

While this study did not aim to explore differences in the associations between violence victimization and perpetration experiences and demographics (sex assigned at birth, age, sexual orientation, and race/ethnicity), some significant differences were found that are worth noting. Results indicated that male youths were more likely than female youths to report victimization (sexual violence, bullying, and sexual harassment) and perpetration (sexual harassment and any perpetration). Results from this study also indicated that older youth were more likely than younger youth to report victimization (sexual violence, sexual harassment, and any victimization) and perpetration (sexual harassment and any perpetration). Further, results also indicated that youths who identified as sexual minorities were more likely than nonsexual minority students to report victimization (Sexual violence, bully, sexual harassment, and any victimization), but there were no statistically significant differences in reported levels of perpetration. Finally, while White youth were more likely than their non-White peers to report victimization (any victimization), no statistically significant differences were found in reported levels of perpetration. Given the process of homophily found in adolescent social networks (McPherson et al., 2001; Wallace & Ménard, 2017), future research should explore differences that may exist

between perpetration and victimization experiences among male, sexual minority, and non-White youths and their peer networks.

Several limitations should be noted. First, we did not measure all forms of IV such as stalking and gang-related violence. We also did not disaggregate by type of violence given that some of the types of violence were too low-base rate to do so. Future research should include more comprehensive measures of IV victimization and perpetration and larger samples to be able to disaggregate forms of violence in analyses. Our ability to fully capture every adolescent's friend group was also limited since we were unable to examine social networks for those who did not consent to be in the study and we were not able to measure peer networks from outside of the school district. Also, the sample lacked racial and ethnic diversity, although our study included a notable number of Native American youth (the study site is close to two large, rural Indian reservations). While our study also did not capture nuances in gender identity, this would be important to consider in future studies. Overall, future research is needed to replicate these findings in samples of more diverse youth. Also, although these findings confirm the clustering of IV within networks, future research is needed to better understand the explanatory mechanisms underlying these findings. Future research may explore these mechanisms by examining how interventions aimed at reducing IV influences network-behavior dynamics (Steglich et al., 2012; Veenstra et al., 2013).

Despite the limitations of the current study, the findings have several important implications for practice. First, many youths reported victimization and/or perpetration experiences, which serves as a reminder that primary prevention must start earlier than middle and high school. Second, intervention developers should consider delivery of IV prevention within the context of peer groups, although some research suggests that this type of method can actually produce iatrogenic effects increasing the likelihood that youth engage in violence and other problem behaviors (e.g., alcohol use) (Dishion et al., 1999; Weiss et al., 2005). It is possible that group-based interventions for middle and high school youth involved in social networks characterized by IV may need more individualized interventions, such as motivational interviewing (Rothman & Wang, 2016). Once we have a better understanding for the reasons explaining variability in homophily of IV within peer networks, we can create more tailored prevention and response efforts accordingly. Researchers could consider monitoring the impact that prevention and intervention initiatives have on the structure of social networks via social network analysis, which could help to understand the extent to which program impact diffuses throughout social networks (Valente et al., 2015). Understanding the extent to which IV clusters within networks and explanatory mechanisms underlying this phenomenon as well as the impact of prevention intervention initiatives on

structures of social networks, we believe, will help advance the field of prevention science.

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## CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

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