

The Peer Context and the Development of the Perpetration of Adolescent Dating Violence

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Received: 3 December 2012 / Accepted: 19 January 2013 / Published online: 5 February 2013
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Abstract The peer context is a central focus in research on adolescent risk behaviors but few studies have investigated the role of the peer context in the perpetration of adolescent dating violence. This longitudinal study examined between-subjects and within-person contemporaneous and lagged effects of peer attributes, measured with social network analyses, on trajectories of dating violence perpetration and determined if effects varied by grade and/or sex of the adolescent. Data are from adolescents who participated in a five-wave panel study beginning when

they were in 7 through 9th grade and ending when they were in 10 through 12th grade ($n = 3,412$); half were male, 40.5 % were white, 49.9 % were black and 10.4 % were of another race/ethnicity. Significant between-subjects effects indicate that adolescents who typically have friends who use dating violence, and girls who are typically high in social status, are at increased risk for using dating violence throughout adolescence. Adolescents who typically have high quality friendships and girls who typically have friends with pro-social beliefs are at decreased risk for using dating violence throughout adolescence. Significant within-person contemporaneous effects indicate that both boys and girls reported lower levels of dating violence than usual at times when they had more friends with pro-social beliefs, and reported higher levels of dating violence than usual at times when they had higher social status. None of the lagged effects were significant and none of the effects varied across grade. These findings suggest that the peer context plays an important role in the development of the perpetration of adolescent dating violence.

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Keywords Adolescent dating violence · Dating abuse · Peer context · Social network analyses

Introduction

Adolescence in comparison to the childhood years is marked by increased participation in risky behaviors and increased social interactions with peers. These two developmental phenomena come together in that adolescent risk taking often occurs in the company of peers, making the peer context a central focus in research on adolescent risk taking (Steinberg 2008). In this article, we examine the peer context in relationship to adolescent dating violence, a

prevalent health risk behavior that results in negative developmental, emotional, and physical consequences (Foshee and Reyes 2011). We determine whether characteristics of the peer context are associated with trajectories of dating violence perpetration across grades 8–12. Because the prevalence of dating violence perpetration is consistently reported to be about the same for boys and girls (see Foshee and Reyes 2011 for a review), both boys and girls are included in analyses.

We examine three domains of peer attributes suggested by the developmental literature as critical aspects of the peer context (e.g., Crosnoe 2000; Giordano 2003; Hartup 1996; Savin-Williams and Berndt 1990) and identified by empirical studies as relevant to adolescent risk behaviors: friends' behaviors and beliefs; the quality of relationships with peers; and social status among peers. The first domain addresses the content of peer relationships whereas the second and third domains address the structure of peer relationships. The risk behavior literature, with dating violence being no exception, has tended to focus more on the first domain, and in particular, on the behaviors of friends. The developmental literature has tended to focus more on the other domains, and in particular, on the quality of friendships, because of the implications for the development of social competencies and emotional adjustment that, in turn, may be implicated in risk behaviors. The examination of all three domains of peer relationships is intended to provide a more complete assessment of how the peer context is associated with adolescent dating violence. As elaborated later, we examine the extent to which these peer attributes explain differences *between* adolescents on the perpetration of dating violence and explain differences *within* adolescents on when they are most likely to perpetrate dating violence, including an examination of *lagged* effects that determine whether peer attributes at one point in time predict dating violence at a later point in time. We also examine variations in these relationships by the grade level and sex of the adolescent.

First, however, we consider the evidence and rationale for examining each of the three domains of peer context attributes and our general expectations for how these attributes will be related to dating violence. From the domain of friends' behaviors and beliefs, we examine the dating violence behavior of friends and the pro-social beliefs of friends. Regarding the quality of peer relationships, we examine the extent to which adolescents have reciprocated friendships and have overlapping friendships in which their friends are friends with each other. Regarding social status, we examine adolescents' centrality within their peer network. All of these variables lend themselves to using a social network analysis approach to measurement, which we apply and describe below and in the methods.

Friend Behaviors and Beliefs

The limited number of studies examining associations between peer attributes and adolescent dating violence has focused almost exclusively on the behaviors of friends and not on other aspects of the peer context, and find that adolescents with friends who engage in dating violence are more likely to be involved in dating violence themselves. Most of these studies measured friends' dating violence based on adolescents' perceptions of their friend's behaviors and found that perceived friends' dating violence involvement (either as a victim or a perpetrator) predicted later perpetration of dating violence (Arriaga and Foshee 2004; Foshee et al. 2001). Further, in a sample of high risk boys, having deviant friends in the eighth grade predicted hostile talk about women with friends in the 12th grade, which predicted the use of violence against a dating partner at ages 19–24 (Capaldi et al. 2001). However, because of the false consensus effect that can occur when adolescent perceptions are used to measure friends' behaviors, the associations reported in the above studies may be inflated (Bauman and Ennett 1996). With a social network approach, as we use in the current study, friends' behavior is based on the friend's reports of their own behavior, eliminating the possibility for a false consensus effect.

Although the predominant focus in peer research is on the negative impact of peers on adolescents, peers also can impact adolescents in positive ways (Barry and Wentzel 2006). One way that peers can impact adolescent behaviors in a positive way is through the process of social control, which is the influence of others on individual behaviors in a way that promotes social order. Exposure to friends who hold pro-social beliefs such as believing in societal rules and laws that maintain social order, being committed to conventional activities and societal institutions that can promote one's future success and holding anti-deviance beliefs may have a constraining influence on adolescent behaviors. Adolescents exposed to such beliefs among friends may be less likely to participate in deviant behaviors because to do so may result in negative sanctioning by the friends. Friends' pro-social beliefs have been found to be associated negatively with adolescents' engagement in risk behaviors (Adamczyk 2009; Adamczyk and Felson 2006; Ennett et al. 2010; French et al. 2011; Spoth et al. 1996), including violence (Prinstein et al. 2001).

Quality of Peer Relationships

Social network analysis of friendship nominations is a useful approach to measuring the quality of adolescent peer relationships and integration into friendship groups. Two social network indicators of the quality of peer relationships are examined: *having reciprocated friendships* and

having a high proportion of transitive triads, which assesses the extent of overlapping friendships in which friends are friends with each other. Reciprocated friendships, where an adolescent nominates someone as a friend who also nominates the adolescent as a friend, are considered to involve greater emotional closeness and friendship quality than non-reciprocated friendships (Ennett et al. 2006; Faris and Ennett 2010; Newcomb and Bagwell 1995). Having reciprocated friendships has been found to be protective against a number of adolescent risk behaviors (Ennett et al. 2006), whereas having a high proportion of unreciprocated friendships has been associated with a number of health risk behaviors and attributes (Cauce 1986; Clark and Ayers 1988; Strauss and Pollack 2003).

A triad is a set of three peers linked through friendship nominations and can be transitive or intransitive. A transitive triad is when a friend's friend *is* a friend (Ennett et al. 2010). An intransitive triad is when a friend's friend *is not* a friend. Transitive triads capture the important dimension of belonging to groups where friends are connected with each other (Ennett et al. 2010), whereas intransitive triads reflect unbalanced and potentially discordant relationships (Bearman and Moody 2004). A high proportion of transitive triads has been found to be protective against adolescent problem behaviors (Ennett et al. 2006; Ennett et al. 2008a), whereas having a high proportion of intransitive triads has been found to be a risk factor for adolescent health risk behaviors.

Connolly and Goldberg (1999) explicate several ways in which friendships and friendship groups prepare adolescents for dating and that can explain why adolescents who are well-integrated into friendships may be at less risk for dating violence. They suggest that, through friendships, adolescents learn skills for developing intimacy, empathy, and perspective-taking; dealing with negative feelings like anger and jealousy; and resolving conflict in pro-social ways (Buhrmester 1990; Connolly and Goldberg 1999; Hartup 1996). Non-integrated adolescents, in contrast, may not have had the opportunity to learn and practice skills that will be important for maintaining healthy dating relationships, putting them at greater risk for using dating violence. Furthermore, according to Connolly and Goldberg, non-integrated adolescents may miss the opportunity to explore ideas about romantic relationships with friends and this missed opportunity leaves these adolescents prone to accept idealized notions of relationships that they pick up from other sources like various media. Once dating, discrepancies in an adolescent's ideal and real relationships could lead to relationship dissatisfaction and increase the likelihood of dating conflict that could lead to violence. These authors also note that adolescents who have not become connected with friendship groups typically begin

with dyadic dating as opposed to dating in groups, which they view as developmentally disadvantaged because romantic relationships then occur without supportive interactions with a close set of friends. Although no study has examined associations between friendship integration and adolescent dating violence, Casey and Beadnell (2010) found that social isolation during adolescence was associated with later perpetration of adult intimate partner violence.

Social Status

Within any social system, a hierarchy of social relationships invariably emerges with some individuals having more importance or prominence (i.e., social status) than others. One social network indicator of social status that assesses prominence and prestige in the network based on the pattern of friendship ties is *centrality* (Alexander et al. 2001; Ennett et al. 2006; 2008a; Espelage et al. 2007; Faris and Felmlee 2011). Although multiple measures of centrality are available, all measures share the commonality that central adolescents are those that are extensively or strategically connected with other adolescents in the network. The domains of quality of peer relationships and social status are different from each other in that the former captures friendship integration whereas the latter captures the adolescent's standing relative to the entire network of adolescents. The domains are logically distinct in that a maximally central adolescent links many otherwise disconnected peers and thus is not deeply integrated into a single friendship group.

Research assessing characteristics of high status adolescents, as defined by the social network attribute of centrality, suggests that social status could be a risk factor for dating violence. As a result of their pattern of connections to others, central adolescents have been viewed as having greater leverage and control over information and resources, having access to resources from many but not dependent on any one, and as being in a position to manipulate social situations and peers, each of which confers power (Burt 1982; Espelage et al. 2007; Faris and Felmlee 2011). Some research indicates that central adolescents, in addition to having an advantaged social position, also tend to have positive personal characteristics such as physical attractiveness, intelligence, wealth, and athletic ability that may be attractive to dating partners and central adolescents tend to have more cross-sex friendships, both of which may provide more potential for dating access (Faris and Felmlee 2011; Feiring 1999). The increased access to dating partners coupled with power conferred to central adolescents (both boys and girls) may lead to an increased likelihood of exerting control over dates, which may be obtained through the use of violence.

Developmental Considerations

Peer attributes may be more strongly associated with dating violence at certain developmental periods (grades) than others. Many studies report that susceptibility to peers is stronger in earlier than in later adolescence (Berndt 1979; Gardner and Steinberg 2005; Monahan et al. 2009; Steinberg and Monahan 2007; Steinberg and Silverberg 1986; Sumter et al. 2009; Wall et al. 1993). These findings have been attributed to both social and biological developmental processes of adolescents. Steinberg and Monahan (2007) argue that in striving to achieve emotional autonomy from parents, early adolescents become more oriented towards peers. Instead of achieving independence and autonomy, however, they become dependent on peers for warmth, intimacy and acceptance because they have not yet accomplished the task of identity formation that is needed for becoming truly autonomous. The development of identity needed to become autonomous and thus to resist peers occurs in later adolescence. Consistent with this explanation, Brown et al. (1986) found that older adolescents see peer groups as restricting their autonomy and they report not being as influenced by them. In addition, recent studies on the brain development of adolescents suggest that changes to the brain that occur during puberty and early adolescence may result in a heightened sense of self-awareness, potentially increasing the susceptibility of early adolescents to peer opinions and desires, whereas changes in brain structure in later adolescence may buffer that susceptibility (Blakemore and Choudhury 2006). Consistent with these expectations, Steinberg and Monahan (2007) found that susceptibility to peers remained constant and high for 10–14 years old, but that susceptibility to peers decreased from ages 14–18, the ages encompassed in the current study.

Sex Considerations

Evidence suggests that associations between peer attributes and adolescent health risk behaviors may vary by the sex of the adolescent. For example, some studies report that girls tend to have closer friendships than boys and report more intimacy with them (Berndt 1982; Urberg et al. 1995), suggesting that, as a result, problems with friends may affect girls more than boys. In fact, a number of studies have found that peer behaviors, beliefs, and problems have a greater influence on girls' than boys' sexual behaviors (Upadhyay and Hindin 2006), relational aggression (Werner and Crick 2004), violent offending (Zimmerman and Messner 2010), alcohol consumption (Anderson et al. 2011; Dick et al. 2007; Epstein et al. 1999; Simons-Morton et al. 2001; Yeh et al. 2006), cigarette smoking (Piko 2006; Wang et al. 1995), and suicidal thoughts (Bearman and Moody 2004). Others, however, have found that girls as compared to boys report having greater autonomy from peers (Berndt

1979; Steinberg and Silverberg 1986; Sumter et al. 2009) and that the deviant behavior of friends is associated more strongly with male than female deviant behaviors (Storvold and Wichstrom 2002; Wall et al. 1993). The two studies that examined sex differences in the influence of friend dating violence on adolescent dating violence report conflicting results, with one reporting no sex differences in associations (Arriaga and Foshee 2004) and one finding that associations were stronger for girls than for boys (Foshee et al. 2001).

Hypotheses

In the current study, we examine *between-subject effects* and *within-person contemporaneous* and *lagged effects* of the peer attributes on the perpetration of dating violence and determine if associations vary over time (by grade) and the sex of the adolescent. We examine all three types of effects because they each provide unique information about relationships between the peer context and dating violence. *Between-subject effects* are examined to determine whether characteristics of an adolescent's peer context averaged across the developmental period (8–12th grade) can explain individual variability (between subjects) in trajectories of dating violence across the same period. When examining between-subject effects, peer characteristics are treated as time-stable and can be conceptualized as an adolescent's "typical" peer context. Conceptually, an examination of these effects determines whether, for example, adolescents who have a riskier peer environment across their middle and high school years use more dating violence during that same developmental period than those who have a less risky peer environment across those years, and thus inform *who* is at risk (Hussong et al. 2010). Based on the above literature, our hypotheses related to examining *between-subject effects* are that adolescents who have friends who perpetrate dating violence and/or are higher in centrality during grades 8–12 will report higher levels of dating violence perpetration during this same developmental period than those who do not have friends who perpetrate dating violence and are lower in centrality and that adolescents who have friends with pro-social beliefs and/or who have higher quality friendships during grades 8–12 will report lower levels of dating violence perpetration during this same developmental period than adolescents who do not have friends with pro-social beliefs and who have lower quality friendships.

Within-person effects focus on the timing of effects and thus inform *when* adolescents are at risk (Hussong et al. 2010). In the current study, when examining within-person effects, peer characteristics are treated as time-varying and two types of within-person effects were examined: *contemporaneous* and *lagged effects*. *Within-person contemporaneous effects* are examined to determine whether

adolescents report increased (or decreased) use of violence against dates, over their typical amount, at time points when the peer context is riskier (or less risky) than typical. Our hypotheses related to examining *within-person contemporaneous effects* are that at those times when an adolescent's peer attributes are riskier than they are typically (i.e., they have more friends who use dating violence, fewer friends with prosocial beliefs, fewer quality friendships, or higher social status), the adolescent's use of dating violence will be higher than it is typically and at those times when an adolescent's peer attributes are less risky than they are typically (i.e., they have fewer friends who use dating violence, more friends with prosocial beliefs, more quality friendships, or lower social status) the adolescent's use of dating violence will be lower than it is typically.

Within-person lagged effects are examined to assess the temporality of relationships and thus to determine whether characteristics of the peer context at one point in time (for example in the fall of 8th grade) predict dating violence at a later point in time (for example spring of 8th grade). Our hypothesis related to *lagged effects* are that the amount of exposure to friends' dating violence, amount of exposure to friends with pro-social beliefs, degree of friendship quality, and level of centrality at one point in time will influence the amount of dating violence used by an adolescent at a later point in time.

As noted above, when examining both types of *within-person effects*, peer characteristics are treated as time-varying. Based on the developmental considerations described above, we hypothesize that the *within-person contemporaneous* and *lagged* effects of the peer attributes on dating violence will be stronger in earlier, as compared to later, adolescence.

We examine sex as a moderator of the associations between the peer attributes and the perpetration of dating violence. However, based on the inconsistent findings noted above on sex differences in associations between peer attributes and adolescent health risk behaviors, we do not state the expected direction of the moderation.

Methods

Study Overview

Data are from a seven-wave longitudinal study of adolescent health risk behaviors (Ennett et al. 2008b; Foshee et al. 2011). The current study uses the last five waves of data collected over a period of two and a half years starting when participants were in the spring of 7, 8 and 9th grades (referred to here as wave one) and ending when participants were in the fall semester of the 10, 11, and 12th grades (referred to here as wave five). Six-month time intervals separated the first four waves of data collection and a 1 year interval

separated waves four and five. Participants were enrolled in two public school systems located in two predominantly rural US counties. Within these two school systems there were nine middle schools, one grade 8–12 school, two K–8 schools, two alternative schools, and five high schools.

At each wave, all enrolled students in the targeted grades who were able to complete the survey in English and who were not in special education programs or out of school due to long-term suspension were eligible for the study. Parents had the opportunity to refuse consent for their child's participation by returning a written form or by calling a toll-free telephone number. Assent was obtained immediately prior to the survey administration from adolescents whose parents had consented. Trained data collectors administered the questionnaires in student classrooms. To maintain confidentiality, teachers remained at their desks while students completed questionnaires and the students placed questionnaires in envelopes before returning them to the data collectors. The Institutional Review Board for the University of North Carolina at Chapel Hill approved the data collection protocols.

Response rates for each wave ranged between 73 and 80 %. Averaging across waves, 7 % of parents refused consent, 8 % of adolescents declined to participate, and 4 % of students were absent on the days when data were collected. The analysis sample was limited to those who completed any of the wave two through wave five surveys because the dating violence trajectory outcomes were based on data from those four waves ($n = 3,412$). The wave one data were included so that a lagged effect of the peer characteristic variables would be available for the time point prior to the start of the trajectory. Most (83 %) students in the study participated in at least two waves of data collection ($n = 2,828$), with 60 % participating in three or more waves ($n = 2,050$).

About half of the sample is male. Approximately 40.5 % are white, 49.9 % are black and the remaining 10.4 % are of other race/ethnicities including Latino, Asian, American Indian, or mixed race. The average age at wave one is 14.2 years. At wave one, approximately 40 % of participants reported that the highest education obtained by either parent was high school or less and 46 % reported living with two biological parents. At wave two (the beginning of the dating violence trajectory), 73.9 % reported having ever been on a date and the prevalence of any physical dating violence perpetration in the past 3 months was 14.3 %.

Social Network Analysis

Social network analysis was conducted on friendships reported by adolescents at each wave of data collection (Ennett et al. 2006). Data collectors provided each student a student directory that alphabetically listed all enrolled

students along with a unique four-digit peer identification number for each student. Adolescents identified up to their five closest friends, starting with their best friend. Friends not in the directory were identified by “0000.” Because most adolescent friendships in middle school are with adolescents in the same school and grade, social networks at middle school assessments were bounded by school and grade. In high schools and alternative schools, networks were bounded by school because classes and activities were not grade segregated and therefore cross-grade friendships were likely. In the two K-8 schools, networks also were bounded by school because of their small enrollments.

Measures

Physical Dating Violence Perpetration

A short version of the Safe Dates Physical Dating Abuse Perpetration Scale (Foshee 1996) was used at waves two through five. Adolescents were asked if they had ever been on a date, defined as “including informal activities like meeting someone at the mall, park, or at a basketball game as well as more formal activities like going out to eat or to a movie together.” Adolescents who answered with “yes” were then asked, “During the past 3 months, how many times did you do each of the following things to someone you were dating or on a date with? Don’t count it if you did it in self-defense or play.” Six behavioral items were listed: “pushed, grabbed, shoved, or kicked”, “slapped or scratched”, “physically twisted their arm”, “hit them with a fist or something else hard”, “beat them up”, and “assaulted them with a knife or gun.” Response categories ranged from zero (0) to ten times or more (5) in the past 3 months. Adolescents who reported not dating were assigned a value of “0.” Scores were summed to create a physical dating violence perpetration measure at each wave (Cronbach’s α ranged from .90 to .96 across waves). In analyses, we adjusted for non-normality in the distribution of the outcome by taking the log of one plus the dating violence score.

Peer Context Characteristics

Table 1 presents descriptive statistics for each of the peer variables assessing the domains of friends’ behaviors and beliefs, quality of peer relationships, and social status. The peer attributes assessing friends’ behaviors and beliefs include *friends’ perpetration of dating violence* and *friends’ pro-social beliefs*, characteristics assessing the quality of peer relationships domain include *having reciprocated friendships* and *proportion of transitive triads* and the characteristic assessing the social status domain is *betweenness centrality*. Each construct was measured at each wave and was modeled as both time-stable (for examining *between-subject* effects) and time-varying (for examining *within-person contemporaneous* and *lagged effects*). All peer network variables except for the proportion of transitive triads, were created using SAS interactive matrix programming (IML) modules developed by James Moody (2012); Proportion of transitive triads was created using methods described in Moody (1998).

Friends’ Perpetration of Dating Violence

The creation of the *friends’ perpetration of dating violence* measure involved several steps. At all waves, adolescents were asked “During the past 3 months how many times have you hit someone you were dating” with response options ranging from 0 for none to 4 for 10 or more times. A binary variable was created for each nominated friend (at each wave) indicating whether the friend had or had not hit a dating partner in the previous 3 months. The number of nominated friends who had hit a dating partner was then summed and the *friends’ perpetration of dating violence* measure was coded such that 1 = having *more than one* friend who had hit a date and 0 = having one or no friends who had hit a date in the previous 3 months. The binary cut off was set to *more than one* friend who had hit a partner because the nomination procedures did not preclude adolescents from nominating a girl/boyfriend as a friend and

Table 1 Descriptive statistics on raw peer measures (before centering) by wave

	Wave 1			Wave 2			Wave 3			Wave 4			Wave 5		
	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>
Friends’ dating violence	0–1	0.07	0.26	0–1	0.05	0.22	0–1	0.05	0.22	0–1	0.03	0.16	0–1	0.04	0.19
Friends’ pro-social beliefs	0–5	2.09	1.28	0–5	1.89	1.24	0–5	1.74	1.20	0–5	1.72	1.20	0–5	1.63	1.20
Number of reciprocated friendships	0–1	0.37	0.48	0–1	0.40	0.49	0–1	0.37	0.48	0–1	0.36	0.48	0–1	0.31	0.46
Proportion of transitive triads	0–1	0.82	0.15	0–1	0.81	0.17	0–1	0.79	0.19	0–1	0.77	0.21	0–1	0.76	0.21
Centrality	0–13.34	1.07	1.54	0–9.82	0.69	1.09	0–15.91	0.67	1.22	0–5.61	0.29	0.54	0–4.99	0.33	0.63

any report of violence perpetrated by that person could represent dyadic violence between the couple rather than exposure to friends using dating violence.

Friends' Pro-social Beliefs

A pro-social beliefs score was created for all study adolescents from questions assessing how strongly they agreed or disagreed with the statements “It is good to be honest,” “People should not cheat on tests,” and “In general, police deserve respect;” how important or unimportant they thought it was for them to “finish high school,” “go to college,” and “have a happy family life;” and whether they thought only good things (value of 0) to only bad things (value of 6) would come from smoking cigarettes, drinking alcohol, and smoking marijuana (assessed separately). A composite variable was created from these items by averaging the items (alphas range from .78 to .82 across the waves). The friends' pro-social beliefs measure was the number of nominated friends who had a score of the mean or above on the pro-social beliefs scale. Because the adolescent could nominate up to five friends, this variable could range from 0 to 5 friends with pro-social beliefs.

Having Reciprocated Friendships

A count was calculated of the number of peers that the adolescent nominated as a friend who also nominated the adolescent as a friend, with a range of 0–5 reciprocated friends.

Proportion of Transitive Triads

The first step in calculating the proportion of transitive triads was to determine all possible triads of adolescents in the network. Then the proportion of all possible triads that involved the adolescent that were transitive (i.e. meaning each friend in the triad was friends with the other members of the triad) was calculated. Thus, this measure assesses the extent to which a friend's friend *is* also a friend of the adolescent (Ennett et al. 2010).

Betweenness Centrality

Betweenness centrality measures the extent to which an adolescent indirectly links pairs of adolescents who are not directly linked as friends. It is measured by first determining the shortest paths, or geodesics, between all pairs of actors and then calculating the percentage of all these geodesics that include the focal actor. Paths are determined by friendship nominations that link adolescents together directly and indirectly. This variable is coded such that higher values reflect greater centrality, or social status.

Control Variables

All analyses control for *race/ethnicity*, *failed school year*, *parent education*, *family structure*, *number of friends outside the network*, and *dating status* to decrease the likelihood of potential spurious relationships between peer attributes and dating violence. *Race/ethnicity* and *failed school year* were determined based on available data across all waves of the survey and were modeled as time-stable. *Race/ethnicity* was measured by two indicator variables, one indicating black race and one indicating a race/ethnicity other than white or black and white was the reference. *Failed school year* was coded such that 0 = no failed school years over the assessment period and 1 = at least one failed school year. *Parent education*, *family structure*, *number of friends outside the network*, and *dating status* were time-varying. *Parent education*, an indicator of family socioeconomic status (Goodman 1999) ranged from less than high school (0) to graduate school or more (5), and was measured as the highest level of education attained by either parent at each wave. *Family structure* was coded to indicate the number of biological parents (0, 1 or 2) the adolescent lived with at each wave. *Number of friends outside the school network* ranged from 0 to 5, as indicated by the number of “0000” friendship nominations. The average number of friends outside the school network was less than 1 at each wave. *Dating status* was measured at each assessment such that 0 = never dated and a 1 = had dated. *Sex* was conceptualized as a moderator variable and was coded such that 0 = female and 1 = male.

Analytic Strategy

Data analysis occurred in several phases involving the reorganization of data based on grade rather than wave, imputation of missing data, estimation of unconditional dating violence trajectories, centering of predictor variables, and hypothesis testing.

To take advantage of the cohort sequential design of this study, data were reorganized such that the grade-level of the adolescent was used as the primary metric of time rather than wave of assessment. This allowed for trajectories of dating violence to be continuously modeled across grades eight through twelve. After combining across cohorts and reorganizing the data by grade, information from 8,263 data points was available across eight discrete data points: grade 8 fall (n = 783), grade 8 spring (n = 713), grade 9 fall (n = 1,487), grade 9 spring (n = 741), grade 10 fall (n = 2,056), grade 10 spring (n = 662), grade 11 fall (n = 1,299) and grade 12 fall (n = 522). In preliminary analyses using this sample we found no evidence of cohort differences in dating violence growth trajectories, suggesting that data from each of the cohorts could be combined to

estimate a single developmental curve across grades 8 through 12.

We addressed the issue of missing data in our covariates through multiple imputation (Rubin 1987) using SAS PROC MI (SAS Institute Inc. 2008). Following standard recommendations, the imputation equation included all of the independent covariates and the dependent variable at all waves (Allison 2001) but imputed values of the dependent variable were not used in analyses, thus following a multiple imputation then deletion strategy (von Hippel 2007). Ten sets of missing values were imputed using Markov Chain Monte Carlo methods. Models were fit to each of the ten imputed datasets and parameter estimates and standard errors were combined using SAS PROC MIANALYZE (SAS Institute Inc. 2008).

Random coefficients growth curves were used to model trajectories of dating violence across grades 8 through 12 and to test study hypotheses. Models were fit using PROC MIXED in SAS Version 9.2. To determine the optimal unconditional model, we examined and compared several different models that differed in functional form (flat, linear, quadratic) and specification of the random effects structure. The best-fitting unconditional model was a quadratic random-intercept model with the autoregressive error structure. The quadratic and linear effects indicate that dating violence increases from fall of 8th grade to spring of 10th grade when it then begins to decline. This trajectory pattern is consistent with other studies that have examined trajectories of dating violence perpetration across adolescence (Foshee et al. 2009). Dependence induced by nesting of students within schools and neighborhoods was found to be negligible (intraclass correlations were $<.001$). As such, models do not account for nesting of dating violence within schools and neighborhoods, but are likely not biased by this omission.

Peer variables were centered appropriately to disaggregate between-subjects and within-person effects (Hussong et al. 2008). Time-averaged measures were used to assess between-subjects effects and were created by averaging each individual's scores on each peer variable across all waves they participated in and then grand-mean centering each measure (i.e. subtracting the mean for the sample from each individual's score). As recommended by Raudenbush and Bryk (2002), contemporaneous and lagged within-person effects were assessed using time-varying peer measures that were person-mean centered by subtracting the mean for the individual from their score at each wave. Lagged effects were assessed with the within-person peer variables at the previous time point.

To test the study hypotheses, we estimated a series of conditional mixed-level models to arrive at a final model. The first model (Model 1) included only the control variables. The next model (Model 2) added to that model the between-subjects peer variables and the set of interactions

between the between-subjects peer variables and sex. A multivariate Wald test was used to determine if the set of interactions significantly contributed to the model; significant individual interactions were retained if the Wald test was significant. In the next model (Model 3), the contemporaneous within-person peer variables were added and two sets of interactions were tested using the multivariate Wald test; those between the contemporaneous within-person peer variables and grade and those between the contemporaneous within-person peer variables and sex. Again, individual significant interactions were retained if the Wald test for a set of interactions was significant. In the final model (Model 4), the lagged within-person peer variables were added to the Model 3 and two sets of interactions were tested using the multivariate Wald test; those between the lagged peer variables and grade, and those between the lagged peer variables and sex. Again, individual significant interactions were retained if the Wald test for a set of interactions was significant.

Results

The results from the final model (Model 4) are in Table 2 and represent each type of effect (between-subjects and within-person contemporaneous and lagged) over and above the other types of effects (Curran and Bauer 2011).

Between-Subjects Effects

The multivariate Wald statistic for testing the set of interactions between the between-subjects variables and sex was statistically significant ($F = 3.76$; numerator $df = 5$; p value = .0021); two individual significant interactions from that set of interactions were retained in the final model, those between *friends' pro-social beliefs* and *sex* and between *centrality* and *sex*. Girls who had a greater number of pro-social friends across grades 8 through 12 reported lower levels of dating violence perpetration across that period ($b = -.07$; $p < .0001$), but the number of friends with pro-social beliefs was not associated with dating violence by boys ($b = -.01$; $p = .49$). Girls who were higher as compared to lower in centrality during grades 8 through 12 reported higher levels of dating violence perpetration across that period ($b = .026$, $p = .01$), but centrality was not associated with dating violence perpetration by boys ($b = -.01$ $p = .11$). Additionally, there were significant main effects of friend dating violence and both indicators of quality peer relationships. Adolescents who had a greater number of friends involved in dating violence across grades 8 through 12 reported higher levels of dating violence across that period; adolescents with a higher as compared to a lower number of

Table 2 Parameter estimates from the final mixed-level model

Variable	Estimate	95 % Confidence interval	p value	Standardized regression coefficient
Intercept	.0289	[−.0199, .0777]	.2460	n/a
Grade	.0294	[−.0049, .0636]	.0929	.0570
Grade squared	−.0094	[−.0175, −.0012]	.0248	−.0733
<i>Between-subject effects</i>				
Friend behaviors and beliefs				
Friends' dating violence	.0313	[.0165, .0460]	<.0001	.0550
Friends' pro-social beliefs	−.0739	[−.0982, −.0496]	<.0001	−.1302
Quality of peer relationships				
Number of reciprocated friendships	−.0208	[−.0400, −.0016]	.0341	−.0366
Proportion of transitive triads	−.0221	[−.0435, −.0007]	.0433	−.0389
Social status				
Betweenness centrality	.0258	[.0054, .0461]	.0130	.0454
Friends' pro-social beliefs by sex	.0637	[.0305, .0969]	.0002	.0718
Centrality by sex	−.0438	[−.0733, −.0143]	.0036	−.0525
<i>Within-person contemporaneous effects</i>				
Friend behaviors and beliefs				
Friends' dating violence	.0282	[−.0271, .0835]	.3175	.0080
Friends' pro-social beliefs	−.0142	[−.0279, −.0005]	.0416	−.0207
Quality of peer relationships				
Number of reciprocated friendships	.0022	[−.0057, .0100]	.5858	.0057
Proportion of transitive triads	.0107	[−.0856, .1069]	.8278	.0029
Social Status				
Betweenness centrality	.0158	[.0032, .0284]	.0143	.0209
<i>Within-person lagged effects</i>				
Friend Behaviors and Beliefs				
Friends' dating violence	−.0214	[−.0728, .0299]	.4130	−.0072
Friends' pro-social beliefs	−.0050	[−.0181, .0081]	.4520	−.0083
Quality of peer relationships				
Number of reciprocated friendships	.0040	[−.0036, .0115]	.3026	.0107
Proportion of transitive triads	−.0352	[−.1225, .0522]	.4289	−.0097
Social status				
Betweenness centrality	.0006	[−.0098, .0109]	.9139	.0010

Models control for sex, race/ethnicity, failed school year, parent education, family structure, number of friends outside the network, and dating status. Standardized regression coefficients were calculated by multiplying the estimate by the ratio of the standard deviations of the independent and dependent variables

reciprocated friendships during grades 8 through 12 reported decreased levels of dating violence across that period; and adolescents with a higher as compared to a lower proportion of transitive triads during grades 8 through 12 reported decreased levels of dating violence across that period. All significant between-subjects associations are in the hypothesized direction.

Within-Person Contemporaneous Effects

The multivariate Wald tests for the set of interactions between the within-person contemporaneous peer variables

and grade ($F = 1.92$ numerator $df = 5$; p value = .087) and between the within-person contemporaneous peer variables and sex ($F = 1.91$; numerator $df = 5$; p value = .089) were not statistically significant, and thus both sets of interactions were dropped from analyses. Thus, none of the within-person contemporaneous effects varied across grade or by sex of the adolescent. Two within-person contemporaneous main effects were statistically significant, both in the hypothesized direction. First, adolescents reported lower levels of dating violence than usual at time-points when they had more friends with pro-social beliefs. Second, adolescents reported higher levels of dating violence than usual at those times

when they were higher in centrality. In contrast to the between-subjects *friends' pro-social beliefs* and *centrality* effects, the within-person contemporaneous effects of these two variables were significant for both boys and girls. None of the other within-person contemporaneous effects were statistically significant, even when lagged effects were not included in the model.

Within-Person Lagged Effects

The multivariate Wald tests for the set of interactions between the lagged peer variables and grade ($F = 1.49$; numerator $df = 5$; p value = .189) and between the lagged peer variables and sex ($F = 1.28$; numerator $df = 5$; p value = .269) were not statistically significant, and thus both sets of interactions were dropped from analyses. Further, none of the lagged effects was statistically significant.

Control Variable Effects

In the final model, *sex*, *race/ethnicity*, and *dating status* were related to trajectories of dating violence perpetration. Females were significantly more likely than males to use dating violence at each grade ($b = -.16$, $p < .0001$). Black as compared to white adolescents ($b = .11$, $p < .0001$) and adolescents of other race/ethnicity as compared to white adolescents ($b = .07$, $p = .0092$) were significantly more likely to use dating violence at each grade. As expected, adolescents who had dated compared to those who had not were significantly more likely to have used dating violence at each grade ($b = .31$, $p < .0001$). Having failed a school year ($b = -.008$, $p = .73$), the number of friends the adolescent nominated outside of the network ($b = .004$, $p = .516$), parent education ($b = -.004$, $p = .605$), and family structure ($b = -.016$, $p = .057$) were not associated with dating violence. Overall, these findings concur with those of other adolescent dating violence perpetration studies (Foshee and Reyes 2011).

Discussion

Although the role of peers in the development of many adolescent health risk behaviors has been studied extensively, little attention has been given to the role of peers in the development of adolescent dating violence perpetration. This is a significant gap in the literature given that there is substantial evidence that peers play a role in the development of other forms of aggression and violence (Espelage et al. 2007; Faris and Ennett 2010; Sijtsema et al. 2009; Werner and Crick 2004) and that the peer context is central in the dating lives of adolescents (Brown 1999;

Connolly and Goldberg 1999). To our knowledge, this is the first study to examine associations between multiple domains of the peer context, defined through social network analyses, on trajectories of dating violence perpetration across adolescence. We examined between-subjects effects and within-person contemporaneous and lagged effects of indicators of the three domains of friends' behaviors and beliefs, quality of peer relationships, and social status—and determined if these effects varied by the grade and sex of the adolescent. Social network analyses enabled a broad examination of the peer context because it is used to assess the behaviors and beliefs of friends, as reported by the friends themselves, as well as network relational properties, through the identification of patterns of relationships based on the friends that adolescents nominate. Consistent with expectations from the developmental literature, our findings suggest that consideration of an inclusive set of peer attributes is warranted. All three domains of peer attributes were important in the development of dating violence, but associations varied depending on the type of effect examined and the sex of the adolescent.

We found strong between-subjects effects of all peer attributes examined in directions hypothesized indicating that an adolescent's typical peer context across middle and high school distinguishes those who do and do not use dating violence throughout those years. Specifically, adolescents who typically have friends who use dating violence, and girls (but not boys) who are typically high in social status are at *increased* risk for using dating violence throughout adolescence and adolescents who typically have high quality friendships and girls (but not boys) who typically have friends with pro-social beliefs are at *decreased* risk for using dating violence throughout adolescence.

In addition to these between-subjects effects, two within-person contemporaneous effects were significant, both in the hypothesized direction. Both boys and girls reported *lower* levels of dating violence than usual at time-points when they had more friends than usual with pro-social beliefs and reported *higher* levels of dating violence than usual at those times when they were higher in social status than usual. These within-person effects indicate that adolescents are not immune to fluctuations in their peer environment over and above the effects of their typical peer environment.

None of the lagged effects were significant. In addition, and counter to expectations, there was no evidence that the effects of peer attributes on dating violence were stronger in earlier, as compared to later, adolescence. Overall, the findings suggest that attributes of the peer context are linked to dating violence, that peers play a role in adolescent dating violence in a variety of different ways, and that

the peer context may influence dating violence perpetration differently for boys and girls.

Counter to conclusions often reached in studies with a narrow focus on peer behavior—some aspects of the peer context, specifically, having friends with pro-social beliefs and having high quality friendships, were shown to constrain involvement in dating violence. In the only other study that assessed the association between friends' pro-social beliefs and the perpetration of dating violence, Foshee and Reyes (2011) found that perceived friends' beliefs about the unacceptability of tobacco, alcohol and drug use was protective against dating violence. Using a more comprehensive measure of friends' pro-social beliefs and based on the peer's reports of their own beliefs, we also found that friends' pro-social beliefs were protective against the use of dating violence, especially for girls. Empirical research generally supports the notion that having quality friendships is adaptive for children and adolescents, while peer rejection and social isolation are maladaptive (Dishion et al. 1995; Ennett and Bauman 1993; Kupersmidt and Coie 1990; Parker and Asher 1987). Our study, which is the first to examine the association between friendship quality and the perpetration of dating violence, supports these general notions in that having high quality friendships protected boys and girls from using violence against dates. It is possible, however, that having reciprocated friendships and being a member of transitive triads with peers who adhere to unhealthy dating violence norms and gender roles could put adolescents at risk for rather than protect them from dating violence and therefore future studies should examine this possibility. However, it is important to note that in our study the associations between reciprocated friendships and the perpetration of dating violence and between proportion of transitive triads and the perpetration of dating violence were statistically significant even when including the friend dating violence variable. Thus, the protective effect of having quality friendships is over and above any risk from having friends who use dating violence.

In contrast to the protective effects of some peer attributes, our findings suggest that having friends who use dating violence is a risk factor for both boys and girls and that having high social status is a risk factor for dating violence perpetration, especially for girls. Our finding that the dating violence behaviors of friends are associated with adolescents' use of dating violence is consistent with other studies (Arriaga and Foshee 2004; Foshee et al. 2001), including those that used social network analyses to assess friends' behaviors (Foshee et al. 2010; Reyes et al. 2011). This is the first study to examine associations between social status and the perpetration of dating violence. An interesting finding is that girls, but not boys, who have high status through-out adolescence are at high risk of

perpetrating dating violence. Adolescents with high status are likely more actively dating than those without high status, and thus they are in more situations where dating violence could occur. However, this would be the case for both boys and girls of high status and analyses controlled for dating status at each time-point, suggesting that increased dating activity is likely not an explanation for the finding. Perhaps this finding reflects those found in a number of studies that high status or popular girls can bully and be mean to their peers (Eder 1985; Merten 1997); girls may be more likely than boys to take advantage of the power conferred on those with status. However, that both boys and girls report increased dating violence at those times when their status was higher, suggests that boys are not immune to the power of social status.

That none of the lagged effects were significant was surprising. A methodological reason for not detecting lagged effects is that the time lag between the assessment of the peer context and the use of violence by the adolescent—6 months for almost all of the lags—may not be appropriate. Because of the rapidly changing peer environment of adolescence, a smaller time lag may be needed to detect the influence that peers have on adolescents' use of dating violence. Another methodological explanation is that lagged effects were examined net of between-subjects and within-person effects. However, examining lagged effects without appropriately controlling for between-subjects and within-person effects could produce inflated and misleading lagged effects because any lagged effects detected could be explained partially by between-subjects and/or within-person contemporaneous processes.

Based on the extensive evidence presented earlier, we hypothesized lagged effects of the peer attributes on the perpetration of dating violence. However, some research suggests the opposite causal pathway such that adolescent behaviors may predict peer attributes (Bauman and Ennett 1996; Ennett and Bauman 1994; Hogue and Steinberg 1995; Kandel 1978). As examples, adolescents who use dating violence may choose friends who also engage in dating violence or adolescents may use dating violence to gain social status among peers. This latter assertion would be supported by research finding that adolescents' use of deviant behavior, like aggression and bullying, increases their social status and prestige (Faris and Felmlee 2011; Sijtsema et al. 2009) and that less popular adolescents use deviant behaviors in hopes of gaining popularity (Abel et al. 2002; Faris and Ennett 2010; Mitchell and Amos 1997; Sijtsema et al. 2009). Research is needed to test whether adolescent dating violence influences peer attributes.

That the associations between peer attributes and adolescent dating violence did not decrease from grades 8–12 is also surprising given the amount of evidence for

decreasing susceptibility to peers across adolescence. Much of that evidence is from studies that measured self-reported vulnerability to peers, whereas this study used friendship nominations to assess actual peer behaviors and beliefs and relational attributes. Perhaps older adolescents claim less susceptibility to peer influences than is actually the case. Alternatively, perhaps the increasing relevance of dating, and dating violence, as adolescents age made the peer context relevant to this behavior across the grade span examined.

There are several limitations of the study. The perpetration of dating violence was based on self-reports but few other measurement options are available because dating violence is rarely witnessed by others, adolescents typically do not tell others about the violence, and dating violence rarely appears in the law enforcement system (Foshee 1996). Friend's beliefs related specifically to the use of violence against dates were not measured but those kinds of beliefs are likely influential on adolescent dating violence behaviors. Our indicators of the quality of peer relationships did not directly assess characteristics of the friendship such as support and satisfaction within the friendship, which may play a role in constraining abusive behaviors towards dates. A limitation of the social network analysis is that the fixed choice format for the number of friendship nominations may have underestimated the number of friendships present and distorted the true structure of the friendship networks (Holland and Leinhardt 1973). On the other hand, if more friendship nominations were allowed, adolescents could have named less close friends (Rogers and Kincaid 1981), leading to overestimation rather than underestimation of significant friendships. In addition, because information was not collected on friends not in the school networks, information is lacking about the broader friendship networks of adolescents. However, only a relatively modest number of friends outside the network were nominated. Also, the procedures for nominating friends did not rule out the possibility that a nominated friend could be a boy/girlfriend; future peer social network studies of dating violence should consider using nomination procedures that preclude adolescents from nominating romantic partners as friends. Finally, the study sample is from two counties in North Carolina that tend to have larger percentages of African Americans and residents that are more disadvantaged than residents of North Carolina and the United States in terms of median income and poverty level. Thus, generalizability of the study findings may be limited to adolescents living in similar types of counties in the US.

There are many strengths of this study. The data used were from a study with a large ethnically diverse sample of adolescents with high response and retention rates over five assessments. The cohort sequential design allowed us to examine developmental trajectories of dating violence

from the end of middle school through high school, an appropriate developmental period for studying dating violence. As well, we were able to determine whether relationships between peer characteristics and dating violence changed with changing development. During adolescence the peer context is dynamic and fluid, changing from grade to grade and even from semester to semester with reassignments to new classes. Thus, it is important to capture changes in the peer context, which we did with the time-varying within-person peer variables. As already noted, the focus of many peer context studies is on the behaviors of friends, while we examined the behaviors and beliefs of friends as well as the relational properties of peer networks, providing a fuller examination of the peer context. Assessing the peer context using social network analyses allowed for a more objective assessment of the peer context than measurement based on adolescent reports of the peer context, the latter of which can produce inflated relationships between peer characteristics and adolescent behavior. Finally, by examining between-subjects and within-person contemporaneous and lagged effects, after appropriately controlling for the effects of each, we were able to assess *who* is at risk for dating violence, *when* they are at risk, and temporality of relationships for a more refined examination of the peer context.

Our findings indicate that peers play an important role in adolescent dating violence and suggest that interventions for preventing dating violence need to incorporate consideration of peers. Thus far, there have been no evaluated peer-focused dating violence prevention programs, likely because the empirical and theoretical foundation for informing the development of such interventions is lacking. This study contributes to developing that foundation. Future studies focused on understanding more about the mechanisms linking aspects of peers and the peer group to adolescent dating violence and sex differences in those mechanisms will be crucial for informing the content of peer-focused dating violence prevention programs, as will findings from qualitative studies focused on gaining insight into the role of peers in the development, maintenance, and protection of dating violence.

Acknowledgments This research was funded by the National Institute on Drug Abuse (R01 DA16669) and the Centers for Disease Control and Prevention (R49 CCV423114).

Conflict of interest The authors declare that they have no conflicts of interest.

Author contributions VF conceived of the study, co-led the collection of the data, and drafted the manuscript. TB performed the statistical analyses and participated in writing sections of the manuscript related to measurement and statistical analysis. HLMR contributed to the overall analytical approach, contributed to the interpretation of the findings, contributed to substantive content of the

paper, and wrote sections of the manuscript. STE co-lead the collection of the data, was responsible for social network measurement, and participated in the writing of the manuscript. RF contributed to the measurement and conceptualization of the social network measures. LTC contributed to the substantive content of the paper and helped to draft the manuscript. AH contributed to the overall analytical approach and contributed to the interpretation of the findings. CS contributed to the overall analytical approach and contributed to the interpretation of the findings. All authors read and approved the final manuscript.

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