

Trajectories of Physical Dating Violence from Middle to High School: Association with Relationship Quality and Acceptability of Aggression

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Abstract Although research on dating violence is growing, little is known about the distinct developmental trajectories of dating violence during adolescence. The current study identifies trajectories of physical dating violence victimization and perpetration that boys and girls follow from sixth to twelfth grade, examines the overlap of these trajectories, and characterizes them by perceptions of a caring dating relationship and acceptability of dating aggression. The sample consisted of randomly selected sixth graders from nine schools in Northeast Georgia ($n = 588$; 52 % boys; 49 % White, 36 % African American, 12 % Latino) who completed yearly surveys from Grades 6–12. We used latent class mixture modeling to identify the trajectories and generalized estimating equations models to examine the acceptability of dating aggression by dating violence trajectories. Participants followed two trajectories of dating violence victimization (boys: low and high; girls: low and increasing) and two of

perpetration (boys and girls: low and increasing). When examining the joint trajectories of victimization and perpetration, a similar proportion of boys (62 %) and girls (65 %) were in the low victimization and low perpetration group and reported the lowest acceptance of dating aggression. The same proportion of boys and girls (27 %) were in the high/increasing victimization and perpetration group, and reported the highest acceptance of dating aggression. However, acceptance of dating aggression decreased from Grade 6–12 for all groups, even for those whose trajectory of dating violence increased. Victimization and perpetration were associated with reporting a less caring dating relationship. Results highlight the importance of focusing prevention efforts early for adolescents who follow this increasing probability of physical dating violence.

Keywords Trajectories · Physical dating violence · Acceptability of dating aggression · Relationship quality · Adolescence

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Introduction

Understanding adolescent romantic relationships is a challenge to researchers, as it seems that dating experiences are as varied and complex as adolescents themselves. Recent studies, however, have started to unveil common patterns in dating relationships. For example, the frequency of dating and age of first relationship vary greatly, but clusters of teens follow similar trajectories: Some adolescents start dating as early as sixth grade, while others postpone dating until after high school (Orpinas et al. in press). Research also has demonstrated that subgroups of adolescents exhibit common patterns of behavior over time. For example,

Barker et al. (2006) identified three trajectories of reactive and proactive aggression against peers between the ages of 13 and 17 years, and Orpinas et al. (2012b) found three trajectories—low, increasing, and high—of psychological dating violence from middle to high school. The study of developmental trajectories brings order to complex phenomena by identifying—instead of assuming—distinct groups. Researchers also can estimate the proportion of the population that follows each trajectory and can link group membership to other individual characteristics.

Although research on teen dating violence is abundant, studies on dating violence trajectories are scarce. The purpose of the present study is to identify and describe the developmental trajectories that adolescents follow from sixth to twelfth grade in relationship to physical dating violence perpetration and victimization. A specific goal of this research is to better understand whether boys and girls follow different trajectories of dating violence perpetration and victimization. Sex differences in trajectories are particularly important given research suggesting that women perpetrate violence in romantic relationships as often as men (e.g., Johnson 2010; Langhinrichsen-Rohling 2010). Additionally, researchers often conclude that intimate partner violence is bidirectional, but frequently authors report perpetration and victimization separately or the overlap at one point in time. Thus, besides identifying single trajectories of perpetration and victimization, in the present study we estimated the joint trajectory of both behaviors. Further, because poor relationship quality and holding norms that support dating aggression have been associated with increased aggression in romantic relationships (Linder et al. 2002; Simon et al. 2010), we examined the association of dating trajectories with the perception of having a caring dating relationship and with self-reported acceptability of dating aggression.

Prevalence of Dating Violence in Adolescent Relationships

The prevalence of aggression in romantic relationships varies by study, but overall about a third of adolescents report experiencing physical dating violence (O’Leary et al. 2008; Swahn et al. 2008a). During the past decades, substantial evidence has emerged indicating that more girls than boys report pushing, shoving, slapping, and perpetrating other forms of physical violence against their dates (Feiring et al. 2002; Foshee 1996; Muñoz-Rivas et al. 2007; O’Leary et al. 2008; Sears et al. 2007). Other studies provide a more nuanced vision of the problem. In samples of high school students, girls have reported significantly more physical dating violence perpetration than boys, but no sex differences were observed in victimization (Malik et al. 1997; O’Leary and Smith Slep 2003; Swahn et al.

2008a). Further, in a longitudinal study, Foshee et al. (2009) found that gender did not influence the trajectory of physical dating violence perpetration; however, the study only examined a single trajectory. Of note, studies reporting the frequency of behavior often do not highlight the intensity, seriousness, or consequences of the assaults. Research suggests, however, that females are more likely than males to be injured and even to die in cases of intimate partner violence (Archer 2000; Muñoz-Rivas et al. 2007).

Several cross-sectional and longitudinal studies have examined racial differences in teen dating violence, but the results are inconclusive. While dating violence does occur in all racial groups, some authors have found higher prevalence among African American adolescents (Foshee et al. 2010; Makepeace 1987; O’Keefe et al. 1986), others have reported higher prevalence among White youth (Lane and Gwartney-Gibbs 1985), and one study found no racial differences (White and Koss 1991). Another study found that dating violence victimization differed by sex and race: O’Keefe and Treister (1998) found that significantly fewer African American girls than White girls and significantly more African American boys than White boys reported victimization in a dating relationship. Conversely, Foshee et al. (2010) found that Black girls and boys were significantly more likely than White girls and boys to perpetrate violence in their dating relationships. This study expands current literature by examining the proportion of adolescents from different racial and ethnic groups in each trajectory.

Theoretical Explanations of Teen Dating Violence

The theoretical explanations of teen dating violence are multiple, but none completely elucidate the phenomenon. The feminist perspective highlights the different cultural expectations that guide the socialization of boys and girls and could explain why women are aggressive in self-defense. For example, Foshee et al. (2009) hypothesized that the trajectory of moderate physical violence did not vary by sex because they did not measure physical violence perpetrated in self-defense. However, other researchers have rejected this hypothesis. Several studies support the reciprocation of teen dating violence (Capaldi et al. 2007; O’Leary et al. 2008). Graham-Kevan and Archer (2005) investigated three explanations for female-to-male violence: coercion, fear, and reciprocity, with the latter one yielding the strongest support. Additionally, some researchers contend that self-defense is a common motivation among battered women, but is not frequent among teens (O’Leary and Slep 2012). From a different perspective, social cognitive theory (Bandura 1986) explains aggression as a behavior learned from the environment. Thus, living in a dysfunctional family, having aggressive peers, and perceiving that the culture accepts dating violence are all risk factors for perpetration and

victimization (Foshee et al. 2004; Kernsmith and Tolman 2011; Schnurr and Lohman 2008) and may explain the stability of behaviors over time.

Trajectory Modeling and Longitudinal Studies of Teen Dating Violence

Most research on dating violence perpetration and victimization to date has been cross-sectional and, thus, fails to explain the diversity of trajectories that adolescents follow. Using the same methodology as the present study, researchers have demonstrated that adolescents follow distinct trajectories for behaviors such as peer aggression (Brame et al. 2001; Kokko et al. 2006), sexual risk taking (Brookmeyer and Henrich 2009), and substance abuse (Lynne-Landsman et al. 2011). Using a different methodology, a few longitudinal studies have examined changes in dating violence among adolescents. Foshee et al. (2004) examined the predictors in eighth or ninth grade of dating violence victimization in twelfth grade. The authors found that the risk for becoming a victim of serious physical dating violence was greater for boys and girls who experienced early victimization than non-victimized students, highlighting the stability of the behavior. A second study described only one trajectory of moderate physical violence and one of severe physical violence, finding a curvilinear trend for both. Violence increased from age 13–17 years and then declined at ages 18 and 19. African American adolescents reported more moderate and severe physical dating violence than White youth as well as more acceptance of dating abuse, stronger traditional gender stereotypes, and more friends who perpetrated dating violence; however, no differences by gender or neighborhood disadvantage were found (Foshee et al. 2008, 2009). A third study, conducted in Italy, concluded that physical dating violence decreased from ages 16–18, but the large inter-individual variability suggested more than one trajectory (Nocentini et al. 2010). Finally, Chiodo et al. (2012) examined ninth grade predictors of eleventh grade dating violence in a sample of girls who were predominantly Caucasian. The authors divided the sample into no violence (the largest group), mutual violence (second largest), victim only, and perpetrator only. The girls in the mutual violence group had a number of risk factors at the behavioral, school, and family levels. None of these longitudinal studies, however, identified distinct trajectories of dating violence.

Relationship Quality and Acceptability of Dating Violence

The experiences that adolescents have in romantic relationships are diverse. Positive dating relationships can aid in healthy development by providing adolescents with

social support and influencing the development of a positive self-identity (Collins et al. 2009; Furman and Buhrmester 1992; Furman and Shaffer 2003). Conversely, bad dating experiences, particularly those related to physical violence, are associated with a plethora of negative experiences such as anxiety, depressed mood, suicidal thoughts, alcohol and drug use, lower educational achievement, and poor relationships with parents (Ackard et al. 2007; Banyard and Cross 2008; Chase et al. 2002; Hagan and Foster 2001; Silverman et al. 2001; Singer et al. 1995). Further, teen dating violence is a predictor of dating aggression in college (Smith et al. 2003). Several studies have found that poor relationship quality is associated with dating aggression among young adults (Hettrich and O’Leary 2007; Kaura and Lohman 2007; Linder et al. 2002) and that this association may be stronger for women than men (Katz et al. 2002). In contrast, Giordano et al. (2010) found that adolescents who reported dating violence did not differ in their levels of love and caring in their dating relationships from those who did not report violence. Thus, relationships cannot always be clearly classified into positive or negative, peaceful or violent.

Ending violent relationships can be a complex, confusing, and often a long process. Thus, regardless of overall relationship quality, people in violent relationships may stay in those relationships for long periods of time (Khaw and Hardesty 2009). The reasons for this phenomenon are various. Some stay in violent relationships because they are fearful of the reaction that leaving might spark in their significant other, others may blame themselves for the abuse (Summers and Feldman 1984), and still others may feel too helpless to leave their abusive partner (Wilson et al. 1992). Thus, even for adolescents, reports of being in a negative or uncaring relationship over time may be sustained. In general, the construct of a caring partner relationship may be a good indicator of healthy relationships. To expand research in this area, we examined whether adolescents in distinct trajectories of dating violence differed in their perceptions of the positive, caring aspects of their dating relationships. We hypothesized that youth in trajectories of more dating violence would report a worse relationship quality.

The final section of the present study examines changes in the acceptability of dating aggression for the joint trajectory groups. Several studies have shown that the acceptance of violence is associated with aggressive behaviors (Guerra et al. 1995; Kernsmith and Tolman 2011; Reed et al. 2011; Simon et al. 2010). Since boys and girls are more accepting of violence perpetrated by girls than violence perpetrated by boys, and there is greater social stigma associated with male aggression, we analyzed separately the acceptance of male-to-female and female-to-male aggression (Avery-Leaf et al. 1997; Kaura and Lohman 2007; Noonan and Charles 2009; Reeves and Orpinas 2012; Simon et al. 2010). Acceptance of

dating aggression is a modifiable mediator and a component of successful prevention programs (Ball et al. 2009; Foshee et al. 2005, 2008). Thus, examining the acceptability of aggression longitudinally by trajectory of dating violence will further scientific knowledge of the relationship between these constructs.

Purpose and Hypotheses

The purpose of this study is to identify the developmental trajectories that adolescents follow from middle to high school in relationship to physical dating violence, examine the overlap of trajectories of perpetration and victimization, and describe these trajectories in terms of quality of the relationship and acceptability of dating violence. The present study has four objectives. The first objective is to identify the individual trajectories of physical dating violence perpetration and victimization from sixth to twelfth grade for boys and girls separately. We hypothesize that youth will follow distinct trajectories of physical dating violence. Based on previous research, we expect that the majority of adolescents will report no violence (Swahn et al. 2008a) and that some will report increasing violence (Foshee et al. 2009). The second objective is to examine the joint trajectories of physical dating violence perpetration and victimization. Based on prior research, we expect that physical dating violence perpetration and victimization will be strongly associated (Cyr et al. 2006; Giordano et al. 2010). The third objective is to investigate whether students in the different joint trajectories differ in their perceptions of a caring relationship. We expect that youth in trajectories of no or infrequent dating violence will report a more positive relationship with their partner (Kaura and Lohman 2007). The final objective is to investigate the association between trajectories of physical dating violence and the acceptance of male-to-female and female-to-male dating aggression. We expect that youth in trajectories of more dating violence will report more acceptance of dating aggression (Simon et al. 2010), and that both trajectories will follow a similar pattern. Findings from this study will fill a critical gap in the scientific understanding of longitudinal trajectories of physical dating violence.

Methods

Design and Sample

The present study used data from the *Healthy Teens Longitudinal Study*. The purpose of *Healthy Teens* is to understand the developmental trajectories that adolescents follow from middle to high school, as well as risk and

protective factors associated with these trajectories. In sixth grade, approximately 100 students were randomly selected from each of nine middle schools and were invited to participate in this study ($n = 939$). Of these students, 79 % ($n = 745$) enrolled in the study. In ninth grade, this cohort of students was invited to continue to participate; 84 % ($n = 624$) of those previously enrolled agreed to the high school evaluations. The schools were located in one of six counties in Northeast Georgia; these counties had higher poverty and crime rates than the average for the United States. The schools represent a range of characteristics, including racially diverse populations and varied socioeconomic status. The sample was originally selected as part of the Multisite Violence Prevention Project (Multisite Violence Prevention Project 2004).

Because only students who reported dating were asked questions about dating violence, the present study excluded from the analysis students who never reported dating during the seven evaluations ($n = 32$) and surveys with large number of missing values ($n = 4$). Thus, the final sample of the present study included 303 boys and 285 girls (48.6 % White, 36.2 % African American, 11.6 % Latino). The mean age of this cohort was 14.8 years ($SD = 0.57$) in ninth grade. At any given assessment point, missing data were relatively low and ranged from 4 to 12 %. Only in high school students indicated the gender of their dating partner. The proportion of students who reported dating someone of the same sex or dating both boys and girls was 1 % in Grade 9 and increased to 6 % in Grade 12.

Students who reconsented in high school to continue in the *Healthy Teens* study did not differ from those who did not consent in their mean scores in physical dating perpetration or victimization in middle school (Grades 6, 7, and 8). There were no significant sex differences between those who reconsented in Grade 9 and those who did not consent. Some race differences were significant: More than expected African American students reconsented in ninth grade, and fewer than expected Asians and multicultural students reconsented; no significant differences for White or Latino students were observed ($\chi^2(4) = 27.28, p < 0.001$).

Measures

Dating

Dating was measured with one question. “In the last 3 months, have you had a boyfriend or girlfriend (someone that you dated, gone out with, gone steady with)?” Response categories were *yes* and *no*. Dating was measured seven times—each year from Grade 6–12. At each assessment, students who reported dating answered additional questions on physical dating violence perpetration and victimization.

Physical Dating Violence Perpetration

Physical dating violence perpetration (7 items, α range across grades = 0.91–0.94) (Foshee 1996) measured how often participants were physically aggressive against their dating partners. Students received the following instructions: “Thinking about the last 3 months, how often have you done the following to your boyfriend/girlfriend (someone that you dated, gone out with, gone steady with)? Only include it when you did it to the person first. In other words, don’t count it if you did it in self-defense.” Students indicated the frequency of perpetrating the following behaviors: slapped, slammed against a wall, kicked, pushed or shoved, threw something that could hurt, punched or hit with something that could hurt, and scratched. Response categories were (0) *never*, (1) *1–3 times*, (2) *4–9 times*, (3) *10 or more times*. The scale was computed as an average of all items with higher values indicating higher levels of physical dating violence perpetration. The distribution of the responses was heavily skewed to the left with a majority of students reporting 0 or 1 values (Table 1). For this reason, responses were dichotomized: (0) no physical dating violence perpetration and (1) one or more acts of physical dating violence perpetration.

Physical Dating Violence Victimization

Physical dating violence victimization (7 items, α range across grades = 0.90–0.94) measured how often participants were victims of physical aggression from their partners. Students received the following instructions: “Thinking about the last 3 months, how often has a boyfriend/girlfriend (someone that you dated, gone out with, gone steady with) done the following things to you? Only include it when the person did it to you first. In other words, don’t count it if they did it to you in self-defense.” Students indicated the frequency of being victims of the following behaviors: slapped, slammed against a wall, kicked, pushed or shoved, threw something that could hurt, punched or hit with something that could hurt, and scratched. Response categories were (0) *never*, (1) *1–3 times*, (2) *4–9 times*, (3) *10 or more times*. The scale was computed as an average of all items with higher values indicating higher levels of physical dating violence victimization. The distribution of the responses was heavily skewed to the left (Table 1). For this reason, responses were dichotomized: (0) no physical dating violence victimization and (1) one or more acts of physical dating violence victimization.

Caring Partner Relationship

The *Caring Partner Relationship Scale* (6 items; α in Grades 10–12 were 0.95, 0.94, and 0.96) measured

Table 1 Sex differences in self-reported physical dating violence perpetration and victimization among dating adolescents by grade

	Boys (%)	Girls (%)	Boys M \pm SD	Girls M \pm SD
Perpetration				
Grade 6	14.4	24.4*	0.12 \pm 0.39	0.16 \pm 0.42
Grade 7	15.6	20.7	0.11 \pm 0.36	0.11 \pm 0.33
Grade 8	13.6	26.2**	0.09 \pm 0.33	0.14 \pm 0.35
Grade 9	16.2	33.5***	0.16 \pm 0.46	0.18 \pm 0.41
Grade 10	19.6	29.2*	0.13 \pm 0.36	0.16 \pm 0.38
Grade 11	16.3	29.6**	0.11 \pm 0.35	0.17 \pm 0.40
Grade 12	14.9	32.3***	0.09 \pm 0.32	0.18 \pm 0.39*
Victimization				
Grade 6	37.8	22.4**	0.24 \pm 0.47	0.13 \pm 0.39*
Grade 7	29.2	14.8**	0.15 \pm 0.39	0.08 \pm 0.32*
Grade 8	34.8	20.9**	0.24 \pm 0.54	0.09 \pm 0.29**
Grade 9	35.8	24.3*	0.21 \pm 0.48	0.14 \pm 0.40
Grade 10	35.9	18.8**	0.22 \pm 0.45	0.10 \pm 0.34**
Grade 11	37.8	22.3**	0.24 \pm 0.50	0.09 \pm 0.25***
Grade 12	32.3	26.8	0.19 \pm 0.39	0.13 \pm 0.32

Percentages indicate at least one act of physical dating violence
M mean, *SD* standard deviation, Scale score range: 0 = *never*, 1 = *1–3 times*, 2 = *4–9 times*, 3 = *10 or more times*

Sex comparisons using Chi square test for proportions and *t* test for mean differences: * $p < .05$, ** $p < .01$; *** $p < .001$

participants’ perceptions of care and support from their partner. All questions started with: “My boyfriend/girlfriend” followed by the following six statements: cares about me; is interested in my school, work, or daily activities; believes that I will be a success; helps me when I’m having a hard time; always wants me to do my best; and listens to me when I have something to say. Items were developed for this study by adapting them from the caring relationships scale (Constantine and Benard 2001), which asks parallel questions for parents, teachers, and peers. Response categories ranged from (1) *not at all true* to (4) *very much true*. The scale was computed as an average, and higher values indicate a more caring relationship with the partner. Participants completed these questions only in Grades 10, 11, and 12.

Acceptability of Dating Aggression

Acceptability of Dating Aggression from male to female (4 items, α range across grades = 0.80–0.94) and from female to male (4 items, α range across grades = 0.83–0.90) measured acceptability of physical aggression by boys and girls towards dating partners in general, in the following situations: (a) partners sometimes deserve to be hit by their dates; (b) OK to hit if insulted in front of friends; (c) OK to hit if

made mad; or (d) OK to hit if made jealous on purpose (Foshee et al. 1998). All participants, whether they had dated or not, indicated their degree of agreement with each statement, using the following range of responses: (1) *strongly disagree* to (4) *strongly agree*. Scale scores were averaged with high scores indicating stronger acceptance of aggression. Participants completed these scales every year from Grades 6–12.

Procedures

The University's institutional review board approved all research procedures. Parents provided written permission for their children to participate in the study in sixth and ninth grade agreeing to the yearly evaluations. Students assented at each data collection point. All data presented in this study were collected in the second semester (spring) of the academic year; sixth grade data were collected in the spring of 2003, and twelfth grade data in the spring of 2009. Trained research assistants supervised the data collection. In middle school, data were collected using a computer-assisted survey interview. Students read the questions on the computer screen and heard them through headphones. High school students completed the survey online using a school computer and received a gift card for completing the survey; middle school students received a small token (e.g., a pen). Students completed the surveys in approximately 45 min. Schools received an incentive for participating in the study and for defraying associated costs. Trained staff members surveyed students who dropped out of school at their home or a community location.

Results

Cross-Sectional Prevalence

Of the boys, approximately two-thirds reported dating in each grade level. Of the girls, about half reported dating in sixth grade, and this proportion increased to about three-fourths in twelfth grade. Across all years, boys and girls most frequently reported slapping, scratching, and pushing or shoving their partner, and being the victims of these same behaviors. Table 1 presents the proportion of students who reported at least one act of physical dating violence by grade and sex, among students who reported dating. In all grade levels, more girls than boys reported perpetration of dating violence, and more boys than girls reported victimization. In six of the seven comparisons of proportions, this difference was statistically significant. The last two columns of Table 1 depict the mean (M) and standard deviation (SD) of physical dating violence. The distribution of the scale scores for perpetration and victimization was

heavily skewed to the left, with the large majority of the sample reporting 0 or 1 values.

Single and Joint Trajectories of Physical Dating Violence

The examination of trajectories was done in two steps. First, we identified distinct trajectories of physical dating victimization and perpetration separately using Proc TRAJ, a SAS-based procedure (Jones et al. 2001). This semi-parametric group-based modeling procedure, a type of growth-mixture modeling, assumes that the population is heterogeneous, containing subgroups of individuals who follow a similar trajectory of behavior over time. This procedure uses maximum likelihood to estimate the model parameters and accommodates for missing values. We selected the optimal number of trajectories using the following criteria: the change in Bayesian Information Criterion (BIC), the proportion of students assigned to each group (equal to or greater than 5 %), the group average posterior probabilities (equal to or greater than 0.7), and literature on developmental trajectories (Nagin 2005). Each trajectory was further adjusted for the best shape (i.e., linear, quadratic, or cubic). We dichotomized the scales (0 = no physical violence and 1 = one or more acts of physical violence) and used a logistic model to fit the data. We conducted all analyses separately for boys and girls.

Second, we modeled the joint trajectories of physical victimization and perpetration. As recommended by Nagin and Tremblay (2001), we used the information from the univariate models (number of groups and shape of trajectories for each variable) to identify the best fit for the joint trajectory models. The principal outputs of the joint trajectory modeling are the conditional probabilities (the probability of belonging to a specific physical dating victimization group given the membership in a specific physical dating perpetration group and the reverse probability) and joint probabilities (the probability of membership in a specific physical victimization and a specific physical perpetration group). These probabilities describe the developmental overlap of two distinct but related behaviors that were evolving during the same time period. We describe the results separately by sex. We used Chi square and standardized residuals to examine significant differences in the racial composition of the joint trajectories. All analyses were conducted using SAS version 9.2 and SPSS version 19. We report results separately for boys and girls.

Boys

Victimization Among boys, we identified two trajectories of physical dating violence victimization (Fig. 1a), with high average posterior probabilities (0.87, 0.89), showing a

good fit of the model. Both victimization groups were stable over time. The first trajectory, labeled “low victimization,” contained 62.1 % of the sample. The probability of physical dating victimization of this group was 0.17. The second trajectory, labeled “high victimization,” showed an average probability of victimization of 0.63.

Perpetration We also identified two trajectories of physical dating violence perpetration (Fig. 1a), with high average posterior probabilities (0.92, 0.88). The first trajectory, labeled “low perpetration,” contained 73.4 % of the sample. The probability of physical dating perpetration of this group was very small (0.05), and was stable over time. The second trajectory, labeled “increasing perpetration,” showed an increasing probability from middle to high school of being physically aggressive against a dating partner, starting at 0.37 in sixth grade and increasing to 0.55 in twelfth grade.

Joint Trajectories Table 2a shows the conditional and joint probabilities of being a victim and a perpetrator of physical dating violence. All low victimization boys were estimated to be in the low perpetration group. Of the high victimization boys, 70.1 % of were in the high perpetration group and 29.9 % in the low perpetration. Similarly, all boys in the increasing perpetration group were classified in the high victimization group, and 84.6 % of boys in the low perpetration group were classified in the low victimization group.

The estimates of joint probability showed that 62.1 % of boys were in the low victimization and low perpetration group (LVLP; 57 % Caucasian, 26 % African American, 13 % Latino), 26.6 % in the high victimization and increasing perpetration group (HVIP; 28 % Caucasian, 63 % African American, 6 % Latino), and 11.3 % in the high victimization and low perpetration group (HVLV; 49 % Caucasian, 22 % African American, 27 % Latino) (Table 2a). Racial composition of these three trajectories was significantly different than expected, $\chi^2(4) = 40.49, p < 0.0001$. The HVIP group had fewer than expected White students and more than expected African American students; the HVLV group had more than expected Latino students.

Girls

Victimization Among girls, we identified two trajectories of physical dating violence victimization (Fig. 1b), with high average posterior probabilities (0.94, 0.90), demonstrating a good fit of the model. The first trajectory, labeled “low victimization,” was composed of 70.7 % of the sample and was stable over time. The probability of physical dating violence victimization for this group was very low (0.07). The second trajectory, labeled “increasing victimization,” showed an increasing probability of being the victim of dating physical violence over time, increasing from 0.37 in sixth grade to 0.66 in twelfth grade.

Fig. 1 a Estimated trajectories of physical dating victimization and perpetration: Grades 6 to 12—boys. **b** Estimated trajectories of physical dating victimization and perpetration: Grades 6 to 12—girls

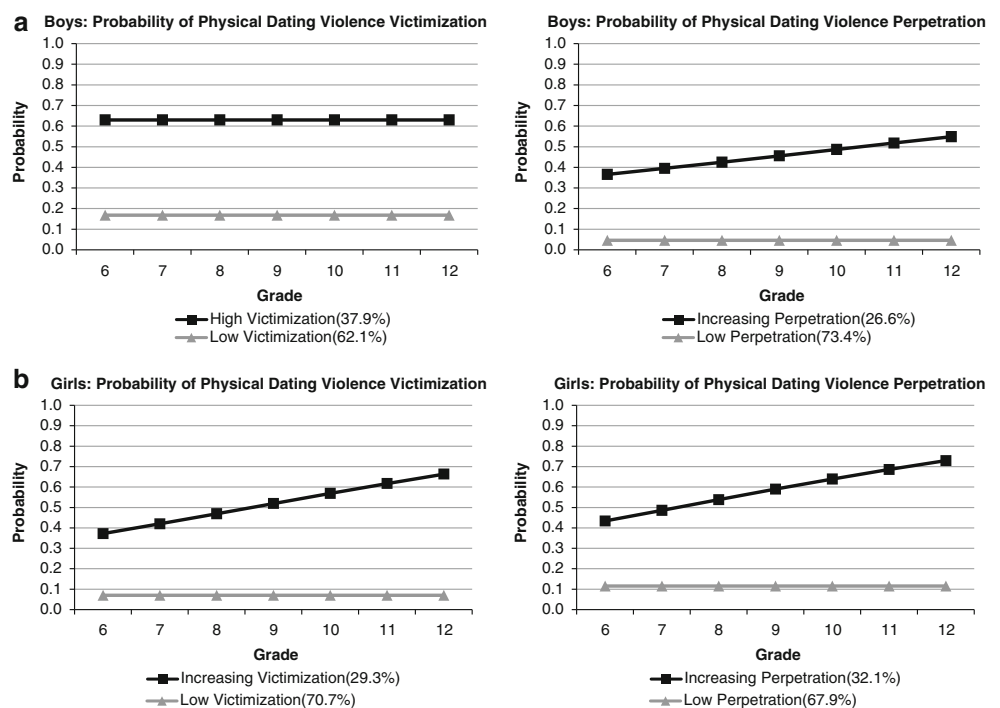


Table 2 Overlap of physical perpetration and victimization

Dating violence	Low victimization (%)	High victimization (%)	Group percentage (%)
(a) Boys			
Probability of physical perpetration conditional on victimization group			
Low perpetration	100	29.9	
Increasing perpetration	0	70.1	
Group percentage	100	100	
Probability of physical victimization conditional on perpetration group			
Low perpetration	84.6	15.4	100
Increasing perpetration	0	100	100
Probability estimates for joint physical victimization and perpetration			
Low perpetration	62.1	11.3	73.4
Increasing perpetration	0	26.6	26.6
Group percentage	62.1	37.9	100
(b) Girls			
Probability of physical perpetration conditional on victimization group			
Low perpetration	92.4	8.9	
Increasing perpetration	7.6	91.1	
Group percentage	100	100	
Probability of physical victimization conditional on perpetration group			
Low perpetration	96.2	3.8	100
Increasing perpetration	16.8	83.2	100
Probability estimates for joint physical victimization and perpetration			
Low perpetration	65.3	2.6	67.9
Increasing perpetration	5.4	26.7	32.1
Group percentage	70.7	29.3	100

Perpetration We also identified two trajectories of physical dating violence perpetration among girls (Fig. 1b), with high average posterior probabilities (0.93, 0.90). The first trajectory, labeled “low perpetration,” was composed of 67.9 % of the sample. The probability of physical dating perpetration of this group was small (0.12) and was stable over time. The second trajectory, labeled “increasing perpetration,” showed an increasing probability of being physically aggressive against the partner from middle to high school, starting at 0.43 in sixth grade and increasing to 0.73 in twelfth grade.

Joint Trajectories Table 2b shows the conditional and joint probabilities of being a victim and a perpetrator of physical dating violence. The large majority of the low victimization girls were estimated to be in low perpetration group (92.4 %), and a large majority of the increasing victimization girls were in the increasing perpetration group (91.1 %). Similarly, a large majority of girls in the low perpetration group were classified in the low victimization group (96.2 %), and the majority of girls in the increasing perpetration group were classified in the increasing victimization group (83.2 %).

The estimates of joint probability demonstrated that 65.3 % of girls were in the low victimization and low perpetration group (LVLP; 58 % Caucasian, 27 % African American, 12 % Latino), and 26.7 % were in the increasing victimization and increasing perpetration group (IVIP; 21 % Caucasian, 68 % African American, 12 % Latino) (Table 2b). Racial composition of these two groups was significantly different than expected, $X^2(2) = 40.16$, $p < 0.0001$. The IVIP group had fewer than expected White students and more than expected African American students. The other two discordant groups (low victimization and increasing perpetration = 5.4 %, and low perpetration and increasing victimization = 2.6 %) were small; therefore, they were not included in further analyses.

Caring Partner Relationship

To examine hypothesis three, we used analysis of variance (ANOVA) and Bonferroni correction to compare the mean caring relationship by joint trajectory groups. Because caring relationships was only measured in Grades 10–12, we examined the average score of the Caring Partner Relationship Scale by trajectory group.

Overall, boys and girls in the low trajectories of physical dating violence reported a more positive, caring relationship with their partner than participants in the high or increasing dating violence trajectories. Boys in the low victimization group reported significantly higher mean score on the Caring Partner Relationship Scale (mean = 3.44, SD = 0.64) than boys in the high victimization group (mean = 3.19, SD = 0.67), $F(1,266) = 9.32$, $p = 0.002$; and boys in the low perpetration group reported significantly higher mean scores (mean = 3.44, SD = 0.63) than boys in the increasing perpetration group (mean = 3.06, SD = 0.69), $F(1,266) = 17.36$, $p < 0.001$. Girls in the low victimization group reported significantly higher mean score on the Caring Partner Relationship Scale (mean = 3.59, SD = 0.54) than girls in the increasing victimization group (mean = 3.33, SD = 0.62), $F(1,266) = 11.01$, $p = 0.001$; and girls in the low perpetration group reported significantly higher mean scores (mean = 3.57, SD = 0.55) than girls in the increasing perpetration group (mean = 3.39, SD = 0.61), $F(1,266) = 5.82$, $p = 0.017$.

Acceptability of Dating Aggression

We used generalized estimating equations (GEE) models to examine whether the joint trajectory groups differed in Acceptability of Dating Aggression (male-to-female and female-to-male). We considered both linear and quadratic models with various working correlation structures. The QICs (quasikelihood information criterion) were used for model selection. For girls, we present the results under the selected linear model with the AR (1) working correlation matrix for acceptance of female-to-male dating aggression and unstructured working correlation matrix for acceptance of male-to-female dating aggression. For boys, we present the results under the selected linear model with the unstructured working correlation matrix for both variables. We examined the trajectories of acceptability of dating aggression for the three joint trajectories of boys (LVLP, HVIP, HVLP) and for the two joint trajectories of girls (LVLP, IVIP) that had a dating violence prevalence above 10 % of the sample. Figure 2a, b shows the trajectories of acceptance of dating aggression from females to males and from males to females. High scores indicate stronger acceptance of dating aggression. All trajectories were linear and decreased from sixth to twelfth grade. For all groups, the decreasing rates (slope) did not differ significantly by dating violence trajectories.

Among boys, mean scores for acceptance of dating aggression from *females to males* were significantly different by dating violence trajectories, $\chi^2(4) = 37.60$, $p < 0.0001$. Boys in the LVLP group exhibited significantly less acceptance of aggression than students in the

HVLP group, $\chi^2(2) = 7.94$, $p = 0.019$, and the HVIP group, $\chi^2(2) = 35.12$, $p < 0.0001$. The two high victimization groups (HVIP, HVLP) did not differ significantly. At Grade 6, the estimated mean score of acceptance of female-to-male dating aggression did not differ between the two high victimization groups (HVIP = 2.09; HVLP = 2.00), and both were significantly higher than for the LVLP group (1.71) ($p < 0.0001$). Acceptance scores decreased from Grade 6 to Grade 12 at an estimated rate of 0.05 for the LVLP, 0.07 for the HVLP, and 0.04 for the HVIP groups.

Among boys, mean scores for acceptance of dating aggression from *males to females* were significantly different by dating violence trajectories, $\chi^2(4) = 55.97$, $p < 0.0001$. Boys in the HVIP group exhibited significantly higher acceptance scores than boys in the LVLP group, $\chi^2(2) = 55.48$, $p < 0.0001$ and than boys in the HVLP group, $\chi^2(2) = 18.32$, $p < 0.0001$. The two low perpetration groups (LVLP, HVLP) did not differ significantly. At Grade 6, the estimated mean score of acceptance of male-to-female dating aggression was significantly higher for the HVIP group (1.72) than for the two low perpetration groups (LVLP = 1.33, HVLP = 1.41, $p < 0.0001$). Acceptance scores decreased from Grade 6 to Grade 12 at an estimated rate of 0.02 for the LVLP, 0.02 for the HVLP, and 0.01 for the HVIP.

Among girls, mean scores for acceptance of dating aggression from *females to males* were significantly different for the LVLP and the IVIP groups, $\chi^2(2) = 48.64$, $p < 0.0001$. At Grade 6, the estimated mean score acceptance of female-to-male dating aggression was significantly higher for the IVIP group (2.18) than the LVLP group (1.62), $p < 0.0001$. Acceptance scores decreased from Grade 6 to Grade 12 at an estimated rate of 0.06 for the LVLP group and 0.07 for the IVIP group.

Among girls, mean scores for acceptance of dating aggression from *males to females* were also significantly different for the LVLP and the IVIP groups, $\chi^2(2) = 27.42$, $p < 0.0001$. At Grade 6, the estimated mean score of acceptance of dating aggression was significantly higher for the IVIP group (1.48) than the LVLP group (1.24), $p = 0.0007$. Acceptance scores decreased from Grade 6 to Grade 12 at an estimated rate of 0.03 for the LVLP and 0.03 for the IVIP group.

Discussion

Previous research clearly has shown that physical dating violence has negative emotional and physical health consequences and is a risk factor for violence in adult relationships (Ackard et al. 2007; Banyard and Cross 2008; Chase et al. 2002; Hagan and Foster 2001; Singer et al.

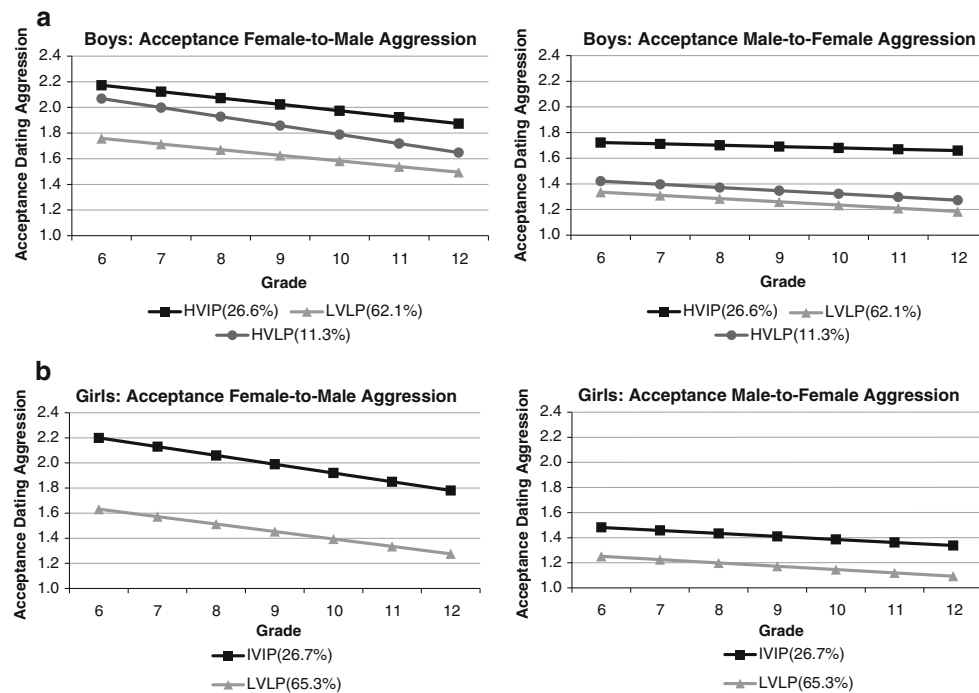


Fig. 2 a Estimated mean trajectories of acceptance of dating aggression for boys calculated by using the generalized estimating equation method. The x axis represents grades; the y axis represents mean acceptance of dating aggression. *HVIP* high dating violence victimization, high dating violence perpetration, *HVLP* high dating violence victimization, low dating violence perpetration, *LVLP* low dating violence victimization, low dating violence perpetration.

b Estimated mean trajectories of acceptance of dating aggression for girls calculated by using the generalized estimating equation method. The x axis represents grades; the y axis represents mean acceptance of dating aggression. *HVIP* high dating violence victimization, high dating violence perpetration, *LVLP* low dating violence victimization, low dating violence perpetration

1995; Smith et al. 2003). Thus, clarifying the developmental pathways, or trajectories, that adolescents follow with respect to dating violence can aid in developing targeted interventions. This study examined trajectories of physical dating violence from sixth to twelfth grade in a randomly-selected sample of boys and girls. The present study expands the scientific understanding of dating violence in several ways.

First, to our knowledge, no study has examined physical dating violence trajectories using seven yearly assessments from middle to high school. The cross-sectional prevalence of physical dating violence perpetration and victimization in the present study was similar to that found by other researchers (O’Leary et al. 2008; Swahn et al. 2008a), with more girls than boys reporting dating violence perpetration and more boys reporting victimization. However, particularly novel are the trajectories of physical dating violence that students followed. Our first hypothesis was confirmed in that boys and girls followed distinct trajectories of victimization and perpetration: a low trajectory and a high or increasing trajectory. An interesting finding of our study was that the majority (two-thirds) of the sample consistently reported very low or no physical dating violence perpetration or victimization over seven years of assessment, and these

trajectories were stable over time. Although it could be argued that most youth would benefit from universal programs and training in positive relationships (Avery-Leaf et al. 1997; Foshee et al. 1998; Macgowan 1997), when resources are scarce, programming should target the small proportion of youth that truly needs specialized programs in violence prevention. Parents, teachers, and school mental health professionals should understand and identify the early signs of dating violence, as they may indicate the start of a long-lasting trajectory. Physical dating violence is rarely an isolated event. Poor communication skills, other behavioral problems, and lack of strategies to handle conflict and psychological aggression could be red flags that alert adults to intervene before physical violence starts (Flynn and Graham 2010; Reeves and Orpinas 2012; Stets and Henderson 1991). Further, the stability of the trajectories suggests that comprehensive, evidence-based interventions that are initiated before middle school may lead to more successful outcomes for preventing violence in relationships (Vivolo et al. 2010). More research is needed to understand the personal and environmental risk and protective factors associated with these trajectories—such as parental involvement, support from peers, drug and alcohol use, and academic failure—and how these factors change over time.

The racial composition of these trajectories was significantly different than expected, with more African American boys in the HVIP group, more Latino boys in the HVLP group, and more African American girls in the IVIP group. Several cross-sectional and longitudinal studies have examined racial differences in teen dating violence, but results regarding the influence of race are inconclusive (Foshee et al. 2010; White and Koss 1991; Silverman et al. 2001). In interviews that we conducted with participants who had reported physical dating violence at most assessments, adolescents—particularly African American girls—depicted a gloomy picture of family turmoil, a culture of crime and poverty, and difficulties with boundaries and cheating (Orpinas et al. 2012a). This portrayal of dating violence is supported by social cognitive theory that depicts violence as a behavior learned from the environment (Bandura 1986). There is a clear gap in this area of research, and more studies are needed to elucidate beyond race which characteristics are associated with a trajectory of high physical dating violence.

Second, the mutuality of dating violence is not a novel finding (Gray and Foshee 1997; Giordano et al. 2010), but this study provides a very different understanding of the problem. Supporting our second hypothesis, approximately 90 % of students were in concordant trajectories: low perpetration and victimization, or high/increasing perpetration and victimization. A small group of boys (11 %) were in the low perpetration and high victimization group, and no boys were exclusively perpetrators. A very small group of girls (5 %) were classified in the increasing perpetration and low victimization group. Cross-sectional studies also have found very few boys in the sole perpetrator group, but a larger proportion of girls exclusively being perpetrators (Capaldi et al. 2007; O’Leary et al. 2008). Our examination of mutuality of violence across time, rather than a one-time assessment, may explain this difference. Practitioners would probably like to know which comes first, victimization or perpetration. However, it was not possible to answer that question, as most participants consistently reported both or none within the same time period.

Third, our study confirms the hypothesis that teens in the low victimization and perpetration trajectories of physical dating violence perceived their romantic relationships as more caring than adolescents in the increasing or high dating violence trajectories. Although this result may seem customary and expected, findings from previous research have been contradictory: Some studies indicate that adolescents can experience violence in a relationship and still be satisfied with it overall (Capaldi and Crosby 1997; Giordano et al. 2010; Gray and Foshee 1997), while others indicate that dating violence is related to lower relationship satisfaction (Kaura and Lohman 2007), particularly among

women (Katz et al. 2002). While the construct of a caring partner relationship is not identical to relationship satisfaction, the two are related. The caring partner relationship scale used in the present study measured the level of care and positive support that youth received in their dating relationships. The items in this measure are similar to some of the items (e.g., partner shows pride for participant, partner cares about participant, participant obtains help from partner) used in relationship satisfaction measures in other studies (Capaldi and Crosby 1997; Giordano et al. 2010). Although our study shows a significant difference in caring partner relationships between the low and increasing trajectories of dating violence, the mean scores in the caring partner relationship scale were overall high. With scores ranging from 1 to 4—with 4 indicating the most positive relationship—all mean scores were above 3. Thus, in spite of being involved in physical violence, these relationships probably also provide some positive support. One limitation of the present study is that the construct of a caring partner relationship was measured only in Grades 10, 11, and 12, so it is impossible to ascertain whether youth in middle school exhibited patterns of caring relationships similar to those that they exhibited in high school and whether those patterns change over a longer period of time. Another possible limitation is whether students had more than one relationship in that time frame, one positive and one aggressive, which could confound the association between the two variables. More research is needed to understand what motivates aggression within dating relationships, what type and magnitude of support adolescents get from these relationships, and whether these motivations vary by sex.

The fourth hypothesis, that youth in trajectories of higher levels of dating violence would report more acceptance of dating aggression and that both trajectories would follow a similar pattern, was only partially supported. Boys and girls in the low victimization and perpetration group reported the lowest acceptance of dating violence, and participants in the high/increasing perpetration and victimization groups reported the highest support for violence. Other studies also have found an association between dating violence and acceptance of violence (Kernsmith and Tolman 2011; Reed et al. 2011). However, acceptance of dating violence decreased from Grade 6–12 for all groups, while trajectories of dating violence perpetration and victimization remained flat or increased. This mismatch between trajectories of violence and acceptance of dating violence highlights the importance of studying risk factors over time, not just as early predictors. In this case, the acceptance of dating violence would have been an early predictor, but its developmental path did not match the dating violence trajectories.

Study Strengths and Limitations

The greatest strength of this study is its longitudinal design with annual evaluations of adolescents over 7 years. This study identified distinct trajectories of physical dating violence of boys and girls and highlights that the majority of adolescents are not perpetrators or victims of these behaviors. The study used strong measures of physical dating violence victimization and perpetration that include multiple items, which have been used in previous studies (Foshee 1996) and showed high internal consistency. In the search for the optimal number of trajectories, we used statistical criteria as well as theory and previous research findings. The study evaluated the overlap between the longitudinal trajectories of physical dating violence victimization and perpetration separately for boys and girls, emphasizing the mutuality of trajectories of dating violence, a result that has been identified previously in cross-sectional studies (Cyr et al. 2006; Giordano et al. 2010; Swahn et al. 2008b). In addition, the study emphasizes that some early predictors of aggression in romantic relationships, such as the acceptability of dating violence, may not be good targets of intervention as they may change following a different trajectory than the targeted behavior. In this study, some students followed a trajectory of increasing physical dating violence while at the same time acceptability of dating aggression decreased. These results expand the current scientific understanding of adolescent development in relation to physical dating violence.

This study had some limitations. As in all longitudinal studies, some students were lost to the follow-up or withdrew consent, but we were able to reach most students who dropped out of school. At any assessment point from Grades 6–12, the missing data were relatively low. Additionally, the statistical analysis of trajectories was robust to missing data. Results are based on self-reported measures, which may result in over or underreporting. However, adolescents were assured that responses were confidential. The study only measured self-reported aggressive behaviors. In further studies, an examination of dual reports of the adolescents and their romantic partners would strengthen the results. Although the study requested information about positive aspects of the relationship, additional information about the number of dates, the length of the relationships, or the consequences of violence would have helped to further understand the romantic relationships and the impact of physical violence. Further, relationship quality was only measured in high school, and results may be different in middle school. Because the data were collected from schools in Georgia, the identified trajectories may differ in other populations. Finally, in sixth grade, some students participated in a program designed to reduce peer violence; however, this program

did not address dating violence (Multisite Violence Prevention Project 2004), and its impact on peer violence was low and inconsistent (Multisite Violence Prevention Project 2009). In summary, this study is the first to report the trajectories of physical dating violence from middle to high school; however, replication is needed to determine whether the trajectories identified in this study vary in other populations and geographic areas.

Conclusions

This study contributes to the understanding of physical dating violence by identifying distinct trajectories of physical dating violence from middle to high school in a diverse longitudinal cohort of a randomly-selected sample of adolescents. In addition, it examines the association with caring partner relationships and acceptability of dating aggression. Most importantly, the study highlights that the majority of students consistently do not engage in physical dating violence, and this group is stable over time. Conversely, one-fourth of boys and girls were in the high or increasing trajectories of physical dating violence, a trajectory that already started high in sixth grade. The results emphasize the importance of early interventions and the need to understand further the characteristics of this high-risk group.

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Author contributions P.O. is the principal investigator of the longitudinal study, conceived the study, and coordinated and drafted the manuscript; H.H. participated in the design and conducted the statistical analyses of the data; X.S. participated in the design and supervised the interpretation of results; K.H. participated in the design and helped to draft the introduction and conclusions sections; L.N. participated in the design of the study, performed statistical analyses and drafted the methods section. All authors read and approved the final manuscript.

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