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Sexual Dating Aggression Across Grades 8 Through 12: Timing and Predictors of Onset

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Abstract

Investigators have identified a number of factors that increase risk for physical and psychological dating abuse perpetration during adolescence, but as yet little is known about the etiology of sexual dating aggression during this critical developmental period. This is an important gap in the literature given that research suggests that patterns of sexual dating violence that are established during this period may carry over into young adulthood. Using a sample of 459 male adolescents (76% White, 19% Black), the current study used survival analysis to examine the timing and predictors of sexual dating aggression perpetration onset across grades 8 through 12. Risk for sexual dating aggression onset increased across early adolescence, peaked in the 10th grade, and desisted thereafter. As predicted based on the Confluence Model of sexual aggression, associations between early physical aggression towards peers and dates and sexual aggression onset were stronger for teens reporting higher levels of rape myth acceptance. Contrary to predictions, inter-parental violence, prior victimization experiences, and parental monitoring knowledge did not predict sexual dating aggression onset. Findings support the notion that risk factors may work synergistically to predict sexual dating aggression and highlight the importance of rape myth acceptance as a construct that should be addressed by violence prevention programs.

Keywords

sexual dating aggression; dating violence; rape myth acceptance; survival analysis

Introduction

Teen dating violence is a prevalent national problem (Centers for Disease Control [CDC] 2008; Halpern et al. 2001) with devastating physical and mental health consequences for victims (Ackard et al. 2007; Roberts et al. 2003). The term “dating violence” encompasses

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physical, psychological (emotional), and/or sexual aggression that occurs between two people in a close relationship (CDC 2012). Yet, while a growing body of research has examined the etiology and development of physical and psychological dating aggression during adolescence (e.g., Miller et al. 2011; Makin-Byrd and Azar 2011), comparatively little research has examined sexual dating aggression among teens. Extant research on adolescent sexual dating aggression has focused primarily on victimization rather than perpetration and nearly all studies examining sexual dating aggression have used a cross-sectional design. As a result, we have a limited understanding of the etiology and course of sexual dating aggression during this critical developmental period. This is a significant gap in the literature given empirical findings that suggest that patterns of sexual aggression that initiate during adolescence may carry over into young adulthood (Loh et al. 2005; White and Smith 2004). Similarly, research indicates that adolescent victims of sexual coercion may develop a pattern of continued victimization that may have cumulative effects on psychological adjustment and potential impacts on the health of future relationships (Young et al. 2012). As such, research that contributes to increase our understanding of sexual dating aggression during adolescence may inform efforts to reduce or prevent this behavior and its consequences across the life-course. To this end, the current manuscript uses a survival analysis approach to examine the timing of onset and longitudinal predictors of sexual dating aggression using data from a multi-wave study that spanned grades 8 through 12.

Sexual dating aggression may be defined as forcing a dating partner to engage in a sexual act that he or she does not or cannot (e.g., due to intoxication) consent to (CDC 2012). Empirical research with adolescent populations suggests that sexual dating aggression is less common than physical and psychological dating aggression, with prevalence rates ranging between 3% and 10% (for a review, see Foshee and Mathew 2007). Research also suggests that females are significantly less likely than males to perpetrate sexual dating aggression (Bennett and Finneran 1998; Foshee 1996; Munoz-Rivas et al. 2009; O'Keefe 1997; Poitras and Lavoie 1995). In particular, several studies of U.S. middle and high school students suggest that perpetration rates for males are more than twice as high as those for females, with negligible rates for female perpetration (Bennett and Finneran 1998; Foshee 1996; O'Keefe 1997). Studies further suggest that these gender differences in sexual violence perpetration prevalence rates hold across items assessing a variety of different sexual aggression tactics ranging from rape to verbal coercion to engage in a sexual activity (Munoz-Rivas et al. 2009; Poitras and Lavoie 1995). Consistent with this research, female sexual dating violence perpetration rates were low (at each wave prevalence was 2%) in the study providing the data for the current manuscript. As such, the current study focuses on male perpetration of sexual dating aggression.

Theoretical Perspectives on Sexual Dating Aggression

Several theoretical models have been developed to explain sexual aggression, including rape (for a review, see Gannon et al. 2008). However, these models rarely have been applied in empirical research on teen dating violence. This is likely due, at least in part, to the fact that these models largely have failed to explicitly address sexual aggression that occurs in the context of a romantic relationship (Monson et al. 2008). For example, several theories that have been proposed as explanations for rape behavior were developed to explain a broad range of sexually abusive behaviors including, for example, child molestation, and thus may have limited relevance for explaining sexual aggression that occurs between dating partners.

Perhaps the predominant theoretical model that was developed explicitly to explain male sexual aggression against women is the Confluence Model (Malamuth et al. 1996). The Confluence Model incorporates both “relatively general mechanisms underlying various antisocial behaviors and more specific mechanisms particularly relevant to sexual aggression” (Malamuth et al. 1996, p. 27). The Confluence Model posits that *motivation or*

propensity (e.g., hostile attitudes and behaviors towards women), *inhibitory* (i.e., internal and external constraints against aggression), and *opportunity* (i.e., situational) variables work independently as well as synergistically (i.e., interact) to predict sexual aggression. Additionally the Confluence Model proposes that there are both distal and proximal developmental influences on sexual dating aggression. In particular, early exposure to inter-parental violence and victimization experiences (e.g., childhood physical and sexual abuse, excessive physical or coercive punishment) are viewed as developmentally distal influences that lead to the development of more proximal influences on sexual dating aggression including hostile attitudes towards women and expectations about the meanings of relationships, affiliation with delinquent peers, and involvement in other forms of interpersonal aggression.

While very limited empirical research has examined sexual dating aggression during adolescence, findings support the Confluence Model's proposition that early exposure to interparental violence and childhood victimization experiences predict sexual dating aggression during adolescence (White and Smith 2004; Casey et al. 2008; Banyard and Cross 2006; Borowsky et al. 1997). For example, using a sample of male college students, White and Smith (2004) found that having witnessed inter-parental violence, having been physically punished, and having been sexually abused in childhood were associated with the increased likelihood of having engaged in sexual aggression toward a woman (type of relationship not specified) in high school (assessed retrospectively).

A limited body of research (including studies examining adolescent sexual aggression against any target), also has found significant associations between sexual aggression and several constructs that may be viewed as proximal markers of an increased propensity for engaging in sexual dating aggression, including gang membership (Borowsky et al. 1997), externalizing behavior (Yeater et al. 2012), and involvement in other forms of dating aggression, including the use of dominant (controlling) tactics (Munoz et al. 2009). In addition, in a cross-sectional study of high-school adolescents, Maxwell (2003) found an association between rape myth acceptance and male sexual aggression. As defined by Lonsway and Fitzgerald (1994), rape myths are "attitudes and generally false beliefs that are widely and persistently held that serve to deny and justify male sexual aggression against women" (p. 133). Rape myths function, at least in part, to explain why victims deserve their fate (i.e., because of their dress or behavior), thus allowing sexual aggressors to shift blame from themselves to the victim (Lonsway and Fitzgerald 1994). Rape myth acceptance may be a particularly important construct to examine in relationship to teen sexual dating aggression both because research with college-aged populations suggest that this is a potentially modifiable risk factor for sexual assault (Anderson and Whiston 2005). However, to our knowledge, there have been no longitudinal studies that have examined whether and for whom rape myth acceptance and other propensity variables predict sexual dating aggression onset during adolescence. Moreover, there have been no longitudinal studies that have examined either inhibitory or situational factors that lead to sexual dating aggression.

There is also some empirical evidence that supports the "synergy hypothesis" proposed in the Confluence Model, although all of the research that has examined this proposition has been conducted with college-aged or adult populations. The synergy hypothesis is in essence an "exacerbation" model, wherein the effect of any one risk factor on sexual dating aggression is strengthened by the simultaneous presence of another risk. Malamuth and colleagues have evaluated the synergy hypothesis by using risk analysis to predict sexual aggression, where a cumulative risk index is constructed by classifying individuals as high/low risk on a set of variables and then combining scores (Dean and Malamuth 1997; Malamuth et al. 1996; Malamuth et al. 2000). Findings from their research, as well as that of others who have used this approach, suggest that individuals who score high across all

predictor variables report higher levels of sexual aggression than individuals who do not (Abbey et al. 2011; Malamuth et al. 1995; Malamuth et al. 1996;). This approach does account for covariation that occurs among predictors and can be used to demonstrate that more risk factors are associated with less adaptive outcomes, but it does not provide insight into how particular risk factors may interact with each other (Lanza et al. 2010).

Other studies have examined the synergy hypothesis by examining interactions between constructs that may be viewed as proximal propensity variables in relationship to adult sexual aggression including interactions between the construct of impersonal sex (a preference for casual, uncommitted sexual relationships), hostile masculinity (Malamuth et al. 1991; Wheeler et al. 2002; Jacques-Tiura et al. 2007), empathy (Wheeler et al. 2002), and coercive attitudes (Yost and Zurbriggen 2006). The findings, in general, suggest that the strength of one proximal propensity on sexual aggression may be exacerbated by the presence of another proximal propensity. Thus, these studies provide some empirical support that proximal propensity constructs may interact with each other in predicting sexual aggression. Furthermore, Malamuth et al. (1996) suggest that strong propensity (motivation) may overcome any inhibitions that could prevent the use of coercive acts, implying that proximal propensity and inhibitory variables may interact in influencing sexual aggression. That propensity and inhibitions interact is also implied in Finkelhor's (1984) Precondition Model of sexual abuse, which posits that sexual aggression will occur only when the abusers' motivations are overcome by internal and external inhibitions (constraints) against the behavior. However, there has been very little empirical examination of these proposed interactions (and none in relationship to adolescent sexual dating violence). In summary, despite implying interactions, the vast majority of research that has been guided by the confluence model has not formally evaluated interaction hypotheses (Jacques-Tiura et al. 2007).

The Current Study

The purpose of the current study was to examine the timing and predictors of male sexual dating aggression onset across grades 8 through 12. Drawing from the Confluence Model as well as the empirical research cited above, we identified several predictors that we conceptualized as indicators of an increased *propensity* (or motivation) to engage in sexual dating aggression. These include the distal influences of having witnessed inter-parental violence and prior victimization experiences, and the more proximal influences of rape myth acceptance, peer aggression, physical dating aggression, and use of control tactics against dates. We further identified two predictors, individual social bonding and parental monitoring knowledge, that we conceptualized as markers of internal and external *constraints* against the use of sexual dating aggression (inhibitory factors). Selection of these variables was informed by Social Control Theory (Hirschi 1969), which suggests that individual social bonding and parental monitoring work to constrain teens from engaging in antisocial behavior (Gault-Sherman 2012), as well as longitudinal research that has found that higher levels of parental monitoring (e.g., Miller et al. 2009) and social bonding (e.g., Foshee et al. 2010) are negatively associated with male perpetrated physical dating violence.

Figure 1 presents a conceptual model depicting expected relationships between the predictors examined in the current study and sexual dating aggression. We hypothesized that each of the distal and proximal *propensity* variables would be associated with increased risk of sexual dating aggression onset and that each of the *constraint* variables would be associated with decreased risk of onset (main effects hypotheses; Figure 1, Panel A). In addition, based on the Confluence Models' proposition that propensity and constraint factors work synergistically to predict sexual dating aggression, and the empirical research presented above, we examined hypotheses related to two distinct sets of interactions. First,

we examined interactions between each of the four proximal propensity indicators: rape myth acceptance, peer aggression, physical dating aggression, and use of control tactics against dates. We hypothesized that each pair of propensity variables would work synergistically to predict sexual dating aggression onset (Propensity \times Propensity interaction hypotheses; Figure 1, Panel B). For example, we anticipated that the longitudinal association between involvement in physical dating aggression and sexual dating aggression onset would be stronger for teens reporting higher levels of rape myth acceptance than for teens reporting lower levels of rape myth acceptance. Consistent, with the Confluence Models' general synergy hypothesis, we reasoned that the relationship between any given proximal propensity variable and sexual dating aggression onset would be stronger for individuals reporting higher levels on another proximal propensity variable, than for individuals reporting lower levels on another propensity variable.

Second, we hypothesized that associations between the proximal propensity variables and sexual dating aggression would be weaker for teens reporting stronger internal and external constraints against the use of aggression (Proximal Propensity \times Constraint interaction hypotheses; Figure 1, Panel C). As such, we reasoned that associations between the propensity to engage in aggressive behavior and aggressive behavior would be stronger for individuals reporting weaker internal and external constraints against the use of aggression. For example, we hypothesized that the association between involvement in physical dating aggression and sexual dating aggression onset would be weaker for teens reporting higher levels of social bonding than for teens reporting lower levels of social bonding.

In sum, drawing from the Confluence Model as well as empirical research, we made three hypotheses. First, propensity (distal and proximal) predictors would be positively and constraint predictors would be negatively associated with sexual dating aggression onset. Second, links between each proximal propensity predictor and sexual aggression onset would be stronger for individuals who reported higher levels on any other proximal propensity predictor. Third, links between each proximal propensity predictor and sexual aggression onset would be weaker for individuals reporting higher levels of internal and external constraints against the use of sexual aggression. Cox proportional hazards models were used to examine longitudinal relationships between each predictor variable, measured at baseline among a sample of male adolescents who had not yet engaged in sexual aggression, and self-reported sexual dating aggression onset across grades 8 through 12. Control variables included demographic covariates (minority status, family structure and parent education), the proportion of waves in which an adolescent reported having dated in the past year, and baseline number of dating partners. Demographic covariates were included in models based on research suggesting that minority status (e.g., Chapple 2003; Malik et al. 1997), parent education (e.g., Foshee et al. 2009) and family structure (e.g. Magdol et al. 1998) may be associated with dating aggression, though findings are mixed (Foshee and Reyes 2009). Past year dating and baseline number of dating partners were included as markers denoting the extent to which an individual adolescent may have had the opportunity to perpetrate sexual aggression.

Methods

Study Design

The analyses for this article are limited to 505 male adolescents who participated in the control group of a randomized trial evaluating the effects of a dating abuse prevention program, Safe Dates (Foshee et al. 1996). Adolescents were eligible for the evaluation study if they were enrolled in the eighth (Cohort 1) or ninth grade (Cohort 2) in one of the 14 public schools (seven schools were assigned to the control group) in a primarily rural county in North Carolina. At baseline (October 1994), parental consent was obtained from 84% of

eligible adolescents and questionnaires were completed by 96% of adolescents whose parents consented. Follow-up data were collected seven months later (Wave 2) and then yearly thereafter for four more years until the 8th grade cohort was in the 12th grade using the same procedures as for baseline data collection. Students who were absent for school data collection, including those who had dropped out of school, were mailed a questionnaire to complete and return. Schools were provided with a modest incentive each year for participating in the study. No incentives were provided to teachers or students. The calendar time and grade-level for each of the cohorts across each of the study waves is presented in Table 1.

Nearly all (91%) of the sample participated in at least three waves of data collection, 63% participated in at least four waves of data collection and 50% participated in all waves for which they were eligible. Logistic regression was used to examine predictors of drop-out, where drop-out was defined as non-participation at any wave post-baseline. Baseline sexual dating aggression as well as all study predictors and covariates were included in the model. Findings from this analysis suggest that drop-out was significantly less likely among those who reported having been forced to have sex at baseline and was significantly more likely among participants who were older at baseline. Drop-out was not related to baseline sexual aggression or to any of the other covariates or predictors examined in the current study.

Participants

Of the 505 male control group participants, 45% were in the 8th grade at Wave 1 (Cohort 1), 24% were non-White (19% identified as Black), 18% reported living in a single-parent (or caregiver) household at baseline, and 48% reported that the highest education that their mother (or female caregiver) or their father (or male caregiver) was high-school or less. For the analyses reported in this article, we excluded 20 boys who contributed data only at baseline (because onset could not be predicted for these observations). In addition, at Wave 1, fourteen (3%) boys reported having perpetrated sexual dating aggression and twelve (3%) were missing on these items. These 26 participants were excluded from the sample used for survival analysis to ensure that we predicted onset of sexual dating aggression (analytic sample size=459).

Measures

All measures were based on adolescent self-report; see Table 2 for descriptive statistics.

Sexual dating aggression—Sexual dating aggression was assessed at each wave using the Safe Dates Physical Perpetration Scale (Foshee et al. 1996). Adolescents were asked “During the last year, how many times have you done the following things to a person you have been on a date with.” A date was defined as involving very informal activities such as meeting at a mall, sporting event or park, as well as more formal activities. The two items assessing sexual dating violence behaviors were: (1) “forced them to have sex” and (2) “forced them to do something sexual that they did not want to do.” Sexual dating aggression was coded as a 1 if a teen reported engaging in either of these behaviors one or more times and was coded as a zero if the teen reported not having engaged in either behavior.

Distal Propensity Predictors

Interparental violence: Interparental violence was assessed by the question, “How many times have you seen one of your parents hit the other parent.” Response options ranged from “never” (0) to “ten or more times” (3).

Hit by an adult: Hit by an adult was assessed by the question, “How many times has an adult ever hit you with the purpose of hurting you?” Response options ranged from “never” (0) to “ten or more times” (3).

Forced sex: Forced sex was assessed by the question, “Has anyone ever forced you to do something sexual that you did not want to do?” Response options were “no” (0) or “yes” (1).

Proximal Propensity Predictors

Rape myth acceptance: Rape myth acceptance was assessed by asking how strongly teens agreed or disagreed with the following five statements: “When girls say ‘no’ to sex they usually really mean ‘yes’”; “Girls who get drunk at parties or on a date deserve whatever happens to them”; “A girl who wears sexy clothes is asking to be raped”; “When a girl wears sexy clothes on a date it means she wants to have sex”; “If a girl agrees to go into a bedroom with a boy she is on a date with, it means she wants to have sex.” Response options ranged from “strongly disagree” (0) to “strongly agree” (3). A composite scale was created based on the average of the scores on these items ($\alpha = .73$). These items were developed to specifically map on to rape myths that were targeted by the Safe Dates program and tap into factors assessed in rape myth scales that were developed for adult populations, such as victim precipitation and blame (Lonsway and Fitzgerald 1994).

Physical dating aggression: Physical dating aggression was assessed using the same scale as for sexual dating aggression (see above; Foshee et al. 1996) but the reference period was lifetime (i.e., “Have you *ever* done any of the following things to a dating partner”). Sixteen items assessed physical aggression and ranged from relatively mild tactics (e.g., pushed, grabbed, or shoved their dating partner) to more severe tactics (e.g., beat up their dating partner). Response options ranged from never (0) to ten or more times (3). Due to low prevalence (6%), items were summed and then dichotomized such that a “1” indicated that the teen had ever engaged in any physical dating aggression one or more times and a “0” indicated the teen had never used any physical aggression.

Peer aggression: Peer aggression was measured by asking teens, “How many times have you ever done the following things to someone the same sex and about the same age as you?” Four behaviors were listed (beat them up, hit them with my fist, threatened them with a weapon, used a weapon on them) and response options ranged from never (0) to ten or more times (3). A composite scale was created based on the average of the scores on these items ($\alpha = .79$).

Control tactics: Use of control tactics against dates was assessed by three items that were drawn from a broader scale assessing psychological dating aggression (Foshee et al. 1996). Participants were asked, “how often have you done the following things to someone you have been on a date with? The three behavioral items were: “told them they could not talk to someone of the opposite sex”, “would not let them do things with other people,” and “made them describe where they were every minute of the day.” Response options ranged from never (0) to ten or more times (3). Due to low prevalence (13%), items were summed and then dichotomized such that a “1” indicated that the teen had ever used control tactics against a date and a “0” indicated the teen had never used control tactics against a date ($\alpha = .78$).

Constraint Predictors

Social bonding: Two indicators were used to assess social bonding: conventional beliefs (beliefs) and commitment to conventional activities (commitment). These indicators were selected based on Hirshi’s (1969) Social Control Theory which identifies commitment and

belief as important elements of the social bond that constrains teens from engaging in antisocial behavior (Gault-Sherman 2012; Hirschi 1969). Endorsement of conventional beliefs was measured by asking adolescents how strongly they agreed or disagreed with the following statements; it is good to be honest, people should not cheat on tests and, in general, police deserve respect ($\alpha=.71$). Response options ranged from “strongly disagree” (0) to “strongly agree” (3). Commitment to conventional activities ($\alpha=.82$) was assessed by three items that asked teens to assess the importance of the following things for them: “going to college,” “having a job when an adult” and “finishing high school.” Response options ranged from “not important at all” (0) to “very important” (3). Items assessing beliefs and commitment were averaged to create subscales. Each subscale was then standardized and averaged to create a composite measure of social bonding ($\alpha=.83$).

Parental monitoring knowledge: Parental monitoring knowledge was assessed by two items asking teens, “When you are away from home and not at school or work how often does she [the female caregiver] know where you are” and “When you are away from home and not at school or work how often does she [the female caregiver] know who you are with.” Response options ranged from never (0) to almost always (4). Items were averaged to create a composite measure of parental monitoring knowledge. Kerr and Stattin (2000) note that these types of items reflect parent knowledge of teen’s whereabouts, activities and peer relationships which may result from teen disclosure, parental solicitation of information and/or parent control efforts. As such we refer to this variable as parent monitoring knowledge (Hayes et al. 2003; Laird et al. 2003).

Control Variables—Covariates included as controls included minority status (0=non-hispanic White, 1=non-white), family structure (0=two parent or caregiver, 1=single parent or caregiver), parent education (highest of mother’s or father’s: 0=less than high school, 1=high school graduate, 2=more than high school), dating exposure (proportion of waves in which the teen reported having been on a date in the past year), and baseline number of lifetime dating partners (ranged from “0”=never dated to “4”=10 or more dates).

Analysis Strategy

Cox’s proportional hazards analysis was used to examine whether and when sexual dating aggression onset occurred across grades 8 through 12. Specifically, a binary regression model was estimated with a complementary log-log link function. This model is optimal for interval-censored data such as ours and takes into account the fact that sexual dating aggression onset may have occurred at any-time during the assessment intervals (Allison 1995). This analytic technique also has the advantage of allowing for varying lengths of follow-up in longitudinal studies, thereby minimizing biases due to attrition (Willett and Singer 1993). Propensity and constraint variables were drawn from the baseline (Wave 1) assessment and were incorporated into the model as longitudinal predictors of sexual dating aggression onset.

Data analysis occurred in several phases involving the reorganization of data into person-period format, imputation of predictor missing data, estimation of unconditional models, and conditional model testing. First, data were reorganized into person-period format so that there was one record for each grade that an individual was observed up until the grade when the individual reported sexual dating aggression or was censored. Censoring occurs when an observation is terminated before an individual experiences an event (sexual dating aggression in this case) and may occur either because the study ends or because an individual drops out. A dependent variable was created that was coded as 1 if the teen reported sexual dating aggression onset; otherwise the dependent variable was coded as 0.

Certain assumptions were made regarding participants who dropped out of the study and then participated at later waves (referred to as temporary drop-outs). If data were missing before the first wave when the adolescent reported being a perpetrator ($n=3$), the adolescent was coded as being a perpetrator at the first non-missing wave. This is a potential misclassification problem only in that we do not know precisely when onset occurred. Misclassification is also possible if a respondent does not report perpetration at a later wave but is missing data at an earlier wave because that individual may have perpetrated during the interval assessed at the missed wave ($n=41$ cases). In order to assess potential misclassification bias, sensitivity analyses were performed in which these cases were treated as censored at the first missing wave. No substantive differences were found in the results.

We also note that, by study design, Cohort 2 did not contribute data to the interval between baseline and the end of the 8th grade because assessment of that cohort began in October of grade 9 (see Table 1). As such Cohort 2 data may be considered “late-entry” (or left-truncated). As recommended by Allison (1995:226), this issue was dealt with by not creating any observational units for the 8th grade time-interval for Cohort 2. In addition, a dummy variable was included in the model to account for the fact that the length of the 9th grade interval differed across cohorts (Allison 1995:225).

Maximum likelihood procedures were used to deal with missing data on the outcome (Shafer and Graham, 2002) and multiple imputation (Rubin 1987) was used to deal with missing data on covariates, which was minimal (6% across all variables). Multiple imputation was performed using SAS PROC MI (SAS Institute 2003). Following standard recommendations (Allison 2001), the imputation equation included all of the independent covariates as well as the proposed interaction terms. Ten sets of missing values were imputed using multiple chain 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 2003), which implements the procedures developed by Rubin (1987) to ensure that statistical inference takes into account uncertainty in the imputation process. Under the assumption that data are missing at random/non-informative censoring (i.e., missingness on Y may depend on X (i.e. observed covariates or outcomes) but may not depend on Y), maximum likelihood and multiple imputation methods for dealing with missing data have good statistical properties (i.e., consistent, asymptotically efficient and normal parameter estimates and standard errors; Shafer and Graham 2002).

Third, we estimated and compared, using likelihood ratio tests, unrestricted, linear, and quadratic unconditional survival models for sexual dating aggression onset. The quadratic model fit the data best and this model was used to produce the unconditional hazard function across grades 8 through 12. Next, we fit a series of conditional models to examine associations between each baseline predictor variable and sexual dating aggression. Predictor variables were first mean-centered to facilitate probing of interactions. We then conducted bivariate analyses in which the outcome was regressed on time (grade), the control variables (demographic and dating exposure), and each of the predictor variables one at a time. Next, we fit a multivariate model in which the outcome was regressed on grade, the control variables, and all of the predictor variables simultaneously. Finally we examined the interaction hypotheses described above in two steps using multivariate Wald tests designed to reduce Type 1 error due to multiple hypothesis testing (Cohen et al. 2003; Frazier et al. 2004). First, we added the six two-way Propensity×Propensity interaction terms. A multivariate Wald test was used to determine whether the addition of this set of interaction terms significantly improved model fit. Next we added the eight two-way Propensity×Constraint interaction terms and followed the same procedure as for the first set. After each step, if the multivariate Wald test indicated that fit was not improved, the entire

set of interactions was dropped. If the Wald test indicated that fit was improved, we examined the significance tests for the individual interaction terms and retained those interactions that were statistically significant ($\alpha=.05$) in the reduced model.

Results

Timing of Onset

Onset of sexual dating aggression was reported by 55 (12%) boys. We also note that eleven boys reported perpetration at more than one time-point (20% of those who reported onset). The (noncumulative) hazard curve for onset of sexual dating aggression is depicted in Figure 2. The hazard curve depicts the proportion of adolescents who reported onset among those who had not yet engaged in sexual dating aggression. This plot suggests that the hazard of sexual dating aggression onset peaks in grade 10 and declines thereafter.

Predictors of Onset

Bivariate—Estimates from “bivariate” models, each of which included one predictor variable, grade and grade-squared (time), and each of the demographic and dating exposure covariates, are presented in the first column of Table 3. Consistent with expectations, several propensity predictors were associated significantly and positively with sexual dating aggression onset including peer aggression (hazard ratio=1.77) rape myth acceptance (hazard ratio=1.86), use of control tactics against a date (hazard ratio=1.93) and physical dating aggression (hazard ratio=5.05; see Table 3). Having witnessed domestic violence was associated marginally with sexual dating aggression onset (hazard ratio=1.46; $p=.06$), however, contrary to expectations, having ever been hit by an adult and having ever been forced to have sex were not associated with sexual dating aggression onset. We found mixed support for hypothesized associations between the constraint variables and sexual aggression onset; consistent with expectations, social bonding was associated significantly and negatively with onset (hazard ratio=0.78); however, no association was found between parental monitoring knowledge and onset.

Multivariate—Multivariate model testing began with an initial model that included all of the eight predictor variables, demographic and dating exposure covariates, as well as grade. Inclusion of the set of Propensity \times Propensity interaction terms significantly improved model fit over the initial model ($F(5,9591)=2.67, p=.02$). Two of the six interaction terms in this set were statistically significant and were retained in the model. Inclusion of the Propensity \times Constraint interactions did not improve model fit ($F(7,3243)=1.76, p=.09$) and these terms were dropped from the model. Parameter estimates from the final reduced model, including each of the predictor variables as well as the two significant interactions, are presented in the second column of Table 3. Contrary to expectations, inter-parental violence, prior victimization, control tactics, social bonding and parent monitoring were not associated with aggression onset in the final model and we did not find support for hypothesized interactions between the propensity and *constraint* variables. Consistent with expectations, a main effect was found for physical dating aggression (hazard ratio=2.89), and interactions were found between rape myth acceptance and both physical dating (hazard ratio=4.14) and peer aggression (hazard ratio=1.92).

The two significant interactions were probed by estimating the simple slope for the effects of baseline dating and peer aggression on sexual dating aggression setting rape myth acceptance at the sample mean and one standard deviation above and below the mean (holding all other covariates constant). Findings suggest that, consistent with our general study hypothesis, the association between baseline physical dating aggression and sexual aggression onset was stronger for teens reporting higher levels of rape myth acceptance.

Specifically results suggest that baseline physical dating aggression is not associated with sexual dating aggression onset among teens who report low levels of baseline rape myth acceptance ($p=.90$). However, among teens reporting average (mean) levels of rape myth acceptance, the estimated hazard of sexual dating aggression onset for teens reporting physical dating aggression was nearly three times the hazard for a teen who did not report physical aggression at baseline (hazard ratio=2.89, $p=.03$) and, among teens reporting high levels of rape myth acceptance, the estimated hazard of sexual dating aggression onset for teens reporting physical dating aggression was approximately seven times the hazard for a teen who did not report physical dating aggression at baseline (hazard ratio=7.46, $p<.001$). Figure 3 (Panel A) provides a graphical depiction of these findings using model estimated predicted probabilities.

A similar pattern of results was found for the interaction between peer aggression and rape myth acceptance. Baseline peer aggression was not associated with sexual aggression onset among teens reporting low ($p=.59$) or average ($p=.42$) levels of rape myth acceptance; however, among teens reporting high levels of rape myth acceptance, the estimated hazard of sexual dating aggression onset for teens reporting baseline peer aggression was nearly twice the hazard for teens who did not report baseline peer aggression (hazard ratio=1.93, $p=.01$). These findings are depicted graphically in Figure 3, Panel B.

Discussion

Whereas a growing body of research has examined physical and (to a lesser extent) psychological dating aggression during adolescence, only a handful of cross-sectional studies have examined sexual dating aggression during this important developmental period. As such, little is known about the factors that may contribute to an increased risk for sexual aggression that could inform primary prevention efforts. The current study addresses this gap by examining risk for sexual dating aggression onset across grades eight through twelve as well as longitudinal risk factors that may contribute to sexual aggression onset.

This study's major findings are twofold. First, results suggest that risk for sexual dating aggression onset tends to increase across early adolescence, peaking in the 10th grade. This finding is consistent with longitudinal research using data from the National Youth Survey, which found that the hazard rate for sexual assault onset (having or trying to have sexual intercourse with someone against their will) increased up until age 16 years and then declined thereafter (Grotzinger et al. 2008). This finding is also consistent with longitudinal research examining trajectories of physical dating aggression, which has shown that physical dating aggression tends to peak around the end of the 10th grade and desist thereafter (Foshee et al. 2009; Reyes et al. 2011).

The emergence of sexual aggression during the middle school years may be attributed to the fact that pubertal changes during this time drive an increasing awareness of sexuality and sexual identity and a growing interest and involvement in romantic relationships, providing teens with opportunities to express sexual interest and engage in coercive behaviors (McMaster et al. 2002). As noted by Reyes et al. (2011), dating abuse also may increase during early adolescence because young teens have not yet developed the interpersonal skills needed to handle the multifaceted challenges involved in establishing a relationship with the other sex, including the negotiation of intimacy, conflict, interdependence, exclusivity and sexual desire (Furman and Shomaker 2008; Shulman 2003).

Risk of sexual dating violence onset (i.e., perpetration of sexual aggression for the first time) may tend to desist in late adolescence as older teens, on average, have gained social, emotional and intellectual maturity, and may become increasingly aware that abusive

behaviors negatively impact their ability to engage in romantic relationships, a key developmental task (Furman and Shaffer 2003). However, we caution that the current study followed teens through the 12th grade. Risk of sexual aggression onset may again increase during the transition to young adulthood as teens enter new contexts that may encourage sexually aggressive behaviors (e.g., fraternities; Boeringer 1999) and initiate new relationships that increasingly may involve negotiations around sexual intimacy. In addition, the current study did not examine how rates of onset may differ when considering severe forms of sexual aggression, such as those involving physical force or injury, as opposed to less severe forms of sexual aggression. Grotzinger et al. (2008) found that the age at which new onset of sexual assault drops off (the “maturation” effect) occurred significantly later (age 21) for serious sexual assaults compared to any sexual assault (age 16).

Second, results provide some support for the Confluence Model’s proposition that risk factors for sexual dating aggression may work synergistically to predict onset. Specifically, we found that involvement in early physically aggressive behaviors towards peers and dates is more strongly predictive of sexual aggression onset among teens who report higher levels of rape myth acceptance. These findings suggest that heterotypic continuity in aggressive behavior, in which physically aggressive behaviors later manifest as sexual aggression (Pepler et al. 2006), is more likely among teens that hold attitudes and beliefs that justify male sexual aggression against women. Empirical research suggests that teens who endorse rape myths may have particularly negative and hostile attitudes towards women (Anderson et al. 1997; Suarez and Gadalla 2010) and weakened cognitive controls that would otherwise constrain sexually aggressive behavior. When these hostile attitudes and weakened cognitive controls are paired with increased aggressive tendencies, as indicated by early engagement in physically aggressive behavior towards peers and dating partners, sexual aggression is more likely to occur.

Alternatively, drawing from the work of Connolly et al. (2000), Pepler et al. (2006) and Espelage et al. (2012), we speculate that the pathway from physical peer and dating aggression to sexual aggression may be more pronounced for teens who endorse rape myth acceptance because these teens have an increased need for power and dominance over others (Anderson et al. 2007). In particular, Pepler et al. (2006) and Espelage et al. (2012) have proposed that peer aggression (specifically bullying) and sexual violence may be linked because both behaviors are driven by a need for “control and dominance” (Espelage et al. 2012: p. 61). Our findings are consistent with the proposition that peer aggression and sexual dating aggression are linked, but further suggest that they are only linked for teens with high levels of rape myth acceptance. It may be that there is some heterogeneity in the underlying motives that drive teens to engage in peer and dating aggression. For example, some teens may engage in physically aggressive behaviors towards peers and dates due to an underlying need to dominate and control and others may engage in these behaviors primarily because they have poorly developed conflict resolution skills. Rape myth acceptance may be a marker that identifies teens who engage in aggressive behaviors in order to exert power and dominance, providing an explanation for why the pathway from physical to sexual aggression would be more pronounced for these teens.

We also note that we did not find support for several of the study hypotheses. Perhaps most notably we did not find a relationship between inter-parental violence or prior victimization (hit by an adult with intention to harm, forced sex) and sexual aggression onset. This finding contradicts those of studies that have found a significant association between late adolescent and adult sexual aggression and childhood physical abuse (e.g., White and Smith 2004; Zurbriggen et al. 2010), childhood sexual abuse (e.g., Casey et al. 2009), and witnessing family violence (e.g., Borowsky et al. 1997; Ehrensaft et al. 2003). Although we note that findings from longitudinal studies of the relationship between exposure to family violence

and adolescent physical dating violence perpetration are somewhat mixed, with some studies finding a significant association only within specific sub-groups (for a review, see Foshee and Matthew 2007). There are several measurement related issues that may explain our lack of findings. First, measures of each of these constructs were limited in that they were all one-item measures based on self-report, which may have compromised their reliability and possibly their validity, although the child maltreatment literature does provide mixed support for the validity of adolescent retrospective reports as an indicator of childhood abuse (Everson et al. 2008). Second, our measure of having been hit by an adult with intention to harm may have captured both experiences of physical abuse as well as experiences of physical discipline (corporal punishment). As such, it may not have tapped into the more serious types of physical abuse that may increase risk of externalizing behaviors such as sexual aggression. Third, our measures did not assess explicitly violence exposure that occurred during childhood. Early victimization may have the most detrimental lasting effect on children, because social information processing patterns are usually established during the first eight years of life (Dodge and Price 1994; Ehrensaft et al. 2003). Given these measurement limitations, the finding that victimization experiences and exposure to domestic violence were not associated with sexual aggression onset should be viewed with caution.

We also did not find support for our hypothesis that the association between the propensity variables and sexual aggression onset would be weaker for teens reporting higher levels of social bonding and parental monitoring knowledge (constraint variables). It may be that internal and external constraints on behavior change over time and thus should be assessed during a time frame that is relatively proximal to the outcome behavior rather than at baseline (i.e., it may be that it's the constraints present in an adolescents current environment that are most relevant in terms of influencing his/her behavior at that time). Future research should examine the influence of internal and external constraints on sexual dating aggression using time-varying measures of constraints.

In addition, we note that research suggests that our measure of parental monitoring knowledge could possibly reflect teens' disclosure of information about their daily activities rather than parents' efforts to solicit information about their teens' whereabouts or control their actions (Stattin and Kerr 2000; Kerr et al. 2010). Teens' disclosure of information to their parents may reflect family bonding, which, in turn, may constrain antisocial behaviors such as dating violence (Kerr et al. 2010; Hirschi 1969). Future longitudinal research should continue to examine the potential role of parental monitoring knowledge in contributing to sexual dating aggression using more nuanced measures that distinguish the source of parents' monitoring knowledge (i.e., disclosure, solicitation, or control).

Finally, two of the predictor variables that were not involved in interaction terms, use of control tactics against dates and social bonding, were related significantly to sexual dating aggression onset in the bivariate models but not in the multivariate model. We speculate that the effects of these variables may have been mediated by other predictors in the multivariate model. For example, lower levels of social bonding may lead to involvement in physically aggressive behaviors that, in turn, lead to sexual dating aggression (particularly for those reporting high levels of rape myth acceptance). Similarly, the use of control tactics against dates may lead to (and/or co-occur with) physical dating aggression that, in turn, leads to sexual aggression onset. Future longitudinal research should continue to disentangle the causal pathways linking developmental risk factors for sexual dating aggression.

Several additional limitations to the current study should be noted. First, we examined a large number of interactions in this study. We used a statistical procedures (i.e., multivariate Wald tests) designed to reduce Type I error, but it is possible that insufficient power resulted

in Type II error, a failure to detect moderation effects. As such, null effects for the interactions should be interpreted with caution. Second, the sample for this study was drawn from a predominantly rural area and it is unknown whether findings would generalize to urban or suburban settings. On the other hand, we also note that our sample came from the general population, as opposed to selected groups such as adolescents in the judicial system, thus increasing the generalizability of the findings to school-going adolescents. Third, data were self-report and social desirability bias may have influenced survey responses. However, self-report surveys may be the best available assessment option available to sexual violence researchers and are preferable to interviewer-administered assessments because they minimize social-desirability biases (Kolivas and Gross 2007).

A last limitation involves the current study's not examining the influence of *opportunity* or situational variables on sexual dating aggression. This was because our primary aim was to examine baseline predictors of future sexual dating aggression *onset*, rather than to examine the factors that may precipitate a specific sexual perpetration incident (using for example a situation-level analysis where the incident is the unit of analysis). According to the Confluence Model, opportunity or situational variables may interact with individual characteristics to increase the likelihood that sexual aggression may occur. Situational factors that may influence teen sexual dating aggression include alcohol use by the boy or girl, isolated social settings (e.g., a parked car), the degree of intimacy between the dating partners, the presence of peers who may encourage coercive behavior, and the girls response in decreasing victimization risk (Hoyt and Yeater 2011). Future research should build on the current study to examine whether and how these types of factors may interact with individual characteristics to influence sexual dating aggression.

Implications

This study's findings have several implications for the design and development of prevention programs. First, results are consistent with previous research suggesting that primary prevention programs for sexual dating aggression should target middle-school aged teens (Foshee and Reyes 2009). Interest in dating typically emerges during the middle school years and thus the topic is relevant, yet most teens have not yet engaged in dating aggression. Second, our results highlight the critical importance of attitudes toward rape (or towards sexual aggression more generally) as a construct that should be targeted and evaluated explicitly by prevention programs. In particular, findings identify a particularly high risk group, boys who are using physical aggression against peers and dates early and who also hold rape myths.

Fortunately, a large body of research with college-aged populations suggests that sexual assault education programs can be effective in changing rape-related attitudes (Anderson and Whiston 2005) and at least two existing evidence-based teen dating violence interventions include components addressing rape-related attitudes (Foshee et al. 1996; Wolfe et al. 2003), although evaluations of these programs have not examined whether their programs were effective in changing these attitudes. Our study, however, does not shed light on the issue of whether programs targeting changes in rape myth acceptance by boys should be mixed-gender versus male-only. Brecklin and Forde (2001) conducted a meta-analysis of rape education programs with college-aged populations and found that these programs were more effective in changing rape-related attitudes for men in single gender than in mixed-gender groups. However, a more recent meta-analysis by Anderson and Whiston (2005), which included a larger number of studies and controlled for data dependency, found no evidence that men are more likely to benefit from programming administered in all-male groups as compared to men in mixed-gender groups. More empirical research on this issue is

clearly needed, particularly with respect to adolescent populations (Anderson and Whiston 2005).

Finally, our results are consistent with previous research that has found that peer and dating aggression are related phenomena. As such, an effective and efficient approach to promoting healthy relationships among youth may be to develop prevention programs that address both sets of behaviors (Foshee et al. 2010; Basile et al. 2009). In particular, our research supports the suggestion put forth by Basile et al. (2009) that bullying prevention programs may be adapted to maximize their potential impact on sexual violence perpetration by incorporating themes designed to correct rape myths.

To our knowledge, the current study is the first to examine the timing and longitudinal predictors of onset of sexual dating aggression during adolescence. The longitudinal design enabled us to assess sexual dating aggression onset across a critical developmental period when life-long patterns of dating violence tend to initiate and take root. In addition, in contrast to previous studies that have assessed sexual aggression without specifying the perpetrator-victim relationship (e.g., Maxwell et al. 2003), our study explicitly assessed sexual aggression targeted at dating partners, thus informing our understanding of the developmental origins of this particular form of intimate partner violence. Findings suggest that sexual dating aggression onset increases across middle adolescence and peaks in the 10th grade and that the relationship between early physical aggression towards peers and dates and sexual aggression onset are stronger for teens reporting higher levels of rape myth acceptance. Future studies should continue to examine the longitudinal interplay between individual and contextual risk and protective factors in contributing to sexual dating aggression during adolescence.

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LMR conceived of the research question, conducted the analysis and drafted the manuscript. VF designed and conducted the study that provided the data, contributed to refine the research questions and hypotheses, and helped draft the manuscript. Both authors read and approved the final manuscript.

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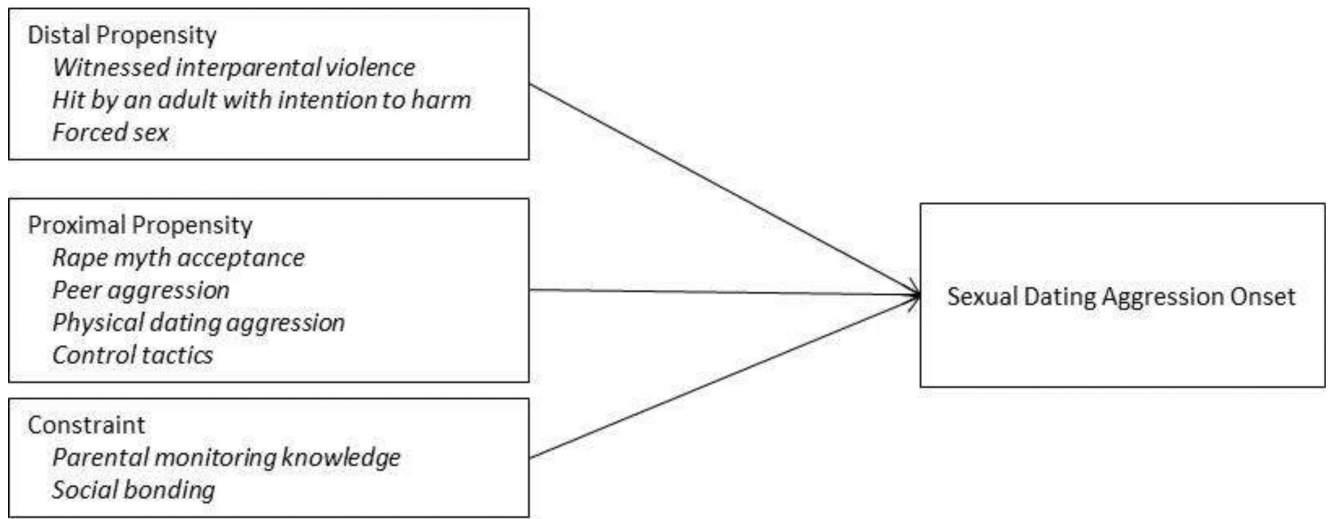
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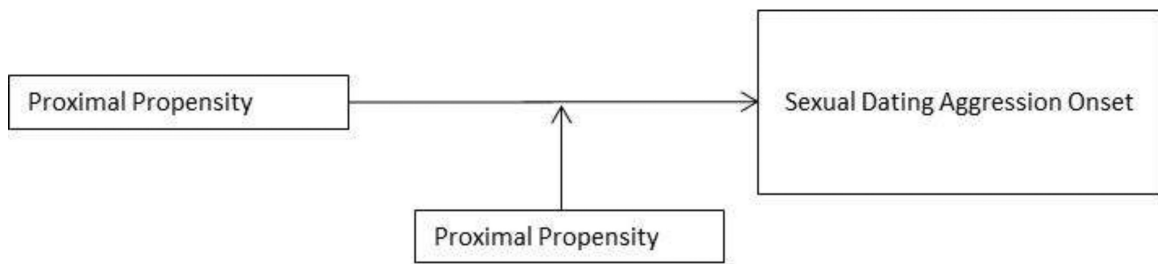
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Panel A



Panel B



Panel C

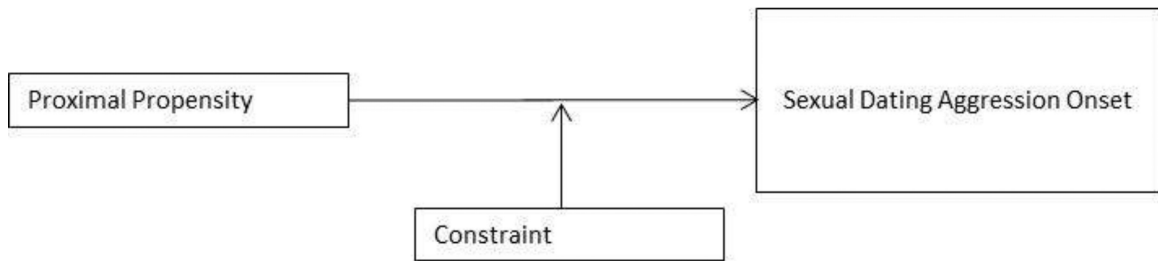


Fig. 1. Study Conceptual Model and Variables. Main effects (Panel A) and interaction hypotheses (Panels B and C).

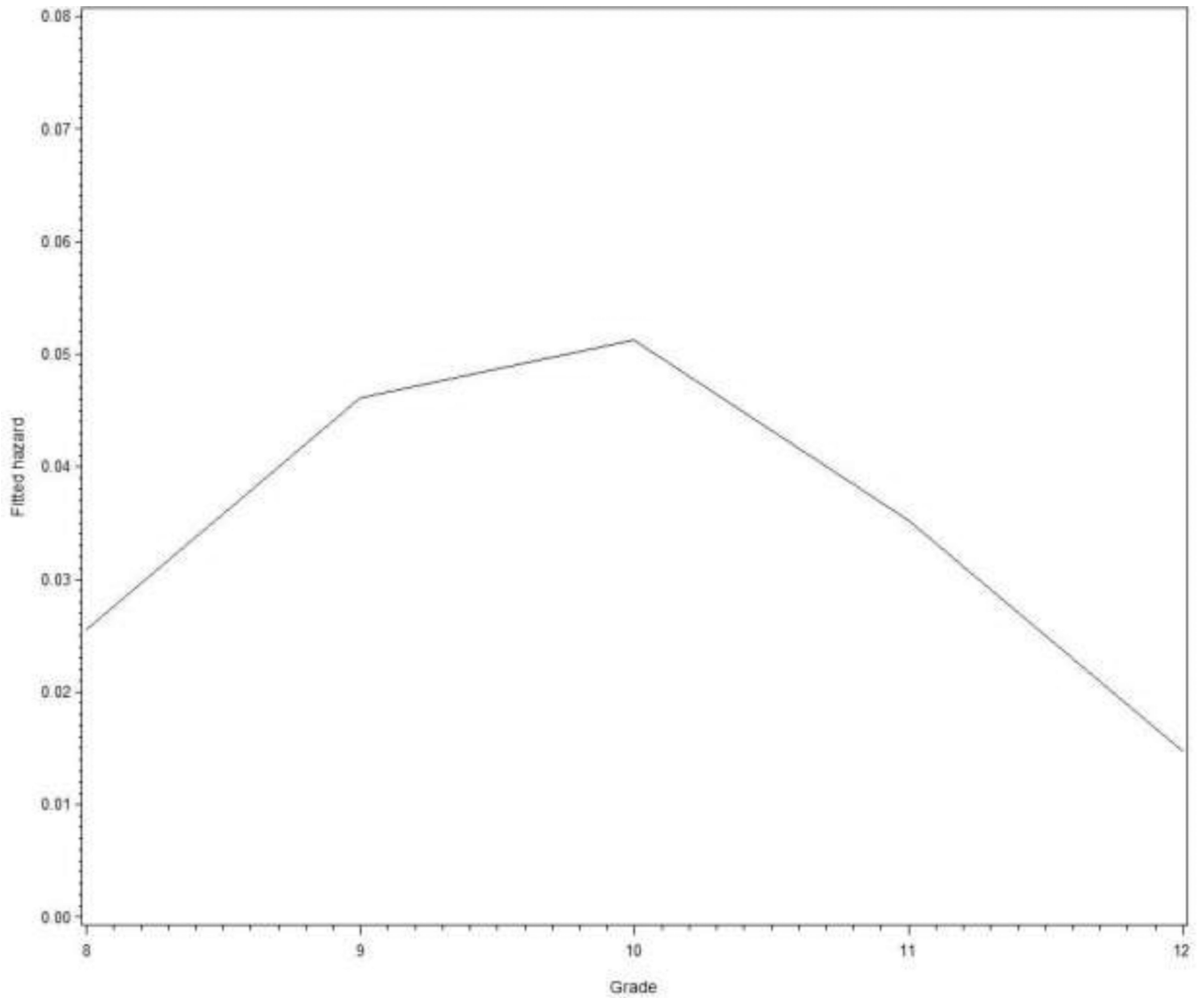
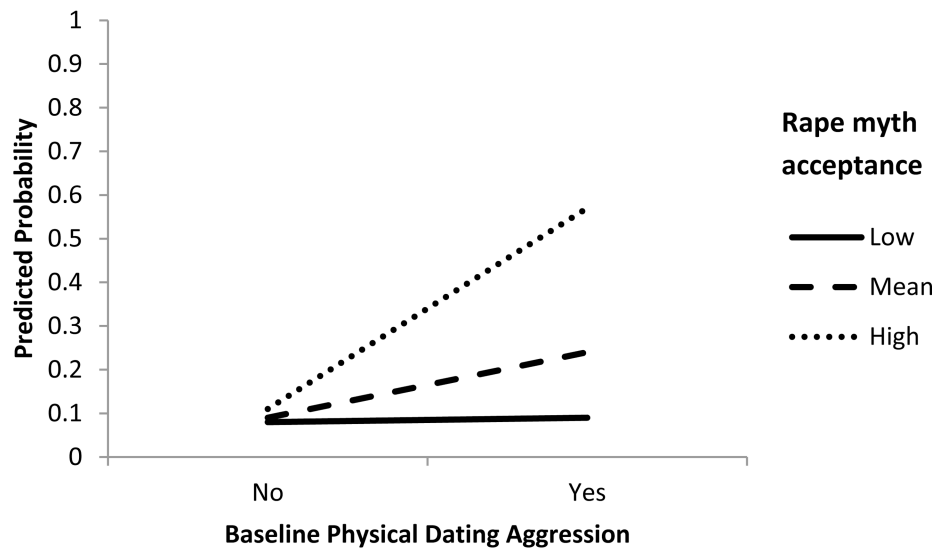


Fig. 2.
Hazard function for onset of sexual dating aggression among males across grades 8 through 12.

Panel A



Panel B

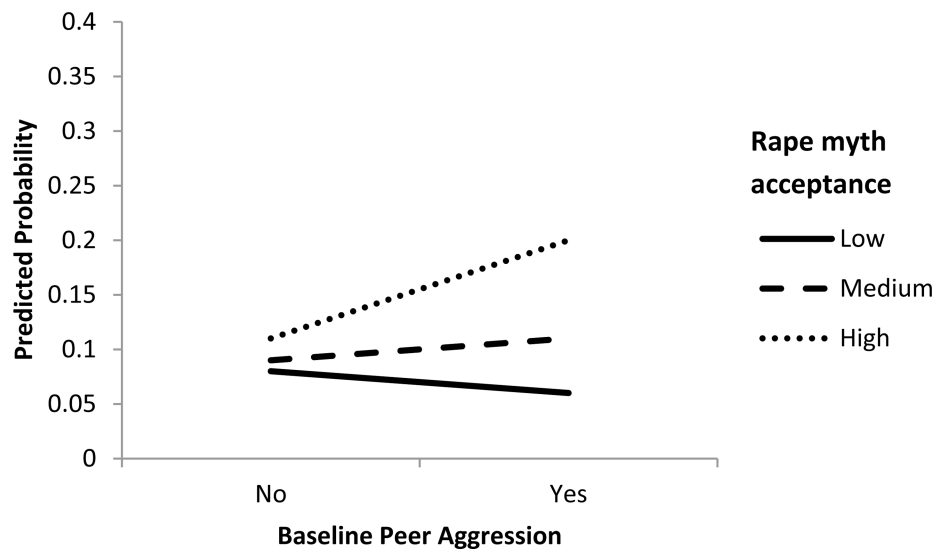


Fig. 3. Predicted probability of sexual dating aggression onset by baseline levels of rape myth acceptance (low=-1 std, average=sample mean, high=+1 std above the mean) and involvement in physical dating aggression (Panel A) and peer aggression (Panel B).

Table 1

Study Design

Wave	1	2	3	4	5	6
Calendar Month	October	May	May	May	May	May
Cohort 1 Grade	8	8	9	10	11	12
Cohort 2 Grade	9	9	10	11	12	--

Table 2

Descriptive statistics for predictor and outcome variables (n=559)

Individual variables	% or mean (SD)	1	2	3	4	5	6	7	8	9	10
<i>Distal propensity</i>											
1	Witnessed interparental violence	0.22 (0.56)	--								
2	Hit by an adult with intention to harm	0.32 (0.67)	0.34	--							
3	Forced sex	3.5	0.14	0.07	--						
<i>Proximal propensity</i>											
4	Rape myth acceptance	0.91 (0.68)	0.01	-0.01	0.10	--					
5	Peer aggression	0.68 (0.61)	0.14	0.24	0.08	0.19	--				
6	Physical dating aggression	6.5	0.13	0.21	0.15	0.07	0.20	--			
7	Use of control tactics against dates	13.3	0.08	0.09	0.03	0.10	0.07	0.29	--		
<i>Constraint</i>											
8	Parental monitoring knowledge	4.12 (0.90)	0.13	-0.19	-0.05	-0.12	-0.30	-0.12	-0.15	--	
9	Social bonding	-0.06 (0.98)	0.07	-0.12	0.01	-0.09	0.17	-0.06	-0.16	0.28	--
<i>Outcome</i>											
10	Sexual dating aggression onset	12	0.08	0.07	0.04	0.13	0.15	0.26	0.13	-0.06	-0.10
											--

Note: Italicized predictors are significantly correlated at p<.05

Table 3

Hazard models of the effect of baseline predictors on sexual dating aggression onset

Variable	Bivariate Model		Multivariate Model	
	Hazard Ratio	95% CI	Hazard Ratio	95% CI
<i>Propensity variables</i>				
Hit by adult	1.28	0.91–1.82	1.01	0.63–1.60
Witnessed domestic violence	1.45 [^]	0.98–2.13	1.30	0.80–2.12
Forced sex	1.48	0.43–5.10	0.62	0.16–2.36
Peer aggression (PA)	1.77 ^{**}	1.22–2.59	1.25	0.73–2.12
Rape myth acceptance (RMA)	1.86 ^{**}	1.23–2.83	1.28	0.76–2.18
Control tactics	1.93 [*]	1.01–3.74	1.20	0.58–2.51
Physical dating aggression (DA)	5.05 ^{***}	2.55–10.07	2.89 [*]	1.09–7.69
<i>Constraint variables</i>				
Social bonding	0.78 [*]	0.61–0.99	0.90	0.64–1.28
Parental monitoring knowledge	0.89	0.65–1.20	1.04	0.73–1.51
<i>Interactions</i>				
RMA × DA	--	--	4.14 [*]	1.01–16.78
RMA × PA	--	--	1.92 [*]	1.05–3.53

Note:

[^]
p<.10;^{*}
p<.05;^{**}
p<.01;^{***}
p<.001.

All parameter estimates are adjusted for grade, grade-squared, age, cohort, minority status, family structure, parent education, baseline number of dating partners and dating exposure.