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The Role of Heavy Alcohol Use in the Developmental Process of Desistance in Dating Aggression during Adolescence

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Abstract

The current study examined the role of heavy alcohol use in the developmental process of desistance in physical dating aggression during adolescence. Using longitudinal data spanning grades 8 through 12 we tested the hypotheses that (a) higher levels of early heavy alcohol use would be associated with decreased deceleration from dating aggression during late adolescence and (b) higher levels of heavy alcohol use during time-points in late adolescence would be contemporaneously associated with elevated levels of dating aggression at those same time points. Contrary to expectations, findings indicate that the effects of both early and continuing heavy alcohol use on dating aggression were strong during early adolescence but tended to diminish over time. Unexpectedly, the contemporaneous effects of alcohol use on dating aggression were stronger in the spring than in the fall semesters. Implications for prevention and for understanding developmental relations between the two behaviors are discussed.

Keywords

Alcohol use; Dating aggression; Longitudinal; Adolescence

Studies of physical aggression (Farrell et al. 2005; Karriker-Jaffe et al. 2008), youth violence (Office of the Surgeon General 2001) and delinquency (Windle 2000) suggest that these behaviors generally follow a curvilinear trajectory over time, in which perpetration increases up until middle or late adolescence and then drops off as adolescents transition into young adulthood. These studies further suggest that levels of and rates of acceleration and deceleration in these antisocial behaviors over time differ systematically across individuals. That is, while the normative pattern is one of increasing and then decreasing involvement in antisocial behavior over time, individual growth processes vary such that, for example, some individuals may report faster (or slower) rates of acceleration and/or deceleration relative to the average trajectory. In particular, researchers have posited that desistance (i.e., deceleration) in antisocial behavior over time is an individualized process

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that is influenced by individual and contextual risk and protective factors that may hinder or hasten the desistance process (Mulvey et al. 2004).

Recently, findings from longitudinal studies of adolescent dating violence suggest that trajectories of physical perpetration follow a curvilinear trajectory similar to that of other antisocial behaviors, with levels increasing up until middle to late adolescence and decreasing thereafter (Foshee et al. 2005, 2009). The finding that a similar developmental pattern holds across these different forms of antisocial behavior suggests that similar factors may play a role in influencing processes of desistance from these behaviors over time. However, whereas numerous studies have examined factors associated with desistance in antisocial behaviors such as peer violence and delinquency, only a handful of studies have examined trajectories of dating aggression, and none of these have explicitly examined factors associated with desistance in dating aggression.

One key risk factor that has been posited to influence the process of desistance in antisocial behavior is substance use, including heavy alcohol use. Specifically, elevated levels of substance use may act as a developmental snare (Moffitt 1993), trapping individuals into elevated patterns of antisocial behavior during time periods when desistance is normative (Hussong et al. 2004; Moffitt 1993). For example, Hussong et al. (2004) found support for hypotheses that both early and continuing substance abuse worked to hinder desistance in antisocial behavior during young adulthood. In the present article, we build from the work of Moffitt (1993) and Hussong et al. (2004) by examining the role that heavy alcohol use may play in understanding the process of desistance in physical dating aggression using a multi-wave longitudinal sample of adolescents that spans grades 8 through 12. This time period captures the period of increase and desistance in dating aggression, as evidence suggests that trajectories of physical dating violence perpetration tend to peak at age 16 or in the spring of 10th grade (Foshee et al. 2009).

Desistance in Antisocial Behavior and Dating Aggression

Moffitt's (1993) theory of antisocial behavior explicitly addresses the phenomenon of desistance in antisocial behaviors such as delinquency and peer aggression; Moffitt's theory posits that involvement in antisocial activities tends to desist when teens transition into young adulthood because the consequences of involvement in these antisocial activities shift from rewarding to punishing during this time period. That is, whereas during early adolescence teens may view antisocial behavior as a means of acquiring mature social status and privilege, in late adolescence and early adulthood this view shifts as there is increasing recognition that involvement in antisocial behavior limits job and relationship opportunities.

While Moffitt's (1993) theory does not explicitly address dating aggression, the same developmental forces that shape trajectories of antisocial behaviors like peer violence, crime and delinquency during adolescence may also influence involvement in partner violence. For example, adolescents may initiate and increase their use of dating aggression during early adolescence to mimic the abusive dating behaviors of antisocial youth who are perceived as more mature, autonomous, and experienced with dating and with sex (Moffitt 1993, p. 687). Dating abuse may also increase during early adolescence because young teens have not yet developed skills related to interpersonal communication (Furman and Shomaker 2008), conflict resolution (Furman and Shomaker 2008) and emotional control (Shulman 2003) that are needed to navigate the complex challenges involved in establishing relations with the other sex, such as the negotiation of intimacy, connectedness, exclusivity and sexual desire.

During late adolescence, the same developmental forces that drive desistance in antisocial behavior may also influence desistance in dating violence. For example, over time,

adolescents gain social, emotional and intellectual maturity. As a result, they become less susceptible to peer influence, less impulsive and emotionally reactive, more proficient in the use of interpersonal and conflict resolution skills and more oriented towards the future, all of which may work to encourage desistance in antisocial behavior, including dating violence (Mulvey et al. 2004; Steinberg 2008). In addition, with increased dating experience, older teens may become increasingly aware that abusive behaviors negatively impact their ability to initiate and maintain romantic relationships, a key developmental task (Furman and Shaffer 2003).

The Role of Substance Use in the Process of Desistance in Dating Violence Aggression

Moffitt's (1993) theory suggests that developmental “snares,” including substance abuse, may work to hinder desistance in antisocial behavior during late adolescence. For example, snares like substance abuse may diminish teens' abilities to recognize the negative consequences of their abusive behavior, develop interpersonal communication and conflict resolution skills, and take on conventional adult roles, all of which enable and promote desistance in dating abuse.

Based on Moffitt's (1993) notion of substance use as a developmental snare, Hussong et al. (2004) proposed two models that describe different pathways through which substance use may work to hinder desistance in antisocial behavior. The first model (called the “launch” model; Hussong et al. 2004) suggests that *early* involvement in substance use or abuse is a marker that identifies individuals who are on a long-term course of elevated antisocial behavior. That is, Hussong et al. (2004) suggest that substance use/abuse during early adolescence may be symptomatic of a broader syndrome of involvement in antisocial behavior that has its roots in early childhood and is characterized by persistence across the lifespan. Building on this reasoning, we further posit that the violent behavior of these “life-course persistent antisocial” youth may generalize to their romantic relationships as they begin to date. This notion is consistent with the cultural spillover theory of criminal violence (Baron and Straus 1987) and with the idea of heterotypic continuity in antisocial behavior over time (underlying continuity in dysfunction that manifests as different behavioral forms over time; Angold et al. 1999). In sum, as applied to this study, the *launch* model of the relationship between substance use and desistance in dating violence behavior, views *early* adolescent heavy alcohol use as a marker that presages life-course persistence in dating aggression.

The second model proposed by Hussong et al. (2004) suggests that substance use may have a “proximal” influence on antisocial behavior that interferes with processes of desistance during late adolescence. This model (called the “snares” model; Hussong et al. 2004) posits that elevated substance use *during time points in late adolescence* exerts a short-term or time-specific effect on antisocial behavior, such that the local effects of [substance use] alter the normative course of antisocial behavior when they or their sequelae are present (p. 1032). The *snares* model is therefore concerned with the time-specific effects of substance misuse during time points in late adolescence (when desistance is normative) on levels of antisocial behavior at those same time points. Applied to this study, the *snares* model suggests that teens who report elevated levels of heavy alcohol use during time points in late adolescence will also report higher levels of involvement in dating violence perpetration than one would expect during those time points, given their overall pattern of dating violence involvement.

Several potential mechanisms may explain why heavy alcohol use during time-points in late adolescence may snare teens into elevated patterns of dating aggression. First, heavy alcohol

use is posited to be proximally related to aggression, including dating aggression, through its psycho-pharmacological effects on cognitive function (Klosterman and Fals-Stewart 2006). In particular, intoxication can intensify feelings of excitement and curiosity, lead a person to overreact to perceived provocation, and decrease the saliency of cues that aggressive behavior will have negative consequences, thereby increasing risk of confrontation and violence. Second, the acute and chronic effects of alcohol on cognitive function may decrease teens' ability to recognize and adapt their behavior to reduce the negative consequences of dating violence and/or make it more difficult for teens to recognize and take advantage of opportunities to adopt conventional adult roles. Third, evidence suggests that heavy alcohol use in late adolescence may serve a social function that operates to maintain relations with deviant peers who condone or encourage antisocial behavior (Hussong et al. 2004), including abusive dating behavior.

In sum, both the *launch* and *snares* models suggest that elevated substance use will diminish the likelihood that an adolescent will respond to the developmental forces that normally work to extinguish antisocial behavior, including dating aggression, during late adolescence. The *launch* model is concerned with early substance use as a distal marker that explains inter-individual differences in trajectories of dating aggression. In contrast, the *snares* model is concerned with the time-specific, intra-individual effects of substance use during time points of normative desistance on dating aggression at those same time points. As suggested by the findings of Hussong et al. (2004), both models may operate to influence processes of desistance.

The Current Study

Based on the models described above, the current study examined two primary hypotheses about the effect of heavy alcohol use on desistance in physical dating aggression using longitudinal data from a multi-wave study of adolescents spanning grades 8 through 12. First, based on the *launch* model, we hypothesized that higher levels of heavy alcohol use during early adolescence would be associated with higher overall levels of dating aggression and decreased deceleration from dating violence perpetration during late adolescence. Second, based on the *snares* model, we hypothesized that higher levels of heavy alcohol use during assessment points in late adolescence, when the normative pattern is one of desistance in dating aggression, would be concurrently associated with higher levels of dating aggression during those time points relative to an individual's expected level of dating aggression. That is, the snares hypothesis predicts that higher levels of heavy alcohol use during late adolescence will result in time-specific elevations in aggression levels, leading an individual to deviate from their expected trajectory of desistance in dating abuse. In addition, because research on dating abuse suggests that some of the processes influencing perpetration may differ for boys and girls (e.g., Foshee et al. 2001), across both models we tested for sex differences in the pathways relating alcohol use to dating aggression.

Method

Participants

The sample for this study was drawn from a multi-wave cohort sequential examination of adolescent health risk behaviors that spanned middle and high school (Ennett et al. 2006). Dating violence was assessed beginning when participants were in the 8th, 9th and 10th grades. As such, the current study uses four waves of data starting when participants were in the 8th, 9th and 10th grades (wave one) and ending when participants were in the 10th, llth, and 12th grades (wave four). Participants were enrolled in two public school systems located in two predominantly rural counties with higher proportions of African Americans than in the general United States (U.S. Census Bureau 2001).

Data were collected at six-month time intervals for the first three waves and there was a one-year time interval between waves three and four. At each assessment all enrolled students in the targeted grades who were able to complete the survey in English and who were not in special education programs or out of school due to long-term suspension were eligible for the study. Trained data collectors administered the questionnaires in student classrooms on at least two occasions to reduce the effect of absenteeism on response rates. Parents had the opportunity to refuse consent for their child's participation by returning a written form or by calling a toll-free telephone number. Adolescent assent was obtained from teens whose parents had consented immediately prior to the survey administration. The Institutional Review Board for the School of Public Health at the University of North Carolina at Chapel Hill approved the data collection protocols.

At wave one, 6% of parents refused consent, 6% of adolescents declined to participate and 8% were absent on the days when data were collected for a total of 2636 students completing a survey at wave one. The response rate, calculated as the proportion of adolescents who completed a survey out of those eligible for the survey at wave 1 was 79%. For this study, analyses excluded students who; (1) reported being out of the typical age range of 12–19 for the grades studied (*n*=33, 1%), (2) did not report their dating status (n=83, 3%), (3) reported never dating across all of the assessments (*n*=171, 6%) or (4) were missing data on the dating violence measures across all waves of the study (*n*=38, 1%), yielding a sample size of 2311. Nearly all students participated in at least two waves of data collection (*n*=2157, 93%), with 75% participating in 3 or more waves (*n*=1741).

Approximately half of the sample was male (47%) and the self-reported race/ethnicity distribution was 45% White, 47% Black and 8% other race/ethnicity. At wave 1, 40% of participants reported that the highest education obtained by either parent was high school or less. Lifetime alcohol use prevalence at wave 1 was 62%, similar to that found in national studies of teen alcohol use (Johnston et al. 2009). Past-three month prevalence of any physical dating violence perpetration at wave 1 was 18%, which is within the range reported by other teen dating abuse studies (for a review see, Foshee and Matthew 2007). Table 1 presents the means, standard deviations and prevalence of past-three month heavy alcohol use and dating aggression by grade-level.

Measures

Measures included heavy alcohol use, physical dating violence perpetration, three demographic covariates (race, sex and parent education) and four psychosocial covariates (family conflict, emotional distress, peer aggression and social bonding). The psychosocial covariates were included in analyses to control for potential confounding given that both theory and empirical evidence suggests that each of these variables are associated with both dating violence and alcohol use (Reyes 2010). Measures of heavy alcohol use, dating violence and the four psychosocial covariates were collected at all waves. Time-invariant measures of heavy alcohol use and the psychosocial covariates were drawn from the baseline assessment for analyses of the *launch* hypothesis and time-varying measures were used for analyses of the *snares* hypothesis. Demographic control variables were time invariant.

Heavy alcohol use—Heavy alcohol use was assessed by four items asking adolescents how many times they had: 3 or 4 drinks in a row, 5 or more drinks in a row, gotten drunk or very high from drinking alcohol, or been hung over in the past 3 months. The items for this measure were adapted from two national studies: Monitoring the Future (Johnston et al. 2009) and the National Longitudinal Study of Adolescent Health (Resnick et al. 1997). Response categories ranged from zero (0) to 10 or more times (5). Item scores were

averaged to create a composite scale of heavy alcohol use at each wave (average Cronbach's α=.95).

Physical Dating Aggression—Dating aggression was measured at all waves using a short version of the Safe Dates Physical Perpetration Scale (Foshee et al. 1996). Adolescents were asked, “During the past 3 months, how many times did you do each of the following things to someone you were dating or on a date with? Don't count it if you did it in self-defense or play.” Six behavioral items were listed: “slapped or scratched them,”“physically twisted their arm or bent back their fingers,”“pushed, grabbed, shoved, or kicked them,”“hit them with your fists or with something else hard,”“beat them up,” and “assaulted them with a knife or a gun.” Response categories ranged from zero (0) to ten times or more (5) in the past 3 months. Scores were summed to create a physical dating aggression scale measure at each wave (average Cronbach's α=.93). Students who were not involved in dating at a given wave were given a score of zero.

Psychosocial Covariates—We assessed peer aggression using the same six behavioral items that were used to assess physical dating aggression except with peers as the reference. Adolescents were specifically asked to report acts perpetrated against peers and to exclude acts perpetrated against a date. Scores were averaged to create a composite scale of adolescent physical aggression at each wave (average Cronbach's α=.91).

Family conflict was assessed by three items from Bloom's (1985) self-report measure of family functioning. Adolescents were asked how strongly they agreed or disagreed with the following three items when thinking about their family life in the past 3 months; we fight a lot in our family, family members sometimes get so angry they throw things and family members sometimes hit each other. Item scores were averaged to create a measure of family conflict at each wave (average Cronbach's α=.87).

Emotional distress was measured as a composite of three scales assessing anger, anxiety and depression in the past 3 months. Anger was assessed by three items drawn from the revised Multiple Affective Adjective Checklist (MAACL-R) that asked adolescents how often they felt mad, angry or furious in the past 3 months (Zuckerman and Lubin 1985). Anxiety was measured using a shortened version of the Revised Children's Manifest Anxiety scale (Reynolds and Richmond 1979) and depression was measured using three items from the Short Mood and Feelings Questionnaire (Angold et al. 1995). We averaged item scores to create a subscale score for each construct (average α=.89 for anger, α=.89 for anxiety, α=.92 for depression) and then standardized and averaged the subscale scores to create a composite measure of emotional distress.

Social bonding was assessed as a composite of teen's endorsement of conventional beliefs, commitment to pro-social values, and degree of religiosity (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. Commitment to pro-social values was measured by assessing how important adolescents felt it is to: finish high school, go to college and have a happy family life. Degree of religiosity was assessed by three items assessing frequency of religious service attendance, the importance of religion to the adolescent and the extent to which religious beliefs influence the adolescent's actions. Item scores were averaged to create a sub-scale score for each construct (average α=.75 for prosocial values, α=.72 for conventional beliefs, α=.78 for religiosity). Subscale scores were standardized and averaged to create a composite measure of social bonding.

Demographic covariates—Sex was coded such that the reference group was female. Race/ethnicity was based on the adolescent's modal response across all waves of assessment and dummy coded to include White (reference group), Black, and other race/ethnicity (including Latinos). Parent education ranged from less than high school (0) to graduate school or more (5) and was measured as the highest education attained by either parent at baseline. Grade level was used as the primary metric of time and ranged from grade 8 (0) to grade 12 (4).

Analytic Approach

The overarching goal of this study was to examine the early and continuing effects of heavy alcohol use on processes of desistance in dating violence perpetration over time. To address this goal, we used multilevel growth curves to model the effects of baseline and time-varying measures of heavy alcohol use on trajectories of dating violence perpetration across grades 8 through 12. Data analysis occurred in several phases involving the reorganization of data based on grade rather than wave, imputation of missing data, centering of variables, estimation of unconditional trajectories of dating violence perpetration and hypothesis testing.

First, to take advantage of the cohort sequential design of this study, data were reorganized such that the grade level of the child was used as the primary metric of time rather than wave of assessment. This allowed for trajectories to be continuously modeled across grades 8 through 12. After combining across cohorts and reorganizing the data by grade, information was available across eight discrete data points: grade 8 fall (n=795), grade 8 spring (n=795), grade 9 fall (n=1586), grade 9 spring (n=791), grade 10 fall (n=2311), grade 10 spring (n=725), grade 11 fall (n=1516) and grade 12 fall (n=725). In previous analyses using this sample we found no evidence of cohort differences in dating violence perpetration growth trajectories, suggesting that data from each of the cohorts could be combined to estimate a single developmental curve across grades 8 through 12 (Reyes 2010). We also note that descriptive analyses of the data organized by grade suggested that correlations between heavy alcohol use and dating violence were stronger in the spring than in the fall semesters. Consequently we included an interaction between heavy alcohol use and semester in our testing of the *snares* model (described further below).

Next, we addressed the issue of missing data in our time-invariant and time-varying covariates through multiple imputation (Rubin 1987) using SAS PROC MI (SAS Institute 2003). Following standard recommendations (Rubin 1996), the imputation equation included all of the independent covariates and dependent variables assessed at each of the eight grade levels. Ten sets of missing values were imputed using multiple chain Marcov 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.

As noted earlier, whereas the *launch* hypothesis is concerned with the distal between-person effects of early heavy alcohol use on trajectories of dating aggression, the *snares* hypothesis is concerned with the within-person, time-varying effects of heavy alcohol use on the repeated measures of dating violence perpetration at each grade time-point. We followed the recommendations of Raudenbush and Bryk (2002, p. 183) for centering time-invariant and time-varying variables to ensure that our measures of early heavy alcohol use (drawn from wave 1) and time-varying alcohol use (drawn from all waves) did not confound between- and within-person effects. Specifically, for the *launch* models wave one heavy alcohol use was centered at the sample mean and for the *snares* models time-varying heavy alcohol use was person-mean centered. Similarly, across both model sets all other time-invariant

covariates were grand-mean centered and time-varying covariates were person-mean centered, with the exception of grade level, which was centered at grade 8.

We used a multilevel growth modeling approach to examine the functional form and error structure of unconditional trajectories characterizing physical dating aggression across grades 8 through 12 (for more detail on the process of determining the best-fitting trajectory model see, Reyes 2010). To adjust for non-normality in the distribution of the outcome the repeated measures for dating violence were logged. The Bayesian Information Criterion, multivariate Wald tests and component fit were used to determine the best-fitting model. Dependence induced by nesting of students within schools was negligible (average Intraclass Correlation<0.01, average Design Effect<2.00) and adjusting for nesting had no effect on the growth factor means or variances. As such the models reported below do not account for the nested structure, but are likely not biased by this omission.

To test the *launch* and *snares* hypotheses we estimated a series of conditional multilevel models. The *launch* hypothesis was tested by formulating a conditional model that included wave one heavy alcohol use and the interactions of alcohol use with grade and grade-squared. This model produced parameter estimates that denoted the effect of early (baseline) heavy alcohol use on: (1) initial levels of dating aggression (intercept effect), (2) initial increases in aggression (slope effect) and (3) deceleration in aggression (quadratic effect). Demographic and time-invariant (baseline) measures of the psychosocial covariates were included as controls for potential confounding. The potential for sex differences in the effects of early heavy alcohol use was examined by including interaction terms between (1) sex and alcohol use, (2) sex, alcohol use and grade and (3) sex, alcohol use and grade-squared. A multivariate Wald test was used to assess the joint contribution of the interaction terms to the model.

The *snares* hypothesis was tested by formulating a conditional model that included time-varying heavy alcohol use as a predictor of the repeated measures of dating aggression. Demographic and time-varying psychosocial covariates were included as controls for potential confounding. In addition we examined variability in the effects of heavy alcohol use over time by including interaction terms between heavy alcohol use and grade and between heavy alcohol use and semester (semester was coded as “0” = fall semester and “1” = spring semester). Finally, we examined the potential for sex differences in the time-varying effects of heavy alcohol use by including 2- and 3-way interaction terms between sex and; (1) heavy alcohol use, (2) heavy alcohol use and grade, and (3) heavy alcohol use and semester. Multivariate Wald tests were used to test the joint significance of the interaction terms.

Results

Parameter estimates for the unconditional dating aggression growth trajectory model are presented in Column 1 of Table 2. The best fitting model was quadratic in the fixed effects, included a random intercept and allowed for heteroscedastic residual variance over time. The model-implied mean trajectory for the sample suggests that the developmental trajectory for physical dating aggression first increases during early adolescence, peaks at the end of grade 10, and then desists during late adolescence. Residual variances in the repeated measures of perpetration were significant across all grade levels at $p<0.001$, indicating that there was substantial variability in the repeated measures of perpetration that was not explained by the underlying trajectory process. Across both the launch and snares models the pattern of findings did not change across models with and without control variables; parameter estimates for the models that included the control variables are presented and discussed.

Launch Model

Parameter estimates from the *launch* model are presented in Column 2 of Table 2. Heavy alcohol use was significantly positively associated with the trajectory intercepts (b=0.23, p<0.001), significantly negatively associated with the linear trajectory component (b=−0.11, p<0.001), and significantly positively associated with the quadratic trajectory component (b=0.01, p<0.05). There was no evidence of sex differences in this pattern of effects, F(3, 130=1.22, p=.30).

The pattern of results from the *launch* model is graphically depicted in Fig. 1, where we plot the model-implied mean trajectories of dating aggression for individuals who at baseline reported no heavy alcohol use, average levels of heavy alcohol use and high levels of heavy alcohol use (set as +1 standard deviation above the mean). On average, individuals who reported high levels of heavy alcohol use at baseline tended to report relatively high levels of dating aggression during early and middle in adolescence. However, the effects of early heavy alcohol use diminished significantly over time so that by late adolescence the perpetration levels for early heavy alcohol users did not differ from individuals who reported no heavy alcohol use in early adolescence (see Fig. 1). Accordingly, the findings from this study are not consistent with our *launch* hypothesis that heavy alcohol use early in adolescence identifies youth who are on a long-term course of persistent dating violence behavior across grades 8 through 12.

Snares

The results of the *snares* models are presented in Table 3. There was a significant positive main effect of the time-varying measure of heavy alcohol use on dating violence perpetration (b=0.13, p<0.001), and there were significant interactions between heavy alcohol use and both grade (b=−0.03, p<0.05), and semester (b=0.08, p<0.05). Again, there were no sex differences in the pattern of effects, F(3, 137)=0.55, p=.65. In the context of the positive main effect for alcohol use, the negative interaction of alcohol use with grade suggests that the strength of the proximal (within-grade level) effect of heavy alcohol use on dating violence perpetration diminished as grade level increased. In contrast, the significant positive interaction between alcohol use and semester suggests that the strength of the proximal effect of heavy alcohol use on repeated measures of perpetration was stronger in the spring than in the fall semesters.

To further probe these interactions we modified the model so that the variable indexing grade level in the interaction with heavy alcohol use was treated as a categorical classification variable. That is, rather than treat grade level as a continuous variable in the interaction with heavy alcohol use, we treated it as a categorical variable with eight different levels (grade 8 fall, grade 8 spring, grade 9 fall, etc.). This enabled us to produce separate parameter estimates for the effect of heavy alcohol use on dating aggression within each grade level. The results of this model are graphically presented in Fig. 2, which shows the parameter estimates and 95% confidence intervals for the effects of heavy alcohol use on dating aggression within each grade-level. Results indicate that teens who reported elevated levels of heavy alcohol use also reported higher levels of dating aggression than one would expect given their overall level of perpetration, across all but two grade-time points (the fall semesters of grades 10 and 12). In addition, as suggested by the significant interaction terms between grade and heavy alcohol use and semester and heavy alcohol use, parameter estimates for the effect of heavy alcohol use on perpetration were generally higher in the spring than in the fall semesters but tended to decrease in strength over time. This pattern of results provides limited support for our *snares* hypothesis. That is, consistent with our *snares* hypothesis, heavy alcohol use was related to elevated levels of perpetration in grades 10.5 and 11, when aggression levels topped off and began to decline; however, contrary to

our hypothesis, effects were weaker in late adolescence and no effects were found in grade 12.

Discussion

In general, results suggest that heavy alcohol use is associated with higher levels of physical dating aggression during adolescence. However, effects were time-dependent and findings do not fully support our two primary hypotheses that both early (the *launch* hypothesis) and time-varying (the *snares* hypothesis) heavy alcohol use hinder the developmental process of desistance in dating aggression during late adolescence.

Launch—As applied in the current study, the *launch* hypothesis posits that heavy alcohol use during early adolescence (baseline alcohol use) is an indicator of a broader pattern of involvement in antisocial behavior that begins in childhood, generalizes into dating violence as teens begin to date, and then persists across late adolescence, when the normative pattern is one of desistance in dating violence. This hypothesis implies that higher levels of heavy alcohol use early in adolescence will be associated with higher overall levels of dating aggrsesion across grades 8 through 12. The findings of the current study do not support this hypothesis. Although higher levels of heavy alcohol use at baseline were associated with higher levels of aggression in early and middle adolescence (consistent with our hypothesis), effects faded over time such that, by late adolescence, early heavy alcohol use was no longer predictive of individual differences in levels of dating violence perpetration (contrary to our hypothesis). Following, we propose several potential explanations for this finding.

First, early adolescent heavy alcohol use alone may not be a sufficiently precise indicator of life-course persistent involvement in antisocial behavior, including dating aggression. Indeed Moffitt's (1993) theory describes a number of early, cumulative and continuing forces (e.g., genetic factors, neurologic dysfunction, child maltreatment) that together with heavy alcohol use may contribute to set adolescents on a trajectory of life-course persistence in antisocial behavior. As such, there may be some heterogeneity in the types of teens who engage in heavy alcohol use during early adolescence such that, for teens with multiple risk factors (e.g., child maltreatment, neurologic dysfunction), early heavy alcohol use presages a life-course persistent pattern of antisocial behavior (as we hypothesized), whereas for others early heavy alcohol use may be indicative of a more short-term pattern of early involvement in problem behavior, including dating aggression, that desists across middle and late adolescence. Accordingly, we recommend that future studies of the *launch* model examine interactions among multiple risk factors measured during childhood and early adolescence in predicting patterns of desistance in dating aggression over time.

A second related explanation for the diminishing effects of early heavy alcohol use on levels of dating aggression over time is developmental. Specifically, while it is clear that early experiences have an effect on later psychopathology, researchers have suggested that their influences are likely mediated, moderated and sometimes reversed by later, more proximal, experiences (Schulenberg et al. 2004). Indeed, research on developmental risk factors for youth violence (Herrenkohl et al. 2000) suggests that proximal risk factors may have stronger effects than distal risk factors in predicting persistence from antisocial behavior over time. In the context of the current study, this reasoning suggests that the direct effect of early heavy alcohol use on trajectories of dating violence may diminish over time as other, more proximal, experiences and influences attenuate effects and gain importance in explaining variability in perpetration levels (e.g., family management practices, peer group influences, opportunities for prosocial engagement).

A third explanation for the pattern of findings in the *launch* model is that, over time, individuals who engage in heavy alcohol use early in adolescence may tend to date less frequently and therefore have fewer opportunities to engage in abusive dating behaviors. Although there is no research available to support this notion, it is possible that early heavy alcohol users may increasingly be seen as unattractive to potential romantic partners. Unfortunately while individuals who did not date across the study period were eliminated from the analysis sample for this study, we did not measure dating frequency and therefore could not control for this variable in our analyses.

Snares—As applied to the current study, the *snares* hypothesis posits that higher levels of heavy alcohol use during assessment points in late adolescence, when the normative pattern is one of desistance in dating aggression, will be concurrently associated with higher levels of dating abuse during those time points relative to an individual's expected level of dating abuse. The findings from this study provide some support for this hypothesis. In particular, consistent with our hypothesis, heavy alcohol use was significantly positively associated with dating aggression across most of the grade-time points assessed in the study, including in grades 10.5 and 11 when dating violence perpetration slows and then desists. This finding is consistent with the notion that heavy alcohol use during late adolescence can actively hinder the desistance process, snaring individuals into elevated levels of perpetration during time periods of normative deceleration.

However, contrary to our hypothesis, we also found that the proximal effect of heavy alcohol use on dating violence perpetration tended to diminish as grade level increased, and was not significant in grade 12. This finding is consistent with results from longitudinal studies that have found that the strength of the correlation between alcohol use and non-dating aggression tends to diminish over time (e.g., Huang et al. 2001). Perhaps these findings can be explained by developmental changes in teens' levels of aggressive inhibitions and/or their self regulatory capacities (Steinberg 2008). In particular, researchers focused on the acute effects of alcohol use on aggression have suggested that cognitive (e.g., acceptance of dating violence), social (e.g., friends' acceptance of dating abuse) and neuropsychological (e.g., ability to generate non-aggressive responses to provocative situations) factors may work synergistically with alcohol use to lower aggressive inhibitions and increase the likelihood of violent behavior (Klosterman and Fals-Stewart 2006). We reason that, as dating aggression becomes increasingly non-normative during late adolescence, teens' acceptance of dating violence may decrease and their ability to appropriately respond to (due to increased self-regulatory capacities; Steinberg 2008) and resolve conflict (due to accumulating experience with interacting with romantic partners; Shulman 2003) may increase, contributing to higher inhibitions against the use of dating aggression and leading to a weakening of the overall relationship between alcohol use and dating abuse. Similarly, as teens grow older romantic relationships are generally characterized by greater intimacy and commitment, which may, on average, contribute to higher inhibitions against the use of dating aggression.

The pattern of results from the snares model could also reflect changes in the risk profile that characterizes heavy alcohol users over time. That is, during early adolescence, when heavy alcohol use is non-normative, teens who are involved in heavy alcohol use may generally tend to have aggressive perceptual and behavioral propensities, thereby increasing the likelihood that the disinhibiting effects of alcohol use will lead to dating aggression. In contrast, because heavy alcohol use becomes increasingly normative during late adolescence, older teens who engage in heavy alcohol use may be a much more heterogeneous group in terms of their aggressive inhibitions, weakening the overall relationship between heavy alcohol use and dating aggression.

We also note that the *snares* model suggests an interesting pattern of periodicity in the effects of alcohol use on dating aggression such that effects tended to be stronger in the spring than in the fall semesters. Adolescent suicide and homicide have also been found to vary across seasonal periods; homicide event rates are highest near the start of the fall and spring semesters and suicide event rates are highest during the spring semester (Centers for Disease Control and Prevention [CDC] 2001). In the current study, our fall assessment covered the period from August through October and our spring assessment covered the period from January through March. One potential explanation for the pattern of effects is that over the course of the school year teens may renew, develop and solidify social relations with their peers and romantic partners. As such, during the spring semester teens may have increased exposure to social opportunities in which dating violence and heavy alcohol use may co-occur. While we are reluctant to put too much emphasis on this finding given that it was not hypothesized a *priori*, our study suggests that future research should assess the potential for seasonal differences in relations between alcohol use and dating aggression.

Finally, across all models, findings suggest that the effects of alcohol use on dating aggression did not vary by sex. This finding is largely consistent with the empirical literature. For example, studies of adult partner violence have found a significant association between alcohol use and both male-to-female and female-to-male partner aggression (for a meta-analysis, see Foran and O'leary 2008).

Limitations and Future Directions

The current study has some important limitations that should be noted. First, although our *snares* hypothesis suggest a direction of influence from alcohol use to dating aggression, our study was not designed to distinguish among the various causal mechanisms that may explain covariation between the two behaviors (Klosterman and Fals-Stewart 2006). While our *snares* models do adjust for covariance between the two behaviors due to shared risk factors we cannot infer causality or temporal ordering between alcohol use and dating violence, nor can we determine whether adolescents were drinking at the time of their involvement in dating aggression. To better establish temporal ordering, future studies of adolescent alcohol use and dating violence should take advantage of innovative new methods, including ecological momentary assessment methods, which enable the assessment of proximal relationships between the two behaviors over short time-periods (e.g., Fals-Stewart 2003).

Second, although the time-span encompassed by this study includes much of the adolescent developmental period, we did not assess teens during the spring of grades 11 or 12 or during the transition to young adulthood. As such, there were a limited number of assessment points during the period of normative desistance in dating aggression. Future longitudinal research should build on the current study by examining relations between alcohol use and dating aggression across multiple time points during late adolescence and early adulthood. Third, because our sample was drawn from predominantly rural areas it is unclear whether study findings would generalize to urban settings.

Implications

To our knowledge, the current study is the first to examine the role alcohol use may play in understanding the process of desistance in adolescent dating aggression. Findings suggest that interventions that prevent or reduce heavy alcohol use during early adolescence may also reduce dating violence perpetration during early and middle adolescence by both boys and girls. In addition, prevention efforts that target heavy alcohol use during late adolescence may reduce dating aggression among older teens and hasten desistance.

Findings also highlight the importance of applying a developmental perspective to increase understanding of how the interrelations among health risk behaviors and their determinants are embedded in the life-course (Cicchetti and Rogosch 2002). In particular, contrary to the notion that perpetrators of dating aggression during adolescence will inevitably end up perpetrating partner violence during young adulthood, accumulating evidence suggests that, on average, dating aggression tends to desist during late adolescence. A better understanding of this developmental pattern, which mirrors that of other antisocial behaviors, will require more theorizing and research into the mechanisms that explain this normative shift towards desistance and further study of both the distal and proximal factors that may influence the desistance process.

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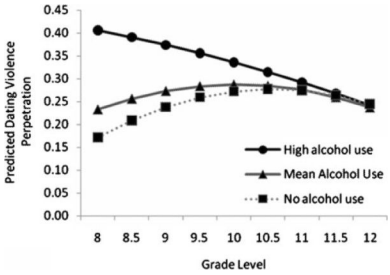

Fig. 1.

Predicted mean trajectories of physical dating aggression across grades 8 through 12 at different levels of early (baseline) heavy alcohol use. *Note*. To produce the predicted mean trajectories baseline heavy alcohol use was set at zero (no alcohol use), the sample mean at baseline (mean alcohol use) and one standard deviation above the mean (high alcohol use). The model controls for demographic (race, sex and parent education) and psychosocial (family conflict, peer aggression, social bonding, emotional distress) covariates

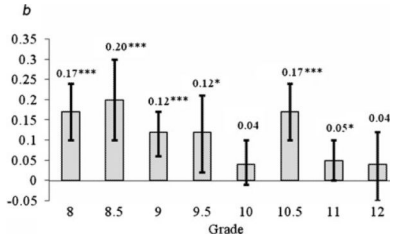

Fig. 2.

Regression coefficients and 95% confidence intervals for the contemporaneous effects of heavy alcohol use on dating aggression across grades 8 through 12. Note. Heavy alcohol use is time-varying and person-mean centered. The model controls for demographic (race, sex, parent education) and psychosocial (family conflict, peer aggression, social bonding, emotional distress) covariates. * $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 1

Means and standard deviations for past 3 month physical dating aggression and heavy alcohol use by grade-level

Grade	n	Dating violence		Alcohol use	
		M (SD)	%	M (SD)	%
8	795	0.20 (.52)	16	0.14 (.57)	11
8.5	795	0.24 (.65)	16	0.17 (.62)	12
9	1586	0.24 (.59)	18	0.29 (.79)	20
9.5	791	0.26 (.65)	19	0.28 (.76)	20
10	2311	0.25 (.61)	18	0.33 (.80)	24
10.5	725	0.29 (.70)	20	0.43 (.99)	27
11	1516	0.25 (.61)	18	0.38 (.84)	27
12	725	0.19 (.50)	15	0.36 (.78)	29

Percentages were calculated as the proportion of respondents reporting any physical dating aggression and the proportion reporting any heavy alcohol use in the past 3 months within each grade-level

Table 2

Results for the unconditional model and the conditional (*launch*) model of the effects of baseline heavy alcohol use on trajectories of physical dating aggression

Parameter	Model	
	Unconditional	Launch
Fixed effects		
Intercept	0.20 (0.02)***	0.23 (0.03)***
Grade	0.07 (0.02)**	0.05 (0.03)
Grade*Grade	−0.02 (0.01)**	−0.01 (0.01)
Early heavy alcohol use	–	0.23 (0.03)***
Early heavy alcohol use*grade	–	−0.11 (0.03)***
Early heavy alcohol use*grade*grade	–	0.01 (0.01)*
Random effects (mean)		
Intercept	0.09 (0.01)***	0.05 (0.01)***

The unconditional model constrained the random effects for the slope (grade) and quadratic (grade*grade) factors to zero. Residual errors were allowed to vary over time and were significant ($p<0.001$) across all grade levels. For the *launch* model heavy alcohol use was drawn from baseline and was grand-mean centered. The *launch* model controlled for demographic (race, sex and parent education) and baseline psychosocial covariates (family conflict, emotional distress, social bonding, and peer aggression)

* $p<0.05$

** $p<0.01$

*** $p<0.001$

Table 3

Results for the conditional (*snares*) model of the contemporaneous effects of heavy alcohol use on physical dating aggression across grades 8 through 12

Parameter	B (se)
Intercept	0.23 (0.03)***
Grade	0.04 (0.03)
Grade*Grade	−0.01 (0.01)
Heavy alcohol use	0.13 (0.03)***
Heavy alcohol use*grade	−0.03 (0.01)*
Heavy alcohol use*semester	0.08 (0.03)**

Random effects for the slope (grade) and quadratic (grade*grade) factors were constrained to zero. Residual errors were allowed to vary over time and were significant ($p<0.001$) across all grade levels. The heavy alcohol use measure was time–varying and was person-mean centered. Parameter estimates are from a model that controlled for time-invariant demographic (race, sex and parent education) and time-varying psychosocial (family conflict, emotional distress, social bonding, and peer aggression) covariates

* $p<0.05$

** $p<0.01$

*** $p<0.001$