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Longitudinal Trajectories of PTSD Symptoms and Binge Drinking Among Adolescent Girls: The Role of Sexual Victimization

Abstract

Purpose—Many studies have documented associations among sexual victimization (SV), posttraumatic stress disorder (PTSD) symptoms, and alcohol use; however, few have examined these associations longitudinally among adolescents. The present study evaluated the impact of SV on the longitudinal trajectory of PTSD symptoms and binge drinking (BD) among adolescent girls, a population known to have high rates of SV and alcohol use.

Methods—Participants (N = 1,808 at wave 1) completed interviews regarding PTSD symptoms, BD, and SV experiences over approximately three years.

Results—Multilevel modeling revealed decreases in PTSD symptoms over the course of the study; however, compared to non-victims, SV adolescents reported greater PTSD symptoms at wave 1 and maintained higher levels of PTSD symptoms over the course of the study after controlling for age. SV reported during the study also predicted an acute increase in PTSD symptoms at that occasion. BD increased significantly over the course of the study; however, SV did not predict initial BD or increases over time. SV reported during the study was associated with acute increases in BD at that occasion, although this effect diminished when participants reporting substance-involved rape were excluded.

Conclusions—SV was associated with immediate and long-lasting elevations in PTSD symptoms, but not with initial or lasting elevations in BD over time, suggesting that adolescent victims have yet to develop problematic patterns of alcohol use to cope with SV. However, SV was associated with acute increases in PTSD symptoms and BD, suggesting a need for BD interventions to reduce alcohol-related SV.

Keywords

adolescence; longitudinal; sexual victimization; alcohol use; PTSD symptoms

Sexual victimization (SV) is associated with sequelae such as anxiety, depression, posttraumatic stress disorder (PTSD), substance abuse, interpersonal difficulties, and health problems (e.g., Filipas & Ullman, 2006). National surveys indicate that 1.8 million adolescents ages 12–17 report at least one SV (Kilpatrick, Saunders, & Smith, 2003). High rates of SV may be due, in part, to the fact that adolescence is a developmental time-period when dating violence and peer SV are unfortunately common (Wolitzky-Taylor et al., 2008; Young, Gray, & Boyd, 2009). Although population prevalence estimates suggest that only 1.6% of adolescents experience severe victimization (including SV) in the context of a dating relationship (Wolitzky-Taylor et al.), studies using broader definitions of SV (e.g.,

unwanted kissing or touching) reveal that approximately 51% of female high school students report SV by a peer (Young et al.).

Not only is SV prevalent among adolescents, but cross-sectional studies have identified this form of interpersonal violence as a robust predictor of adolescent PTSD symptoms (e.g., McCauley et al., 2009). A literature review on population prevalence and societal costs of PTSD suggests that individuals with PTSD symptoms endorse increased physical and mental health problems as well as greater utilization of health care services (Kessler, 2000). From a public health perspective, better understanding the course of PTSD symptoms is critically important for intervention efforts.

Adolescents comprise a population in which the longitudinal course of PTSD symptoms has been relatively understudied. Existing investigations are limited in that they have typically followed extremely small samples over time in response to discrete events. For instance, among nine adolescents exposed to a maritime accident, PTSD symptoms persisted after one year but dissipated three years following the accident (Maeda, Kato, & Maruoka, 2009). Similarly, among 108 hospitalized adolescents with a traumatic injury, between 19 and 38% of the sample screened positive for PTSD symptoms during one-year follow-up (Zatzick et al., 2006). However, the paucity of data linking more common traumatic events to PTSD trajectories highlights a need to study how SV predicts the longitudinal course of PTSD among adolescents. It also may be important to consider the acute impact that additional victimization may have on PTSD symptoms over time. For instance, older adolescents experiencing ongoing SV endorse more severe distress relative to those reporting distal SV (Green et al., 2005). Thus, adolescents reporting a new SV during the study may have increased PTSD symptoms at that occasion.

In addition to playing a role in the etiology of PTSD symptoms, SV has been linked with increased risk for alcohol use and dependence (e.g., Danielson et al., 2009; Sartor et al., 2007). Among nationally representative samples, 12.4% of adolescents reporting child abuse/neglect also endorse binge drinking (BD; consuming 5 or more drinks on a single occasion) compared with 9.9% of non-abused adolescents (Shin, Edwards, & Heeren, 2009). This finding extends to young adulthood as sexually victimized college women report drinking to intoxication more frequently than non-victims (Rodriguez-Srednicki, 2001). To explain this link, researchers have established that victims may cope with or self-medicate abuse-related negative emotions by using alcohol (Grayson & Nolen-Hoeksema, 2005). Further, among young adults, reciprocal relationships have been established between SV and BD (Testa, Livingston, & Hoffman, 2007). These findings suggest that SV not only precedes alcohol use, but also may result from alcohol use. However, BD varies among adolescents such that four distinct trajectories have been identified: early high BD, increasing BD, late onset BD, and non BD (D'Amico et al., 2001; Hill, White, Chung, Hawkins, & Catalano, 2000). Given variability in adolescent alcohol consumption, it is unclear how SV will affect the development and course of alcohol use problems among adolescents.

The Current Study

The purpose of the present study was to examine how SV impacts the longitudinal course of PTSD symptoms and BD among adolescent girls. The first goal was to explore the trajectory of PTSD symptoms and BD among girls over a three year time period. Longitudinal studies suggest that adolescent PTSD symptoms initially remain static but decrease after one year (Maeda et al., 2009); therefore, we expected a similar trajectory of PTSD symptoms here. Adolescents also report increased frequency and quantity of alcohol consumption over time (White et al., 2006); therefore, we expected an increase in BD over the study. The second goal was to examine the effect of SV on initial PTSD symptoms and frequency of BD, as

well as on the trajectory of PTSD symptoms and BD frequency over time. Because SV is a complex variable that reflects both the presence or absence of SV at a measurement point as well as membership of a static group (e.g., sexually victimized individuals), we hypothesized that those who had ever experienced SV (i.e., lifetime SV) would report more severe PTSD symptoms and BD at wave 1 and a slower decrease in PTSD symptoms and a significant increase in BD over time when compared to those who had never experienced SV. Participants who reported SV at a specific measurement occasion (i.e., waves 1, 2, or 3) were expected to evidence an increase in PTSD symptoms and BD at that measurement point. Older adolescents may have had greater opportunity for SV and BD to take place; therefore, age was controlled for in all analyses.

Method

Participants

The National Survey of Adolescents-Replication (NSA-R) is a longitudinal, nationally representative study of adolescents aged 12-17 years ($N=3,614$ at wave 1) designed to assess the prevalence, risk factors, and mental health outcomes of exposure to potentially traumatic events. Given the low prevalence of SV among male adolescents over the three waves (3.8% reported SV at wave 1, 0.6% at wave 2, and 1% at wave 3), the current study focused on the 1,808 NSA-R female participants. The NSA-R sample consists of a national household probability sample and an oversample of urban-dwelling youth. To correct for oversampling, data were weighted to bring the sample in line with the adolescent U.S. population based on 2005 Census data. Mean age at wave 1 was 14.50 ($SD = 1.71$). Regarding racial/ethnic makeup, 69% were Caucasian, 13% were African-American, 10% were Hispanic, 3% were Native American, and 3% were Asian/Pacific Islander. Demographic characteristics did not differ significantly from those of the full sample. For detailed descriptions of sampling and methodological procedures, refer to McCauley et al. (2010) or Wolitzky-Taylor et al. (2008).

Measures

Sexual victimization history—SV history was assessed using behaviorally specific, dichotomous questions regarding a series of unwanted sexual experiences, including: (a) forced anal, vaginal, and/or oral sex; (b) forced digital penetration and/or foreign object penetration; (c) forced touching of genitalia at least once in the youth's lifetime, and/or (d) any of the aforementioned events when the adolescent was voluntarily or involuntarily incapacitated by drugs and/or alcohol. Specific wording of questions and details of this methodology are available in past publications (Kilpatrick et al., 2000; 2003). At each assessment, participants were asked if they had experienced SV since the previous assessment. Dichotomous responses at each wave were used to create the time-varying SV variable, and participants who reported SV at any wave were considered lifetime victims.

PTSD—The PTSD module of the NSA survey (Kilpatrick et al., 2000) and the National Women Survey (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993) was used to assess current PTSD symptoms. This structured diagnostic interview assessed each DSM-IV symptom with a yes/no response indicating the presence of a symptom during the last 6 months. Research provides support for its concurrent validity, temporal stability, internal consistency, and diagnostic reliability (Resnick et al., 1993; Ruggiero, Rheingold, Resnick, Kilpatrick, & Galea, 2006), and it was validated against the PTSD module of the Structured Clinical Interview for the *DSM* (SCID) administered by mental health professionals (Kilpatrick et al., 1998). Because the three-cluster PTSD diagnosis has not been supported with adolescents (Ford et al., 2009), we used a symptom count (ranging from 0-17) reflecting the number of DSM-IV PTSD symptoms endorsed rather than diagnostic status.

Binge Drinking (BD)—BD was defined as number of days participants reported consuming five or more drinks on a single occasion in the previous twelve months.

Procedure

Data collection procedures were approved by the Institutional Review Board and similar to those used in the 1995 NSA (Kilpatrick et al., 2000). Participants were selected using a multistage, regionally stratified, random-digit dial procedure. Structured telephone interviews took an average of 43 minutes and were administered in English by trained interviewers employed by Shulman, Ronca, and Bucuvalas, Inc., (SRBI), an experienced survey research firm. A computer-assisted telephone interview system prompted interviewers with each question consecutively on a computer screen, and supervisors conducted random checks of data entry accuracy and interviewers' adherence to assessment procedures. Parental consent and adolescent assent were obtained prior to the interview. Although parents provided demographic information, the majority of the interview was conducted with the adolescent. All data for the present study were collected from adolescents. Wave 1 data were collected in 2005, wave 2 between 2007 and 2008, and wave 3 between 2007 and 2009. Mean number of months between wave 1 and wave 2 was 15.29 ($SD = 4.58$), and mean number of months between wave 2 and wave 3 was 14.44 ($SD = 2.67$).

Attrition

Of the 1,808 female adolescents measured at wave 1, 1,258 (70%) completed wave 2, and 819 (45%) completed wave 3. Adolescents reporting SV at wave 1 were less likely to complete all three waves of the study ($\chi^2 = 7.15, p < .01$). Specifically, 37% of adolescents reporting SV at wave 1 completed all three waves of the study compared with 47% of adolescents without wave 1 SV experiences. Completers and non-completers did not differ in PTSD symptoms or BD at wave 1.

Analytic Approach

Multilevel models (MLM) provide a means of distinguishing between-person and within-person effects of longitudinal predictors while accommodating dependency in the residuals arising from longitudinal measurements via flexible variance structures (e.g., random effects). MLM also allows for modeling of individual differences in times between measurement occasions. The present study employed MLM via Mplus version 5.0 (Muthen & Muthen, 2008) to test the random linear effects model depicted in Figure 1. On Level 1, the within-person effect of time and the time-varying effect of SV were modeled as predictors of PTSD symptoms and past-year BD. On level 2, the between person effect of lifetime SV was modeled while controlling for age at wave 1. Missing data were handled using maximum likelihood estimation with robust standard errors (MLR), which permits analysis of data missing at random (MAR). MLR uses all available data to test various combinations of population parameter estimates until it identifies the parameter estimates that yield the best fit to the data as indicated by the highest log-likelihood value (Graham, Olchowski, & Gilreath, 2007). This approach, referred to as full information maximum likelihood, is asymptotically equivalent to multiple imputation (Graham et al., 2007). Because SV adolescents were more likely to drop out of the study at waves 2 and 3, missing data also were modeled under Missing Not at Random (NNAR) assumptions (Enders, 2011). Specifically, a two-part selection model was specified with the substantive multilevel analyses included in the same model with additional regression equations predicting the response probabilities for each incomplete outcome from the between and within-person variables included in the model. Sensitivity analyses (i.e., analyzing those who completed at least two waves and all three waves) also were conducted.

Results

Descriptive Statistics

Frequencies, means, and standard deviations for study variables are presented in Table 1. Further, although time was modeled on Level 1, age centered at wave 1 also was modeled to account for potential age-related differences in PTSD or BD initially and over time. BD was significantly skewed and kurtotic and thus was log-transformed in all analyses.

Multilevel Modeling

Specifying an empty model, the intraclass correlation for the outcomes, PTSD and BD, were .12 and .49, respectively. These values suggest that slightly more than 10% of the variance in PTSD symptoms and slightly less than half of the variance in BD over time can be accounted for by between-person factors. There was significant residual variance in both PTSD symptoms and BD, suggesting that there is individual variability in PTSD scores and BD at each occasion above and beyond the model (see Table 2).

Trajectory of PTSD Symptoms

Results revealed significant fixed effects of intercept and slope and a significant random effect of intercept only. The significant fixed effect of intercept implies that average PTSD score at wave 1 was significantly different than 0. At wave 1, adolescent girls (mean age = 14.5) who did not report lifetime SV had a mean PTSD symptom count of 2.7. The fixed effect of slope suggests that, on average, PTSD symptom counts decreased by .02 symptoms each year. In addition, the significant random effect of intercept (variance = 5.66) suggests that PTSD symptoms at wave 1 varied significantly across participants, revealing individual differences in PTSD symptoms at the study outset.

Trajectory of BD

Results revealed significant fixed effects of intercept and slope. At wave 1, the frequency of engaging in BD for 14.5 year old girls who did not report lifetime victimization was 1.1 days on average. The significant fixed effect of slope suggests that, on average, BD increased by .01 days for 14.5 year-old girls without SV for each year in the study. There were no random effects of intercept or slope after controlling for age centered at wave 1.

Time-Invariant Effect of Sexual Victimization

The fixed time-invariant effect of lifetime SV on the intercept was significant, suggesting that those who ever experienced SV reported 1.2 more PTSD symptoms at wave 1 when compared to those who never experienced SV. Lifetime sexual victimization did not predict the slope of PTSD symptoms over time, suggesting that there were not significant differences in the rate of change of PTSD symptoms between those reporting SV at any point and those not reporting SV. The fixed time-invariant effect of SV (lifetime victimization) on the intercept and slope of BD was not significant, suggesting that, compared to non-victims, those who ever experienced SV did not report more BD days at wave 1 or a significant change in BD over time.

Time-Invariant Effect of Age

Age significantly predicted the fixed intercept for both PTSD symptoms and BD such that, at wave 1, older adolescent girls reported .37 more PTSD symptoms and .07 more days binge drinking. Age did not predict the fixed slope for PTSD or BD, suggesting that age is not related to changes in PTSD or BD over time, on average.

Time-Varying Effect of Sexual Victimization on PTSD Symptoms and BD

The significant time-varying fixed effect of SV suggests that PTSD symptoms increased by 2.3 symptoms on average at occasions when participants reported a new SV. The significant time-varying fixed effect of SV on BD suggests that BD increased by .09 days when a new SV was reported.

Missing Data Analysis

A two-part selection model incorporating the substantive multilevel model with a set of logistic regression equations predicting the likelihood of missingness at a particular wave were estimated under Missing Not at Random (MNAR) assumptions (Enders, 2011). Age and sexual victimization at intercept both predicted missingness at waves 2 and 3, and the previously non-significant association between PTSD symptoms and BD at intercept became significant ($p < .05$). All other parameters evidenced the same patterns of significance as produced by the MAR models. As further support for study findings, sensitivity analyses (conducted with participants who completed at least two waves and those who completed all three waves) revealed similar patterns of significant findings to those obtained in the full sample.

Exploratory Analysis

To ensure that findings were not driven by heightened rates of substance-involved rape, participants reporting alcohol-facilitated SV [11.7% ($n = 37$) at wave 1, 14.7% ($n = 13$) at wave 2, and 26.5% ($n = 11$) at wave 3] were excluded from the analysis at that wave. Findings were similar to those obtained in the full sample with one notable exception: the time-varying effect of SV on BD became marginally significant ($p = .10$).

Discussion

The goal of the present study was to examine longitudinal associations between SV, PTSD symptoms, and binge drinking (BD) among adolescent girls. Hypotheses were partially supported in that, although PTSD symptoms tended to decline at a steady rate over the course of the study, participants reporting lifetime SV endorsed greater initial PTSD symptoms and these differences in symptoms were maintained over the course of the study. Although SV was not associated with differences in the rate of change in PTSD symptoms over time, lifetime victims reported greater PTSD symptoms at baseline and over time, which is consistent with trauma theories suggesting that avoidance of thoughts, feelings, and activities maintains PTSD over time by discouraging emotional activation and processing (Foa & Kozak, 1986). Future studies should examine changes in PTSD symptoms at the level of symptom clusters (e.g., avoidance) to further explore this hypothesis.

Congruent with work detailing that recency of SV is associated with increased PTSD symptom severity (Green et al., 2005), SV at a specific measurement point also was associated with increases in PTSD symptoms at that occasion. Emerging evidence suggests that emotion dysregulation underlies the development and maintenance of PTSD symptoms (Tull, Barrett, McMillan, & Roemer, 2007), thus, adolescents who are better able to regulate emotions and process traumatic events may experience acute elevations in PTSD symptoms that resolve over time. Future studies should explore characteristics of SV as well as risk or protective factors that may contribute to differential longitudinal trajectories.

Although lifetime victimization was not associated with heightened initial BD or changes in BD over time, experiencing SV at a specific measurement point was predictive of increases in BD at that occasion. In contrast to the adult SV literature (Grayson & Nolen-Hoeksema, 2005), the present findings could suggest that many adolescent victims have yet to develop

established patterns of heavy drinking that distinguish them from non-victims, although they may use alcohol to cope with acute distress. However, the finding that this time-varying effect was no longer present after excluding participants who reported alcohol-facilitated SV suggests that BD precedes SV here. This finding not only comports with data revealing that BD is a significant risk factor for SV among older adolescent girls and young adult women (Testa et al., 2007), but also highlights a need to reduce BD to decrease rates of alcohol-related SV. One promising intervention designed to promote communication surrounding BD among high school senior girls and their mothers has demonstrated effectiveness in reducing incidents of BD and SV during freshman year of college when compared to control participants (Testa, Hoffman, Livingston, & Turrise, 2010). Given strong linkages between BD and subsequent SV (e.g., Testa, Hoffman, & Livingston, 2010), the present study provides further support for programs designed to reduce BD. Similarly, PTSD and BD findings emerged when controlling for the effects of age and suggested that older girls are more likely to report increased levels of PTSD and BD at the start of the study. These findings buttress literature documenting increases in adolescent drinking over time (White et al., 2006) and suggest that older adolescents may have had greater opportunity for exposure to potentially traumatic events or social pressures to drink. However, they also highlight a potential need to tailor revictimization and BD interventions differently for older and younger girls (e.g., reduction with older adolescents and prevention for younger adolescents).

Study findings should be considered in the context of limitations. Although MNAR model results and sensitivity analyses bolster results, participants reporting wave 1 SV were less likely to complete all study waves. Future studies should better document possible causes of missingness to improve missing data analysis (Enders & Gottschall, 2011), and studies with better retention of participants are necessary to confirm these conclusions. Further, SV, PTSD symptoms, and BD were assessed via self-report; thus, responses may have been biased by inaccurate recall or underreporting. Albeit challenging in a phone survey, future studies should corroborate findings with official victimization reports or biological indicators of intoxication (e.g., breathalyzer). Finally, although random digit dialing facilitates collection of representative data, participants without landlines may have been excluded here. This concern is lessened by U.S. Census Bureau reports that 91% of families with parents in the age range of interest had landlines in 2005. Future efforts should attempt to contact potential participants without phones or with cellular phones.

Despite these limitations, the present study highlighted important avenues for future research. Collecting additional waves of data would facilitate modeling of possible non-linear relationships between SV, PTSD symptoms, and BD over time. Further, to extend our understanding of the impact of SV on trauma symptoms over time, future work should follow adolescents into adulthood to examine how pre-adult victimization experiences predict adult psychological functioning and SV. Studying these relationships in clinical populations with more severe PTSD or BD may reveal more problematic trajectories of functioning. Finally, other behaviors (e.g., sexual risk taking) that are both risk factors for and outcomes of SV should be incorporated into future studies.

References

- Danielson CK, Amstadter AB, Dangelmaier RE, Resnick HS, Saunders BE, Kilpatrick DG. Does typography of substance abuse and dependence differ as a function of exposure to child maltreatment? *Journal of Child and Adolescent Substance Abuse*. 2009; 18:323–342. [PubMed: 20151043]

- D'Amico EJ, Metrik J, McCarthy DM, Frissell KC, Applebaum M, Bornw SA. Progression into and out of binge drinking among high school students. *Psychology of Addictive Behaviors*. 2001; 15:341–349. [PubMed: 11767267]
- Enders CK. Missing Not at Random Models for Latent Growth Curve Analyses. *Psychological Methods*. 2011; 16:1–16. [PubMed: 21381816]
- Enders, CK.; Gottschall, AC. The impact of missing data on the ethical quality of a research study. In: Panter, AT.; Sterba, AK., editors. *Handbook of Ethics in Quantitative Methodology*. Routledge Taylor & Francis Group; New York: 2011. p. 357–381.
- Filipas HH, Ullman SE. Child sexual abuse, coping responses, self-blame, posttraumatic stress disorder, and adult sexual revictimization. *Journal of Interpersonal Violence*. 2006; 21:652–672. [PubMed: 16574638]
- Foa EB, Kozak MJ. Emotional processing of fear: Exposure to corrective information. *Psychological Bulletin*. 1986; 99:20–35. [PubMed: 2871574]
- Graham JW, Olchowski AE, Gilreath TD. How many imputations are really needed? Some practical clarifications of multiple imputation theory. *Prevention Science*. 2007; 8:206–213. [PubMed: 17549635]
- Grayson C, Nolen-Hoeksema S. Motives to drink as mediators between childhood sexual assault and alcohol problems in adult women. *Journal of Traumatic Stress*. 2005; 18:137–145. [PubMed: 16281206]
- Green BL, Krupnick JL, Stockton P, Goodman L, Corcoran C, Petty R. Effects of adolescent trauma exposure on risky behavior in college women. *Psychiatry: Interpersonal and Biological Processes*. 2005; 68:363–378.
- Hill KG, White HR, Chung IJ, Hawkins JD, Catalano RF. Early adult outcomes of adolescent binge drinking: Person- and variable-centered analyses of binge drinking trajectories. *Alcoholism: Clinical and Experimental Research*. 2000; 24:892–901.
- Kessler RC. Posttraumatic stress disorder: The burden to individual and to society. *Journal of Clinical Psychiatry*. 2000; 61:4–14. [PubMed: 10761674]
- Kilpatrick D, Acierno R, Saunders B, Resnick H, Best C, Schnurr P. Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology*. 2000; 68:19–30. [PubMed: 10710837]
- Kilpatrick, D.; Saunders, B.; Smith, D. Youth Victimization: Prevalence and implications. U.S. Department of Justice, National Institute of Justice; Washington, DC: 2003. (NIJ Research in Brief)
- Maeda M, Kato H, Maruoka T. Adolescent vulnerability to PTSD and effects of community-based intervention: Longitudinal study among adolescent survivors of the Ehime Maru sea accident. *Psychiatry and Clinical Neurosciences*. 2009; 63:747–753. [PubMed: 20021628]
- McCauley JL, Danielson CK, Amstadter AB, Ruggiero KJ, Resnick HS, Hanson RF, Smith DW, Saunders BE, Kilpatrick DG. The role of traumatic event history in non-medical use of prescription drugs among a nationally representative sample of US adolescents. *Journal of Child Psychology and Psychiatry*. 2010; 51(1):84–93. [PubMed: 19674194]
- McCauley J, Ruggiero KJ, Resnick HS, Conoscenti LM, Kilpatrick DG. Forcible, drug-facilitated, and incapacitated rape in relation to substance abuse problems: Results from a national sample of college women. *Addictive Behaviors*. 2009; 34:458–462. [PubMed: 19162407]
- Muthen, LK.; Muthen, BO. *Mplus User's Guide*. 5th Edition. Muthen and Muthen; Los Angeles: 2008.
- Resnick HS, Kilpatrick DG, Dansky BS, Saunders BE, Best CL. Prevalence of civilian trauma and posttraumatic stress disorder in a representative national sample of women. *Journal of Consulting and Clinical Psychology*. 1993; 61:984–991. [PubMed: 8113499]
- Rodriguez-Srednicki O. Childhood sexual abuse, dissociation, and adult self-destructive behavior. *Journal of Child Sexual Abuse*. 2001; 10:75–90. [PubMed: 17522001]
- Ruggiero KJ, Rheingold AA, Resnick HS, Kilpatrick DG, Galea S. Comparison of two widely used PTSD-screening instruments: Implications for public mental health planning. *Journal of Traumatic Stress*. 2006; 19:699–707. [PubMed: 17075907]

- Sartor CE, Lynskey MT, Bucholz KK, McCutcheon VV, Nelson EC, Waldron M, Heath AC. Childhood sexual abuse and the course of alcohol dependence development: Findings from a female twin sample. *Drug and Alcohol Dependence*. 2007; 89:139–144. [PubMed: 17227698]
- Shin SH, Edwards EM, Heeren T. Child abuse and neglect: Relations to adolescent binge drinking in the national longitudinal study of Adolescent Health (AddHealth). *Addictive Behaviors*. 2009; 34:277–280. [PubMed: 19028418]
- Testa M, Livingston JA, Hoffman JH. Does sexual victimization predict subsequent alcohol consumption? A prospective study among a community sample of women. *Addictive Behaviors*. 2007; 32:2926–2939. [PubMed: 17597304]
- Testa M, Hoffman JH, Livingston JA. Alcohol and sexual risk behaviors as mediators of the sexual victimization-revictimization relationship. *Journal of Consulting and Clinical Psychology*. 2010; 78:249–259. [PubMed: 20350035]
- Testa M, Hoffman JH, Livingston JA, Turrisi R. Preventing college women's sexual victimization through parent-based intervention: A randomized controlled trial. *Prevention Science*. 2010; 11:308–318. [PubMed: 20169410]
- Tull MT, Barrett HM, McMillan ES, Roemer L. A preliminary investigation of the relationship between emotion regulation difficulties and posttraumatic stress symptoms. *Behavior Therapy*. 2007; 38:303–313. [PubMed: 17697854]
- White HR, McMorris BJ, Catalano RF, Fleming CB, Haggerty KP, Abbott RD. Increases in alcohol and marijuana use during the transition out of high school into emerging adulthood: The effects of leaving home, going to college, and high school protective factors. *Journal of Studies on Alcohol*. 2006; 67:810–822. [PubMed: 17060997]
- Wolitzky-Taylor KB, Ruggiero KJ, McCart MR, Smith DW, Hanson RF, Resnick HR, de Arellano MA, Saunders BE, Kilpatrick DG. Has adolescent suicidality decreased in the United States? Data from two national samples of adolescents interviewed in 1995 and 2005. *Journal of Clinical Child and Adolescent Psychology*. 2008; 39:64–76. [PubMed: 20390799]
- Young AM, Grey M, Boyd CJ. Adolescents' experiences of sexual assault by peers: Prevalence and nature of victimization occurring within and outside of school. *Journal of Youth and Adolescence*. 2009; 38:1072–1082. [PubMed: 19636772]
- Zatzick DF, Grossman DC, Russo J, Pynoos R, Berliner L, Jurkovich G, Sabin JA, Katon W, Ghesquiere A, McCauley E, Rivara FP. Predicting posttraumatic symptoms longitudinally in a representative sample of hospitalized injured adolescents. *Journal of the American Academy of Child & Adolescent Psychiatry*. 2006; 45:1188–1195. [PubMed: 17003664]

Figure 1.

Figure Depicting Longitudinal Associations Between Sexual Victimization, Posttraumatic Stress Disorder Symptoms, and Binge Drinking Controlling for Age.

Table 1

Descriptive Statistics for Time-Varying Sexual Victimization, Lifetime Victimization, BD, and PTSD Symptoms

Variable	Wave 1 (N = 1808)	Wave 2 (N = 1262)	Wave 3 (N = 819)
Age	<i>M</i> = 14.5 (1.7)	--	--
Sexual Victimization	<i>n</i> = 221 (12.2%)	<i>n</i> = 49 (4%)	<i>n</i> = 29 (3.5%)
PTSD Symptoms	<i>M</i> =2.7 (3.5)	<i>M</i> =1.8 (3.2)	<i>M</i> = .99 (2.55)
Binge Drinking Days	<i>M</i> = 11.04 (22.4)	<i>M</i> = 16.5 (33.0)	<i>M</i> = 13.7 (26.8)
Lifetime Victimization	<i>N</i> = 270 (15%)	--	--

Table 2

Parameter Estimates for Random Linear Effects Model

Parameter	<i>Estimate</i>	<i>S.E.</i>	<i>p-value</i>
PTSD Symptom Residual Variance	5.3	.32	<.001
Binge Drinking Residual Variance	.08	.01	<.001
Fixed			
PTSD Symptom Intercept	2.7	.15	<.001
Binge Drinking Intercept	1.1	.23	<.05
PTSD Symptom Slope	-.02	.007	<.001
Binge Drinking Slope	.01	.001	<.001
Time-varying sexual victimization on PTSD Symptoms	2.4	.32	<.001
Time-varying sexual victimization on Binge Drinking	.09	.04	<.05
PTSD Symptom Intercept on Lifetime Victimization	1.2	.53	<.05
Binge Drinking Intercept on Lifetime Victimization	.05	.06	.42
PTSD Symptom Slope on Lifetime Victimization	.02	.02	.29
Binge Drinking Slope on Lifetime Victimization	.004	.003	.13
PTSD Symptom Intercept on Age	.37	.09	<.001
Binge Drinking Intercept on Age	.07	.01	<.001
PTSD Symptom Slope on Age	-.01	.004	.07
Binge Drinking Slope on Age	.001	.001	.15
Random			
PTSD Intercept	5.66	.53	<.001
Binge Drinking Intercept	.24	.13	.06
PTSD Slope	.001	.001	.56
Binge Drinking Slope	.001	.001	.70