Published in final edited form as:

J Consult Clin Psychol. 2010 April ; 78(2): 249–259. doi:10.1037/a0018914.

Alcohol and Sexual Risk Behaviors as Mediators of the Sexual Victimization - Revictimization Relationship

Maria Testa, Joseph H. Hoffman, and Jennifer Livingston

Research Institute on Addictions, University at Buffalo

Abstract

Objective: Women who experience sexual victimization, whether in childhood, adolescence, or adulthood, are at elevated risk of sexual revictimization. The mechanism responsible for this robust association is unclear, however. The present study proposed and tested a prospective, mediated model that posited that the association between adolescent and college victimization is mediated via two types of risk exposure in the first semester of college: alcohol-related and sexual risk behaviors.

Method: Female adolescents ($N = 469$) were recruited from the community at the time of high school graduation. They completed baseline assessments as well as follow-ups at the end of the first and second semesters of college.

Results: Consistent with hypotheses, adolescent sexual victimization was associated indirectly, via high school risk behaviors, with increased first semester college risk behaviors (i.e., sexual partners, hookups, heavy episodic drinking and heavy drinking contexts), which were, in turn, strongly predictive of sexual victimization experiences in the first year of college. College risk behaviors partially mediated the significant association between adolescent and first year college victimization; however, even women without prior victimization faced elevated risk of college victimization with higher levels of college risk behaviors.

Conclusions: Women who have experienced adolescent sexual victimization engage in higher levels of risk-taking in college, thereby increasing vulnerability to college victimization. Intervention to reduce these primarily alcohol-related risk-taking behaviors may reduce vulnerability to college sexual victimization.

Keywords

sexual victimization; alcohol drinking patterns; college students; sexual risk taking

Numerous studies demonstrate a strong relationship between sexual victimization and revictimization. Women who are victimized sexually, whether in childhood (Merrill et al., 1999), adolescence (Hines, 2007; Humphrey & White, 2000) or adulthood (Kilpatrick, Acierno, Resnick, Saunders, & Best, 1997) are at elevated risk of being victimized again. Although several possible explanations for this persistent finding have been offered, there have been few prospective examinations of the proposed mediational mechanisms and hence limited support for any of these models. The current longitudinal study was designed to address this

Correspondence should be addressed to Maria Testa, Research Institute on Addictions, University at Buffalo, 1021 Main Street, Buffalo NY 14203. Telephone 716-887-2560, testa@ria.buffalo.edu..

Publisher's Disclaimer: The following manuscript is the final accepted manuscript. It has not been subjected to the final copyediting, fact-checking, and proofreading required for formal publication. It is not the definitive, publisher-authenticated version. The American Psychological Association and its Council of Editors disclaim any responsibility or liabilities for errors or omissions of this manuscript version, any version derived from this manuscript by NIH, or other third parties. The published version is available at www.apa.org/pubs/journals/ccp

gap by examining the indirect effect of adolescent sexual victimization on later sexual victimization, specifically focusing on risky alcohol use and sexual behavior as potential mediating mechanisms.

The empirical link between victimization and revictimization is robust and widely replicated across samples and ages but not well understood. Although empirical tests show a direct relationship, the actual relationship is much more likely to be indirect. That is, early victimization is likely to result in consequences for the woman that increase her vulnerability to later assault. Several integrative reviews have considered a variety of possibilities to explain the robust victimization – revictimization relationship (see Breitenbecher, 2001; Gold, Sinclair, & Balge, 1999; Messman-Moore & Long, 2003; Polusny & Follette, 1995). One explanation is that victims have difficulty assessing or responding to risky situations, and these impaired responses to risky situations increase vulnerability to sexual assault (see Gidycz, McNamara, & Edwards, 2006 for a review). Another explanation is that psychological trauma resulting from early victimization, such as post-traumatic stress, mediates the relationship between initial and later victimization (Hedtke et al., 2008; Risser, Hetzel-Riggin, Thomsen, & McCanne, 2006). Trauma symptoms, such as hyperarousal, may interfere with the ability to correctly recognize danger or may alert potential perpetrators to the woman's vulnerability (see Messman-Moore & Long, 2003). Another proposed mechanism involves self-medication of trauma symptoms through use of alcohol or drugs (see Stewart, Pihl, Conrod, & Dongier, 1998) or engaging in sexual activity as a way of regulating negative affect (Briere, 2005). Both substance use and elevated sexual activity may subsequently increase vulnerability to later victimization. It is this mechanism that is the focus of the current investigation.

Numerous studies demonstrate that childhood and adolescent victimization are associated with increased substance use and abuse in adolescence and adulthood (Champion et al., 2004; Epstein, Saunders, Kilpatrick, & Resnick, 1998; Kendler et al., 2000; Kilpatrick, Acierno, Resnick, Best, & Schnurr, 2000; Nelson et al., 2002; Wilsnack, Vogeltanz, Klassen, & Harris, 1997; see Sartor, Agrawal, McCutcheon, Duncan, & Lynskey, 2008 for a review). In turn, women's substance use has been identified as a risk factor for subsequent sexual victimization (Mohler-Kuo, Dowdall, Koss, & Wechsler, 2004; Parks, Hsieh, Bradizza, & Romosz, 2008; Testa, VanZile-Tamsen, & Livingston, 2007). Increased vulnerability associated with alcohol use may stem from several potential mechanisms. First, acute intoxication impairs a women's ability to recognize sexual assault risk while increasing willingness to engage in risk-enhancing behaviors (e.g., Testa, VanZile-Tamsen, Livingston, & Buddie, 2006). At higher levels of intoxication, incapacitation or unconsciousness can result, leaving the woman unable to resist unwanted sexual advances (Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007; Testa, Livingston, VanZile-Tamsen, & Frone, 2003). Among college students, rape while incapacitated is considerably more common than forcible rape (Mohler-Kuo et al, 2004). In addition, young people typically consume alcohol in social settings such as parties and bars where others are drinking (Single & Wortley, 1993). These settings, which include intoxicated males and females in a sexually-laden context (see Norris, Nurius, & Dimeff, 1996) pose risks for sexual victimization independent of alcohol consumption (Copenhaver & Grauerholz, 1991; Parks & Zetes-Zanatta, 1999).

Another risk behavior that has been associated with sexual victimization is increased sexual activity. Numerous studies show that childhood sexual abuse (CSA) survivors initiate sex earlier and have more sexual partners than non-survivors (see Arriola, Loudon, Doldren, & Fortenberry, 2005; Senn, Carey, & Vanable, 2008 for reviews). Prospective studies have implicated higher levels of consensual sexual activity as a risk factor for later sexual victimization (Messman-Moore, Coates, Gaffey, & Johnson, 2008; Parks, Romosz, Bradizza, & Hsieh, 2008; Raghavan, Bogart, Elliott, Vestal, & Schuster, 2004). The increased vulnerability associated with having more sexual partners may reflect the fact that with

exposure to more men, there is a statistically increased chance of encountering an aggressive man. However, it may also reflect greater exposure to parties and other locations that facilitate sexual activity or “hookups,” just as the sexual vulnerability associated with drinking alcohol may reflect risk associated with the settings in which alcohol is consumed. Flack et al. (2007) found that hookups, that is, brief sexual encounters outside of intimate or dating relationships, were the most common context in which sexual victimization occurred in their sample of college women. Frequency of alcohol intoxication is strongly associated with hooking up (Paul, McManus, & Hayes, 2000).

Although mediated models explaining the link between initial and later sexual victimization are often implied (see Filipas & Ullman, 2006; Siegel & Williams, 2003), there are few empirical tests of such models. Gidycz, Hanson and Layman (1995) tested, but failed to find that alcohol or sexual partners mediated the relationship between prior and subsequent victimization in a college sample. However, Orcutt, Cooper, and Garcia (2005) found that the strength of the relationship between prior and subsequent victimization in a community sample was reduced when sexual behavior was considered as a mediator. Substance use was not considered in this study. Thus, a primary goal of this study was to test a mediated model, whereby the relationship between adolescent sexual victimization and college victimization is presumed to be mediated via two types of risky behaviors: sexual and alcohol-related.

The transition from high school to college is a particularly appropriate time to examine the mediating influences of risky behaviors on sexual victimization, given that the college setting, with its inherently greater freedoms, offers increased availability and opportunity to engage in risky behavior if one so desires (Fromme, Corbin, & Kruse, 2008). Accordingly, there are well-documented increases in alcohol consumption from high school to college (Schulenberg & Maggs, 2002; White et al., 2006) and some evidence that the likelihood of having sex with multiple partners increases during this transition as well (Fromme et al., 2008). Moreover, the first year of college is a particularly high risk time for sexual victimization relative to later college years (Humphrey & White, 2000). For college students, sexual and alcohol-related risk behaviors are likely to be particularly important (and related) predictors of sexual vulnerability given that heavy episodic drinking and “hookups” occur within the drinking contexts that also pose a risk for sexual victimization.

Based on these research findings, we propose and test a prospective, mediated model of revictimization among first year college students (see Figure 1). Consistent with much prior research (e.g., Humphrey & White, 2000), we hypothesize that adolescent sexual victimization will increase risk of experiencing sexual victimization during the first year of college. However, we also expect the victimization-revictimization relationship to be at least partially mediated by alcohol-related and sexual risk behaviors in the first semester of college. Thus, we expect a significant path from high school victimization to college risk behaviors and a significant path from college risk behaviors to college victimization. The proposed model accounts for the expected positive association, at baseline, of adolescent victimization and drinking and sexual activity in the last year of high school. Moreover, the model accounts for the significant association of high school risk behaviors and college risk behaviors (e.g. Fromme et al., 2008; Sher & Rutledge, 2007), with high school HED and sexual activity as additional mediators of the effects of adolescent victimization on college risk exposure.

Method

Participants

Participants consisted of 469 female college freshmen who served as a control group for a randomized controlled trial designed to reduce college sexual victimization by reducing drinking. They were recruited by telephone, just prior to high school graduation, from

households in Erie County, NY. At the time of recruitment students were on average 18.1 ($SD = 0.33$) years old. The majority were Caucasian (89.1%, compared to 82.2% Caucasian for the county), lived with both mother and father (87.1%), and came from households with a median income of \$75,000, which is close to the median income of \$74,000 for college freshmen nationally (Pryor, Hurtado, Saenz, Santos, & Korn, 2007). In the fall semester students were enrolled at over 100 different colleges; however, the majority attended public institutions in Western New York.

Potential participants were selected at random from yearbook photos from local city and suburban high school graduating classes of 2004, 2005, 2006, and 2007. Students and their mothers were offered the opportunity to participate in a longitudinal study of transition to college. To be eligible, the graduating senior had to be planning to enter a 2 or 4 year college in the fall, be living with her mother (or a mother figure, such as a grandmother) and both mother and daughter had to agree to participate and provide written informed consent. All procedures were approved by the Social and Behavioral Sciences IRB at the University at Buffalo. We identified 3,153 female students through yearbook photos and, using public telephone directories, were able to locate 1,354 of these.¹ Of these, 133 were ineligible, primarily because they were not planning to attend college in the fall, 153 refused, and 1,068 (78.9%) agreed to participate. Baseline questionnaire booklets, sent in May or June of senior year (Time 0, or T0), were completed by 992 (92.9%) students. After completion of baseline measures, participants were randomly assigned to an intervention ($N = 523$) or control ($N = 469$) condition. Participants completed additional assessments at the end of the first semester of college (Time 1, or T1) and at the end of the second semester of college (Time 2, or T2). They were paid \$30 for completing baseline questionnaires and \$50 for follow-ups.

Of the 469 control participants who completed T0 assessments, 449 (95.7%) completed the T1 follow-up, 431 (91.9%) completed the T2 follow-up, and 428 (91.3%) completed both T1 and T2 follow-ups. To assess possible differences due to attrition, those completing all three assessments were compared to those who missed one or two assessments (either T1 or T2) on a number of T0 variables. Completers did not differ from non-completers on age, baseline drinking or frequency of heavy episodic drinking (HED), number of sex partners in the past year, number of hookups in the last year of high school, or adolescent sexual victimization from age 14 to high school. However, completers were less likely to be Black than non-Black (4.2% vs. 12.2%, $\chi^2 = 5.12$, $df = 1$, $p = .02$), and had fewer lifetime sex partners at T0 ($M = 1.03$) than dropouts ($M = 1.78$, $t = 2.28$, $df = 44.62$, $p = .03$). The structural equation path models utilized data from all respondents, including those who only completed one or two assessments.

Measures

Sexual Victimization—Adolescent sexual victimization experiences (since age 14) were assessed at baseline (T0) using a 20-item revised version of the Sexual Experiences Survey (Koss, Gidycz, & Wisniewski, 1987; Testa, VanZile-Tamsen, Livingston, & Koss, 2004). The same measure was used at T1 and T2 to assess victimization occurring over the past semester. The measure consists of a series of behaviorally specific items reflecting different types of sexual victimization experiences (see Appendix). At T0, women reported the number of times they had experienced each item (0, 1, 2, 3, 4 or more); at T1 and T2 they reported whether or not each occurred. This version expanded upon earlier versions by crossing 4 perpetrator tactics (verbal coercion, threats of physical harm, force, incapacitation) with 5 outcomes (contact, attempted intercourse, completed vaginal intercourse, oral sex, and anal sex). Questions were

¹We have no data with which to compare students who were not located with students who were recruited into the sample. However, our sample contains a larger proportion of intact and stable families and fewer blended families than would be expected. Because of our reliance on public telephone directories, we were unable to recruit students without telephones and whose last names differed from their parents'.

worded such that the tactic rather than the outcome appeared first, following research showing higher prevalence when this phrasing is used rather than the original wording of outcome before tactic (Abbey, Parkhill & Koss, 2005). As our primary measure of adolescent sexual victimization we used the sum of the number of different items endorsed, collapsing over the number of times each item was experienced ($\alpha = .84$). We used the sum of the total number of items reported at T1 and T2 combined ($\alpha = .80$) as a continuous measure of extent of sexual victimization in the first year of college, recognizing that experiences may have occurred in separate episodes or within the same episode.

Alcohol Consumption—At baseline, and at follow-ups at the end of the fall and spring semesters, participants reported on their frequency of heavy episodic drinking (HED) over the past 90 days. Two questions were used: frequency of drinking 4 or more drinks on an occasion and frequency of drinking to intoxication. Responses were on a 6-point Likert scale ranging from 0 = *never* to 5 = *5 or more days per week*. The two highly correlated items ($r = .85$ at T0, $.91$ at T1) were averaged to form a single measure of frequency of HED.

Drinking Contexts—To assess alcohol-related risk exposure reflective of college drinking contexts, six items were administered at T1. These included four items used by Read, Wood, and Capone (2005) that asked how often since starting college they had experienced the following: 1) “been offered a drink?”, 2) “been given a drink without asking for it?”, 3) “someone filled up your drink without asking you if you wanted it filled?”, and 4) “someone bought you a drink without you asking for it?”. We added two additional items: “drank more than you intended because other people encouraged or pressured you to drink?”, and “felt pressured to drink at a party or other situation where others were drinking?”. Responses were made on a 7-point scale ranging from 1 = *never* to 7 = *all the time*. Items had good internal consistency ($\alpha = .88$) and were averaged.

Sexual Partners—At baseline (T0), participants reported separately on the number of men with whom they had had vaginal sex and oral sex within the past year. At T1, they were asked the same questions regarding the past semester. There was a high correlation between the two items at each time point ($r = .62$ at T0, $.53$ at T1), which is consistent with women having oral and vaginal sex with the same partner. To avoid double-counting sex partners, we used the maximum number of partners, oral or vaginal, as a measure of sex partners at T0 and T1.

Hookups—Sexual activity with men, regardless of whether it involves intercourse, is likely to increase vulnerability to unwanted sexual advances. Thus, as an alternative measure of sexual risk exposure, we also assessed number of hookups, defined in the questionnaire as “a romantic or sexual encounter between two people who are strangers or acquaintances. Some physical interaction is typical but it may or may not involve sexual intercourse” (Paul et al, 2000, p. 79). At T1, women were asked how many hookups they had had in the first semester and how many hookups they had had in their last year of high school. Number of hookups reported was correlated modestly with number of sex partners for the same period ($r = .34$ at T0, $.39$ at T1). At T1, a substantial proportion of women reporting no hookups reported one or more sex partners (168/278 or 60%), and a substantial proportion of women reporting no sex partners reported one or more hookups (49/159 or 31%).²

²Women who reported one or more hookups at T1 were asked additional questions about their typical hookup experience. Based on these reports, the typical hookup followed consumption of alcohol by either the woman or the man (69%), involved kissing (96%) and sexual touching (61%), but more rarely included oral (28%) or vaginal sex (21%).

Data analyses

To evaluate the hypothesized mediated effects, structural equation modeling (SEM) analyses were performed, using the best-fitting measurement model to represent women's risk exposure in the first semester of college as a hypothesized mediator. An initial model tested the hypothesis that adolescent sexual victimization predicts sexual victimization during the first year of college without including the hypothesized mediators; this is known as the total effect (MacKinnon, 2008, pp. 48-50). The full structural model tested whether the victimization-revictimization relationship was partially mediated by high school and college risk behaviors (Figure 1). High school risk behavior was modeled as a latent variable with three indicators: frequency of HED in the last 90 days of high school, number of sex partners in the last year of high school, and number of hookups in the last year of high school. High school risk behavior was included as a mediator in the path through risk behavior in the first semester of college. A drop in the direct effect of adolescent sexual victimization on college sexual victimization (in the full model with mediators), compared to the total effect (without the mediators), is evidence of mediation (MacKinnon, 2008, pp. 104-106). AMOS 7.0 (Arbuckle, 2006; Byrne, 2001) with the full information maximum likelihood (FIML) method was used to estimate the model.

To test specific mediation effects, the joint significance test of the indirect paths from the independent variable (adolescent sexual victimization) to the mediator, and from the mediator to the outcome, was used. This test has been shown to have the most power and the most conservative Type I error rate compared with other methods to test indirect effects (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). If both of the component direct paths in the mediational sequence jointly show significance at the .05 level, then there is evidence for a significant indirect or mediating effect through that mediator at the .05 level. Although originally proposed for the single-mediator or "two-path" situation, the test has recently been extended to the situation involving two mediators in sequence, i.e., a "three-path" mediated effect (Taylor, MacKinnon, & Tein, 2008). Thus, this joint significance test was also used to assess the significance of the 3-path mediated effect of adolescent sexual victimization on first-year college sexual victimization via high school risk behavior and college risk exposure. In addition to testing specific indirect paths, a test of complete mediation was performed by comparing the fit of the full model to that of a simpler nested model in which the direct path from adolescent to college sexual victimization was constrained to zero. This tested whether the direct path could be eliminated without significantly harming the model fit (MacKinnon, 2008, pp. 133, 135).

Results

Descriptive statistics were calculated to provide estimates of the prevalence and mean frequency of sexual victimization, heavy episodic drinking (HED), drinking exposure, number of hookups, and number of sex partners at T0 and T1. Women reporting any sexual victimization during the first year of college (161/435 or 37% of the sample) were compared with women who were not victimized on key variables. As shown in Table 1, the two groups differed on prior victimization and on all T0 and T1 risk behavior variables.

Severity and Number of Sexual Victimization Experiences

It is common to use the SES to classify women according to the most severe experience reported: no victimization, contact, coercion, attempted rape, and rape (Koss et al., 1987). This scoring method is mutually exclusive, so that a woman who reports both contact and rape is classified as experiencing rape, which is more severe. Our expanded SES measure, by crossing all tactics with all outcomes, allowed us to classify women into six mutually exclusive levels of increasing severity, scored as follows: no victimization (0), contact (1), attempted coercion

(2), coercion (3), attempted rape (4), and rape (5). Table 2 provides the prevalence of victimization according to the most severe experience reported in the first year of college. The average number of SES items (first and second semester combined) for each victimization group is also shown. As illustrated in the table, women with more severe experiences reported more total experiences, and severity (scored 0 – 5) and total experiences were highly correlated ($r = .83, p < .001$).

Measurement Model

Before testing the measurement model of college risk behavior, bivariate correlations among the study variables were examined (see Table 3). To prevent outliers from having undue influence on the results, variables with skewed distributions (sexual victimization, hookups) were square-root transformed and remaining outliers (those with z-scores greater than 3.29, corresponding to $p < .001$) were recoded to the next highest value prior to inclusion in analyses (Tabachnick & Fidell, 2007)³. The four measures of college risk behaviors were highly correlated ($p < .001$). Not only were there substantial correlations between the two alcohol-related risk measures ($r = .57$ at T1) and between the two sex-related risk measures ($r = .39$ at T1), but also between sex-related and alcohol-related measures. For example, the correlation between T1 HED frequency and T1 hookups was .55. The three measures of high school risk behaviors were also highly correlated ($p < .001$). For example, frequency of HED in high school was highly correlated with number of hookups in last year of high school ($r = .43$), and with number of sex partners in last year of high school ($r = .42$).

Before testing the substantive model, several possible measurement models for the hypothesized mediator, women's risk behavior during the first semester in college, were tested (Byrne, 2001; Cole & Maxwell, 2003, p. 570). While we initially conceptualized drinking and sexual activity as two types of risk behaviors, the high correlations among the risk behavior measures suggested the possibility of a single latent variable encompassing both sexual risk-taking and drinking risk behavior. Previous research in a community sample of women found support for a second-order factor model as the best fitting model that accounted for variance between the two first-order factors of sexual risk-taking and substance use risk-taking behaviors (VanZile-Tamsen, Testa, Harlow, & Livingston, 2006). Thus, we tested the fit of three possible measurement models for the four measures of college risk behaviors: (a) two correlated first-order factors, representing sexual risk-taking and risky drinking; (b) a second-order factor model with the two first-order factors as indicators; and (c) a single first-order factor.

For the first measurement model, two first-order factors were specified: risky sexual behavior and risky drinking, each with two indicators. The indicators of risky sexual behavior were number of sex partners and number of hookups since college began, and the indicators of risky drinking were frequency of HED and drinking exposure contexts since college began. For the second measurement model, a second-order factor called risk-taking replaced the correlation between the two first-order factors of risky sexual behavior and risky drinking. The second-order factor model can be considered to be nested within the first-order model, so the fit of the two models can be compared using a chi-square difference test. In the third measurement model, a single first-order factor was specified with all four college risk behavior measures as indicators. Measurement model parameters were estimated using AMOS.

³Following the application of the square root transformation, only a small number of cases were outliers that needed to be so recoded: for baseline number of SES items, one case with a value of 4.47 (square root of 20) was recoded to a value of 3.74 (square root of 14); for number of hookups in first semester of college, five cases with values of 3.87 (square root of 15) were recoded to a value of 3.16 (square root of 10); and for the total number of SES items during first and second semester in college, three cases were recoded from values of 3.46 (square root of 12) and 3.74 (square root of 14) to 3.32 (square root of 11).

The first measurement model consisting of two first-order factors for first semester sexual and drinking risk behaviors fit the data well ($\chi^2(1, N = 469) = 0.42, p = .52, CFI = 1.00, TLI = 1.01, RMSEA = 0.00$). The standardized factor loadings were all highly significant and large in magnitude, ranging from .52 to .85, and the two factors were highly correlated ($r = .87$), suggesting the possibility of a second-order factor causing each. The single second-order factor model also fit well and, in fact, had the same fit as the two first-order factor model; thus, these are “equivalent models.” This is a consequence of the small number of measures specified for each factor (Rindskopf & Rose, 1988). The second-order risk-taking factor explained large proportions of variance in each of the first-order factors: 82% for risky sexual behavior, and 94% for risky drinking behavior. The third measurement model tested, the single first-order factor model for all items, also had good fit ($\chi^2(2, N = 469) = 6.02, p = .05, CFI = .99, TLI = .96, RMSEA = 0.07$), but this was significantly worse than the fit of the two first-order factor model or the second-order factor model ($\Delta \chi^2(1) = 5.60, p = .02$). Therefore, the second-order factor model was adopted as the best fitting and most parsimonious measurement model representing first semester college risk behaviors.

Testing the Hypothesized Structural Model

The first model tested the hypothesis that adolescent sexual victimization predicts the number of sexual victimization experiences in the first year of college⁴. This model did not include the hypothesized mediators, and was a just-identified or saturated model, i.e., zero degrees of freedom were available for evaluating model fit. As expected, the standardized path from adolescent sexual victimization (T0) to sexual victimization during the first year of college (T1/T2 combined) was highly significant ($\beta = .38, p < .001$).

To test whether the victimization-revictimization relationship was mediated by risk behaviors, the full model presented in Figure 1 was tested. The second-order factor for risk taking was used to represent risk behaviors in the first semester in college, and high school risk behavior was represented by a single latent variable with three indicators: frequency of HED in high school, number of sex partners in the last year of high school, and number of hookups in the last year of high school. This model fit the data well, $\chi^2(20, N = 469) = 64.65, p < .001, CFI = .97, TLI = .92, RMSEA = .07$. The standardized parameter estimates for this model are shown in Figure 2. Adolescent sexual victimization (T0) predicted increased risk behaviors in the last year of high school ($\beta = .52, p < .001$), which in turn predicted increased risk behaviors in the first semester of college (T1) ($\beta = .73, p < .001$), which in turn predicted sexual victimization in the first year of college (T1/T2, $\beta = .55, p < .001$). By the joint significance test, the indirect path from adolescent sexual victimization to first year college victimization through risk taking in high school and risk taking in the fall semester is also significant at $p < .001$. The direct path from adolescent sexual victimization to college risk behavior was not significant ($\beta = -.03, p = .62$) after accounting for the effect of high school risk behavior.

Despite evidence that the effect of adolescent sexual victimization on college victimization was mediated via college risk behaviors, the direct effect of adolescent victimization on college victimization remained significant even with all the hypothesized mediators in the model ($\beta = .18, p < .001$). However, when the mediators were included in the model, the direct effect was reduced by 53% from its value without the mediators ($\beta = .38$). To test for complete mediation, the direct path from adolescent to college sexual victimization in the full model was constrained to zero. This constraint resulted in a significant reduction in model fit, i.e., an increase in chi-square, by a nested model chi-square difference test ($\chi^2(21, N = 469) = 80.33, p < .001, \Delta \chi^2 = 15.68, \Delta df = 1, p < .001$). This showed that the direct path could not be eliminated

⁴Previous studies have used sexual victimization severity score as the outcome (e.g., Gidycz, Coble, Latham & Layman, 1993). Analyses were also done using victimization severity scores (0 – 5) in place of total number of victimization experiences. Results were identical to those using number of victimization items.

without significantly harming the model fit, i.e., the hypothesis of complete mediation was rejected. Thus, the effect of T0 victimization on T1/T2 victimization was partially, but not completely, mediated by the hypothesized mediators, including risk taking behaviors at T1.

Supplemental Analyses

Although the model was originally conceived as a way of examining pathways to revictimization, it is plausible to hypothesize that college risk behaviors contribute to college sexual vulnerability regardless of previous victimization status. Thus, we tested whether the model was equally applicable for women who reported adolescent victimization ($N = 223$) as well as for those not previously victimized ($N = 246$). In both cases, we controlled for high school risk behaviors. Both models (not shown) revealed significant paths from T1 risk taking to college sexual victimization both for previously victimized women ($\beta = .63, p < .001$) and for those who had not experienced prior victimization ($\beta = .45, p < .001$). To test whether the path from risk taking to victimization was stronger for previously victimized women, we ran a two-group model, and compared the fit of the model with this path constrained to equality across the two groups with the model fit with this path unconstrained. A chi-square difference test showed that constraining the path to equality did not significantly worsen the fit ($\Delta\chi^2 = 3.20, p = .07$), so that this path does not differ across the groups.

Discussion

Although many have hypothesized that increased alcohol use or sexual activity may explain the victimization-revictimization link (e.g., Messman-Moore & Long, 2003), this study provides unique empirical support for this contention. We tested and found support for a prospective model hypothesizing that the association between adolescent and first year college sexual victimization could be at least partially explained as resulting from higher levels of college risk behaviors. Women who reported more experiences of adolescent sexual victimization engaged in higher levels of alcohol-related and sexual risk behaviors both at the time of high school graduation and in the first semester of college. These risk behaviors, in turn, increased vulnerability to sexual victimization during the first year of college. It is important to note that the path from adolescent victimization to college risk behaviors was not direct but rather mediated via high school risk behaviors. That is, women victimized in adolescence were already engaging in higher levels of risk behaviors, which continued into college, putting them at continued risk for additional victimization. Although it is possible that heavy episodic drinking and other college risk behaviors reflect self-medication in response to earlier trauma (e.g., Stewart et al., 1998), our findings do not provide direct evidence of this.

We had planned to examine alcohol-related and sexual risk separately, to determine whether these hypothesized pathways were equally plausible. However, preliminary examination of our data indicated that these risk behaviors were highly correlated, leading us to test a model in which alcohol-related and sexual risk comprise a single higher order factor. Although it was disappointing that we were unable to determine whether it is alcohol-related risk behaviors, sexual risk behaviors, or both that account for the victimization-revictimization link, our data are important in revealing the strong associations between alcohol-related and sexual risk behaviors in college students. For example, “hookups”, a context in which sexual victimization frequently occurs (Flack et al, 2007), entail both sexual risk as well as an alcohol-related risk, given that this sexual behavior frequently occurs in drinking contexts. We believe that the alcohol culture within colleges is central to the high levels of sexual risk and sexual victimization present among college students and that it will be difficult to address college sexual victimization without addressing risky drinking (see Testa & Livingston, 2009). On the other hand, the strong associations between sexual and alcohol-related risk behaviors may be unique to college women and should be examined in other samples.

The longitudinal design, low attrition, and multiple measures of risk behaviors are strengths of the study. However, as in all studies, there are weaknesses. The sample was limited to a single geographic area, and consisted largely of Caucasians from two-parent families, hence findings may not generalize to all college women. Although we believe that our model is likely to apply non-college women as well, it needs to be replicated with other samples, since the associations among alcohol, sex, and sexual victimization may be weaker among community women. Second, although we demonstrated the importance of college risk behaviors in understanding college victimization and revictimization and model fit was good, mediation was only partial, suggesting that there are other pathways to college sexual victimization that were not examined. For example, previous research suggests that victimized women may choose riskier and more aggressive intimate partners (Testa, VanZile-Tamsen & Livingston, 2005) and subsequently experience sexual victimization from them (Testa et al., 2007). Finally, although we modeled high school risk behaviors as consequences of adolescent victimization, it is quite plausible that these risk behaviors preceded and contributed to initial adolescent victimization. Although our data cannot address this possibility, findings show clearly that high school risk behaviors tend to continue in college and contribute to later victimization risk.

Our findings have important implications for preventing college sexual victimization. Clearly, heavy episodic drinking within heavy drinking contexts, and elevated levels of sexual activity, both coital and non-coital, increase women's risk of sexual victimization during their first year of college. In fact, even women who were not victimized in adolescence were at higher risk in college to the extent that they engaged in these risky behaviors. Prevention programs that seek to reduce or prevent heavy episodic drinking and its negative consequences (see Carey, Scott-Sheldon, Carey, & DeMartini, 2007; Larimer & Cronce, 2007 for reviews) may also reduce sexual risk behaviors and sexual victimization (see Testa & Livingston, 2009). Because previously victimized women were already more likely to be engaging in risky behaviors in high school and in the first semester of college, they constitute a particularly high risk group that is deserving of attention. However, because even women without existing risk factors increase their vulnerability by via risky drinking and sexual activity in college, universal prevention strategies are well justified.

Acknowledgments

This research was supported by grant R01 AA014514 from the National Institute on Alcohol Abuse and Alcoholism.

Appendix

Revised Sexual Experiences Survey

Has anyone ever overwhelmed you with arguments about sex or continual pressure for sex in order to...

1. fondle, kiss or touch you sexually when you indicated that you didn't want to?
2. try to have sexual intercourse with you (but it did not happen) when you indicated that you didn't want to?
3. succeed in making you have sexual intercourse when you indicated that you didn't want to?
4. make you do oral sex or have it done to you when you indicated that you didn't want to?
5. make you have anal sex or penetrate you with a finger or objects when you indicated that you didn't want to?

Has anyone ever threatened to physically harm you or someone close to you in order to...

6. fondle, kiss or touch you sexually when you indicated that you didn't want to?
7. try to have sexual intercourse with you (but it did not happen) when you indicated that you didn't want to?
8. succeed in making you have sexual intercourse when you indicated that you didn't want to?
9. make you do oral sex or have it done to you when you indicated that you didn't want to?
10. make you have anal sex or penetrate you with a finger or objects when you indicated that you didn't want to?

Has anyone ever used physical force (such as holding you down) in order to...

11. fondle, kiss or touch you sexually when you indicated that you didn't want to?
12. try to have sexual intercourse with you (but it did not happen) when you indicated that you didn't want to?
13. succeed in making you have sexual intercourse when you indicated that you didn't want to?
14. make you do oral sex or have it done to you when you indicated that you didn't want to?
15. make you have anal sex or penetrate you with a finger or objects when you indicated that you didn't want to?

When you were incapacitated (e.g., by drugs or alcohol) and unable to object or consent has anyone ever...

16. fondle, kiss or touch you sexually when you indicated that you didn't want to?
17. try to have sexual intercourse with you (but it did not happen) when you indicated that you didn't want to?
18. succeed in making you have sexual intercourse when you indicated that you didn't want to?
19. make you do oral sex or have it done to you when you indicated that you didn't want to?
20. make you have anal sex or penetrate you with a finger or objects when you indicated that you didn't want to?

Scoring: A woman has experienced sexual contact if she responds positively to items, 1, 6, 11, or 16; attempted coercion if she reports item 2; coercion if she reports items 3, 4, or 5; attempted rape if she reports items 7, 12, or 17; and completed rape if she reports 8, 9, 10, 13, 14, 15, 18, 19, or 20. To create a mutually exclusive severity score, women are assigned a score according to the most severe type of experience; 5 for completed rape; 4 for attempted rape, 3 for coercion; 2 for attempted coercion; 1 for contact; and 0 if no items are reported.

References

- Abbey A, Parkhill MR, Koss MP. The effects of frame of reference on responses to questions about sexual assault victimization and perpetration. *Psychology of Women Quarterly* 2005;29:364–373. doi: 10.1111/j.1471-6402.2005.00236.x.
- Arbuckle, JL. Amos 7.0 user's guide. SPSS Inc./Amos Development Corporation; Chicago, IL: 2006.
- Arriola KRJ, Loudon T, Doldren MA, Fortenberry RM. A meta-analysis of the relationship of child sexual abuse to HIV risk behavior among women. *Child Abuse & Neglect* 2005;29:725–746. doi: 10.1016/j.chiabu.2004.10.014. [PubMed: 15979712]
- Breitenbecher KH. Sexual revictimization among women. A review of the literature focusing on empirical investigations. *Aggression and Violent Behavior* 2001;6:415–432. doi: 10.1016/S1359-1789(00)00014-8.
- Briere, J. Treating adult survivors of severe childhood abuse and neglect: Further development of an integrative model. In: Koenig, LJ.; Doll, LS.; O'Leary, A.; Pequegnat, W., editors. *From child sexual abuse to adult sexual risk: Trauma, revictimization, and intervention*. APA; Washington, DC: 2005. p. 219-232.
- Byrne, BM. *Structural equation modeling with AMOS*. Erlbaum; Mahwah, NJ: 2001.
- Carey KB, Scott-Sheldon LA, Carey MP, DeMartini KS. Individual-level interventions to reduce college student drinking: A meta-analytic review. *Addictive Behaviors* 2007;32:2469–2494. doi: 10.1016/j.addbeh.2007.05.004. [PubMed: 17590277]
- Champion HIO, Foley KL, DuRant RH, Hensberry R, Altman D, Wolfson M. Adolescent sexual victimization, use of alcohol and other substances, and other health risk behaviors. *Journal of Adolescent Health* 2004;35:321–328. doi: 10.1016/j.jadohealth.2003.09.023. [PubMed: 15450546]
- Cole DA, Maxwell SE. Testing mediation models with longitudinal data: Questions and tips in the use of structural equation modeling. *Journal of Abnormal Psychology* 2003;112:558–577. doi: 10.1037/0021-843X.112.4.558. [PubMed: 14674869]
- Copenhaver S, Grauerholz E. Sexual victimization among sorority women: Exploring the link between sexual violence and institutional practices. *Sex Roles* 1991;24:31–41. doi: 10.1007/BF00288701.
- Epstein JN, Saunders BE, Kilpatrick DG, Resnick HS. PTSD as a mediator between childhood rape and alcohol use in adult women. *Child Abuse & Neglect* 1998;22:223–234. doi: 10.1016/S0145-2134(97)00133-6. [PubMed: 9589176]
- 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. doi: 10.1177/0886260506286879. [PubMed: 16574638]
- Flack W, Daubman KA, Caron ML, Asadorian JA, D'Aureli NR, Gigliotti SN, Hall AT, Kiser S, Stine ER. Risk factors and consequences of unwanted sex among university students: Hooking up, alcohol, and stress response. *Journal of Interpersonal Violence* 2007;22:139–157. doi: 10.1177/0886260506295354. [PubMed: 17202573]
- Fromme K, Corbin WR, Kruse MI. Behavioral risks during the transition from high school to college. *Developmental Psychology* 2008;44:1497–1504. doi: 10.1037/a0012614. [PubMed: 18793080]
- Gidycz CA, Coble CN, Latham L, Layman MJ. Sexual assault experience in adulthood and prior victimization experiences. *Psychology of Women Quarterly* 1993;17:151–168. doi: 10.1111/j.1471-6402.1993.tb00441.x.
- Gidycz CA, Hanson K, Layman MJ. A prospective analysis of the relationships among sexual assault experiences. *Psychology of Women Quarterly* 1995;19:5–29. doi: 10.1111/j.1471-6402.1995.tb00276.x.
- Gidycz CA, McNamara JR, Edwards KM. Women's risk perception and sexual victimization: A review of the literature. *Aggression and Violent Behavior* 2006;11:441–456. doi: 10.1016/j.avb.2006.01.004.
- Gold SR, Sinclair BB, Balge KA. Risk of sexual revictimization: A theoretical model. *Aggression and Violent Behavior* 1999;4:457–470. doi: 10.1016/S1359-1789(98)00024-X.
- Hedtke KA, Ruggiero KJ, Fitzgerald MM, Zinzow HM, Saunders BE, Resnick HS, Kilpatrick DG. A longitudinal investigation of interpersonal violence in relation to mental health and substance use.

- Journal of Consulting and Clinical Psychology 2008;76:633–647. doi: 10.1037/0022-006X.76.4.633. [PubMed: 18665691]
- Hines DA. Predictors of sexual coercion against women and men: A multilevel, multinational study of university students. *Archives of Sexual Behavior* 2007;36:403–422. doi: 10.1007/s10508-006-9141-4. [PubMed: 17333324]
- Humphrey JA, White JW. Women's vulnerability to sexual assault from adolescence to young adulthood. *Journal of Adolescent Health* 2000;27:419–424. doi:10.1016/S1054-139X(00)00168-3. [PubMed: 11090744]
- Kendler KS, Bulik CM, Silberg J, Hettema JM, Myers J, Prescott CA. Childhood sexual abuse and adult psychiatric and substance use disorders in women: An epidemiological and cotwin control analysis. *Archives of General Psychiatry* 2000;57:953–959. doi: 10.1001/archpsyc.57.10.953. [PubMed: 11015813]
- Kilpatrick DG, Acierno R, Resnick HS, Best CL, Schnurr PP. Risk factors for adolescent substance abuse and dependence: Data from a national sample. *Journal of Consulting and Clinical Psychology* 2000;68:19–30. doi:10.1037/0022-006X.68.1.19. [PubMed: 10710837]
- Kilpatrick DG, Acierno R, Resnick HS, Saunders BE, Best CL. A two-year longitudinal analysis of the relationships between violent assault and alcohol and drug use in women. *Journal of Consulting and Clinical Psychology* 1997;65:834–847. doi: 10.1037/0022-006X.65.5.834. [PubMed: 9337502]
- Kilpatrick, DG.; Resnick, HS.; Ruggiero, KJ.; Conoscenti, LM.; McCauley, J. Drug-facilitated, incapacitated, and forcible rape: A national study. Medical University of South Carolina, National Crime Victims Research & Treatment Center; Charleston, SC: 2007.
- Koss MP, Gidycz CA, Wisniewski N. The scope of rape: Incidence and prevalence of sexual aggression and victimization in a national sample of higher education students. *Journal of Consulting and Clinical Psychology* 1987;55:162–170. doi: 10.1037/0022-006X.55.2.162. [PubMed: 3494755]
- Larimer ME, Cronce JM. Identification, prevention, and treatment revisited: Individual-focused college drinking prevention strategies 1999–2006. *Addictive Behaviors* 2007;32:2439–2468. doi: 10.1016/j.addbeh.2007.05.006. [PubMed: 17604915]
- MacKinnon, DP. Introduction to statistical mediation analysis. Erlbaum; New York, NY: 2008.
- MacKinnon DP, Lockwood CM, Hoffman JM, West SG, Sheets V. A comparison of methods to test mediation and other intervening variable effects. *Psychological Methods* 2002;7:83–104. doi: 10.1037/1082-989X.7.1.83. [PubMed: 11928892]
- Merrill LL, Newell CE, Thomsen CJ, Gold SR, Milner JS, Koss MP, Rosswork SG. Childhood abuse and sexual revictimization in a female Navy recruit sample. *Journal of Traumatic Stress* 1999;12:211–225. doi: 10.1023/A:1024789723779. [PubMed: 10378162]
- Messman-Moore TL, Coates AA, Gaffey KJ, Johnson CF. Sexuality, substance use and susceptibility to victimization: Risk for rape and sexual coercion in a prospective study of college women. *Journal of Interpersonal Violence* 2008;23:1730–1746. doi: 10.1177/0886260508314336. [PubMed: 18349349]
- Messman-Moore TL, Long PJ. The role of childhood sexual abuse sequelae in the sexual revictimization of women - An empirical review and theoretical reformulation. *Clinical Psychology Review* 2003;23:537–571. doi: 10.1016/S0272-7358(02)00203-9. [PubMed: 12788109]
- Mohler-Kuo M, Dowdall GW, Koss MP, Wechsler H. Correlates of rape while intoxicated in a national sample of college women. *Journal of Studies on Alcohol* 2004;65:37–45. [PubMed: 15000502]
- Nelson EC, Heath AC, Madden PAF, Cooper ML, Dinwiddie SH, Bucholz KK, Glowinski A, McLaughlin T, Dunne MP, Statham DJ, Martin NG. Association between self-reported childhood sexual abuse and adverse psychosocial outcomes. *Archives of General Psychiatry* 2002;59:139–145. doi:10.1001/archpsyc.59.2.139. [PubMed: 11825135]
- Norris J, Nurius PS, Dimeff LA. Through her eyes: Factors affecting women's perception of and resistance to acquaintance sexual aggression threat. *Psychology of Women Quarterly* 1996;20:123–145. doi: 10.1111/j.1471-6402.1996.tb00668.x.
- Orcutt HK, Cooper ML, Garcia M. Use of sexual intercourse to reduce negative affect as a prospective mediator of sexual revictimization. *Journal of Traumatic Stress* 2005;18:729–739. doi: 10.1002/jts.20081. [PubMed: 16382425]

- Parks KA, Hsieh Y-P, Bradizza CM, Romosz AM. Factors influencing the temporal relationship between alcohol consumption and experiences with aggression among college women. *Psychology of Addictive Behaviors* 2008;22:210–218. doi: 10.1037/0893-164X.22.2.210. [PubMed: 18540718]
- Parks KA, Romosz AM, Bradizza CM, Hsieh Y-P. A dangerous transition: Women's drinking and related victimization from high school to the first year at college. *Journal of Studies on Alcohol* 2008;69:65–74.
- Parks KA, Zetes-Zanatta L. Women's bar-related victimization: Refining and testing a conceptual model. *Aggressive Behavior* 1999;25:349–364. doi: 10.1002/(SICI)1098-2337(1999)25:5<349::AID-AB3>3.0.CO;2-O.
- Paul EL, McManus B, Hayes A. "Hookups": Characteristics and correlates of college students' spontaneous and anonymous sexual experiences. *Journal of Sex Research* 2000;37:76–88.
- Polusny MA, Follette VM. Long-term correlates of child sexual abuse: Theory and review of the empirical literature. *Applied and Preventive Psychology* 1995;4:143–166. doi: 10.1016/S0962-1849(05)80055-1.
- Pryor, JH.; Hurtado, S.; Saenz, VB.; Santos, JL.; Korn, WS. American freshman: Forty-year trends 1966-2006. (UCLA). Higher Education Research Institute; 2007.
- Raghavan R, Bogart LM, Elliott MN, Vestal KD, Schuster MA. Sexual victimization among a national probability sample of adolescent women. *Perspectives on Sexual and Reproductive Health* 2004;36:225–232. [PubMed: 15687080]
- Read JP, Wood MD, Capone CA. A prospective investigation of relations between social influences and alcohol involvement during the transition into college. *Journal of Studies on Alcohol* 2005;66:23–34. [PubMed: 15830900]
- Rindskopf D, Rose T. Some theory and applications of confirmatory second-order factor analysis. *Multivariate Behavioral Research* 1988;23:51–67. doi: 10.1207/s15327906mbr2301_3.
- Risser HJ, Hetzel-Riggin MD, Thomsen CJ, McCanne TR. PTSD as a mediator of sexual revictimization: the role of reexperiencing, avoidance, and arousal symptoms. *Journal of Traumatic Stress* 2006;19:687–698. doi: 10.1002/jts.20156. [PubMed: 17075896]
- Sartor CE, Agrawal A, McCutcheon VV, Duncan AE, Lynskey MT. Disentangling the complex association between childhood sexual abuse and alcohol-related problems: A review of methodological issues and approaches. *Journal of Studies on Alcohol and Drugs* 2008;69:718–727. [PubMed: 18781247]
- Schulenberg JE, Maggs JL. A developmental perspective on alcohol use and heavy drinking during adolescence and the transition to young adulthood. *Journal of Studies on Alcohol* 2002;(Suppl 14): 54–70.
- Senn TE, Carey MP, Vanable PA. Childhood and adolescent sexual abuse and subsequent sexual risk behavior: Evidence from controlled studies, methodological critique, and suggestions for research. *Clinical Psychology Review* 2008;28:711–735. doi: 10.1016/j.cpr.2007.10.002. [PubMed: 18045760]
- Sher KJ, Rutledge PC. Heavy drinking across the transition to college: Predicting first-semester heavy drinking from precollege variable. *Addictive Behaviors* 2007;32:819–835. doi: 10.1016/j.addbeh.2006.06.024. [PubMed: 16860940]
- Siegel JA, Williams LM. Risk factors for sexual victimization of women: Results from a prospective study. *Violence Against Women* 2003;9:902–930. doi: 10.1177/1077801203255130.
- Single E, Wortley S. Drinking in various settings as it relates to demographic variables and level of consumption: Findings from a national survey in Canada. *Journal of Studies on Alcohol* 1993;54:590–599. [PubMed: 8412149]
- Stewart SH, Pihl RO, Conrod PJ, Dongier M. Functional associations among trauma, PTSD and substance-related disorders. *Addictive Behaviors* 1998;23:797–812. doi: 10.1016/S0306-4603(98)00070-7. [PubMed: 9801717]
- Tabachnick, BG.; Fidell, LS. Using multivariate statistics. Allyn & Bacon; Boston, MA: 2007.
- Taylor AB, MacKinnon DP, Tein J-Y. Tests of the three-path mediated effect. *Organizational Research Methods* 2008;11:241–269. doi: 10.1177/1094428107300344.
- Testa M, Livingston JA. Alcohol and women's vulnerability to sexual victimization: Can reducing women's drinking prevent rape? *Substance Use & Misuse* 2009;44:1349–1376. [PubMed: 19938922]

- Testa M, Livingston JA, VanZile-Tamsen C, Frone MR. The role of women's substance use in vulnerability to forcible and incapacitated rape. *Journal of Studies on Alcohol* 2003;64:756–764. [PubMed: 14743937]
- Testa M, VanZile-Tamsen C, Livingston JA. Childhood sexual abuse, relationship satisfaction, and sexual risk taking in a community sample of women. *Journal of Consulting and Clinical Psychology* 2005;73:1116–1124. doi: 10.1037/0022-006X.73.6.1116. [PubMed: 16392972]
- Testa M, VanZile-Tamsen C, Livingston JA. Prospective prediction of women's sexual victimization by intimate and nonintimate male perpetrators. *Journal of Consulting and Clinical Psychology* 2007;75:52–60. doi:10.1037/0022-006X.75.1.52. [PubMed: 17295563]
- Testa M, VanZile-Tamsen C, Livingston JA, Buddie AM. The role of women's alcohol consumption in managing sexual intimacy and sexual safety motives. *Journal of Studies on Alcohol* 2006;67:665–674. [PubMed: 16847534]
- Testa M, VanZile-Tamsen C, Livingston JA, Koss MP. Assessing women's experiences of sexual aggression using the Sexual Experiences Survey: Evidence for validity and implications for research. *Psychology of Women Quarterly* 2004;28:256–265. doi: 10.1111/j.1471-6402.2004.00143.x.
- VanZile-Tamsen C, Testa M, Harlow LL, Livingston JA. A measurement model of women's behavioral risk taking. *Health Psychology* 2006;25:249–254. doi: 10.1037/0278-6133.25.2.249. [PubMed: 16569118]
- 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]
- Wilsnack SC, Vogeltanz ND, Klassen AD, Harris TR. Childhood sexual abuse and women's substance abuse: National survey findings. *Journal of Studies on Alcohol* 1997;58:264–271. [PubMed: 9130218]

Figure 1.

Conceptual prospective model of first semester college risk behaviors as mediators of sexual revictimization during first year of college. T0 is the baseline at the end of senior year in high school; T1 is the end of the first fall semester in college; and T2 is the end of the first spring semester in college.

Figure 2.

Standardized parameter estimates for hypothesized mediational path model. Chi-square = 64.65, $df = 20$, $N = 469$, $p < .001$, CFI = .97, TLI = .92, RMSEA = .07. Error terms and correlations are omitted for clarity. HED, heavy episodic drinking. Loadings marked “nt” were not tested for significance since these parameters were fixed to 1.0 during estimation to identify the latent variables. ns, not significant at $p < .05$. *** $p < .001$.

Table 1

Means of Sexual Victimization and Risk Behavior Measures for Whole Sample and For College Victimized and Non-Victimized Women

Measure	Whole Sample (N = 469)			Any Sexual Victimization In First Year of College ^a		<i>t</i> or χ^2	<i>d</i>	Effect size for mean difference
	<i>M</i>	95%CI		No (<i>n</i> = 274)	Yes (<i>n</i> = 161)			
Baseline: End of last year in high school (T0)								
Prevalence of HED in past 90 days	52.4%	[48%, 57%]		44.1%	66.5%	20.24***	–	–
Frequency of HED in past 90 days	0.92	[–1.22, 3.06]		0.70	1.31	5.46***	0.58	[0.38, 0.78]
Prevalence of adolescent sexual victimization since age 14 ^a	47.5%	[43%, 52%]		33.2%	70.2%	55.67***	–	–
Total number of SES items endorsed since age 14 ^b	1.71	[–3.46, 6.88]		1.08	2.79	7.65***	0.79	[0.59, 0.99]
Number of sex partners in past year	0.96	[–1.74, 3.67]		0.76	1.33	3.54***	0.40	[0.20, 0.60]
Number of hookups in past year ^b	1.54	[–4.01, 7.09]		1.04	2.42	5.82***	0.62	[0.42, 0.82]
Follow-up 1: End of first semester in college (T1)								
Prevalence of HED since college began	63.8%	[59%, 68%]		57.3%	82.6%	29.23***	–	–
Frequency of HED since college began	1.20	[–1.10, 3.51]		0.89	1.85	8.67***	0.91	[0.71, 1.11]
Drinking pressure contexts since college started	2.79	[0.10, 5.48]		2.33	3.56	9.53***	1.00	[0.79, 1.21]
Number of sex partners since college began	1.00	[–1.22, 3.21]		0.78	1.38	4.99***	0.54	[0.34, 0.74]
Number of hookups since college began	1.37	[–3.65, 6.39]		0.65	2.60	9.07***	0.99	[0.78, 1.20]

Note. Means of original, untransformed variables are shown. Tests of significance of mean differences and effect sizes for number of SES items and number of hookups were calculated using transformed variables. CI = confidence interval; HED = Heavy episodic drinking; SES = Sexual Experiences Survey.

^aAt least one item on the Sexual Experiences Survey was endorsed.

p < .001.

Table 2

Sexual Victimization Severity and Number of SES items Endorsed: First and Second College Semesters Combined (N = 452)

Most severe victimization (score)	Prevalence	Total No. of SES items endorsed	
	<i>N</i> (Percent)	<i>M</i> (<i>SD</i>)	95% CI
No victimization (0)	292 (64.6%)	0.00 (0.00)	[0.00, 0.00]
Contact (1)	28 (6.2%)	1.36 (0.56)	[0.26, 2.46]
Attempted Coercion (2)	55 (12.2%)	1.96 (1.12)	[−0.24, 4.16]
Coercion (3)	17 (3.8%)	2.82 (1.33)	[0.21, 5.43]
Attempted Rape (4)	33 (7.3%)	4.09 (2.20)	[−0.22, 8.40]
Rape (5)	27 (6.0%)	5.96 (3.44)	[−0.78, 12.70]

Note. CI = confidence interval

Table 3

Correlations, Means, and Standard Deviations of Study Variables (N = 469)

Variable	1	2	3	4	5	6	7	8	9
1. Total SES items since age 14 to high school ^a	–								
2. Freq. HED past 90 days in high school	.34	–							
3. No. sex partners in last year of high school	.34	.42	–						
4. No. of hookups in last year of high school ^a	.29	.43	.34	–					
5. No. sex partners since college began	.27	.36	.45	.25	–				
6. No. of hookups since college began ^a	.23	.29	.19	.46	.39	–			
7. Frequency of HED since college started	.22	.60	.25	.40	.39	.55	–		
8. Drinking exposure since college started	.32	.44	.19	.40	.29	.44	.57	–	
9. Total SES items in first year of college ^a	.38	.29	.23	.32	.29	.46	.44	.44	–
<i>M</i>	0.85	0.92	0.96	0.73	1.00	0.65	1.20	2.79	0.59
<i>SD</i>	1.00	1.09	1.38	1.00	1.13	0.93	1.17	1.37	0.87

Note. All correlations are significant at $p < .001$. Pairwise n 's vary from 423 to 469. HED = heavy episodic drinking. SES = Sexual Experiences Survey.

^aVariable has been square-root transformed, and remaining outliers have been recoded to less extreme values.