Published in final edited form as:

Psychol Addict Behav. 2014 December ; 28(4): 943–951. doi:10.1037/a0036283.

A longitudinal analysis of drinking and victimization in college women: Is there a reciprocal relationship?

Kathleen A. Parks,

Research Institute on Addictions, State University of New York at Buffalo

Ya-Ping Hsieh,

Research Institute on Addictions, State University of New York at Buffalo

Caroline Taggart, and

Research Institute on Addictions, State University of New York at Buffalo

Clara M. Bradizza

Research Institute on Addictions, State University of New York at Buffalo

Abstract

The purpose of the current study was to assess the relationship between drinking and severe physical and sexual victimization in a sample of 989 college women over five years. Participants completed a web-based survey each fall semester, beginning as first time incoming freshman, and continuing each year for five years. The survey was comprehensive in assessing drinking, victimization, and relevant covariates. Women were followed whether they remained at university or not. Prior year same type of severe victimization predicted current year victimization, both severe physical and sexual. However, prior year drinking did not predict current year severe victimization. Prior year severe sexual victimization predicted current year drinking. Our findings of a longitudinal relationship between severe sexual victimization and subsequent increases in drinking suggests that college women may be drinking to cope with negative sequelae that they experience as a result of the victimization. We did not find the same longitudinal relationship between drinking and severe physical or sexual victimization, suggesting that a reciprocal relationship does not exist between drinking and victimization among college women. We did find that severe sexual victimization decreased across college, suggesting that the year prior to and the first year of college may be a critical period for intervening to reduce risk for severe victimization.

Keywords

Drinking; Victimization; Longitudinal Study; College Women; Reciprocal Relationship

Over the past two decades, both global and prospective studies have consistently found an association between alcohol use and sexual victimization among college women (e.g., Abbey, 2002; Gidycz, Hanson, & Layman, 1995). A smaller number of studies have

specifically assessed the relationship between alcohol use and increased risk for physical victimization (both intimate and non-intimate) among college women (e.g., Moore, Elkins, McNulty, Kivisto, & Handsel, 2011; Saewyc et al., 2009; Stappenbeck & Fromme, 2010). The ramifications of personal victimization to young women are substantial. Negative physical and psychological sequelae following victimization can include: symptoms of post-traumatic stress disorder, depression, anxiety, unintended pregnancy, sexually transmitted diseases, and gynecological complications (e.g., Follette, Polusny, Bechtle, & Naugle, 1996; Ullman, 2003). In addition, a number of studies have found that experiencing personal victimization increases the likelihood of subsequent alcohol misuse, as well as the risk for additional victimization experiences (e.g., Bedard-Gilligan, Kaysen, Desai, & Lee, 2011; Corbin, Bernat, Calhoun, McNair, Seals, 2001; Martino, Collins, & Ellickson, 2004).

Findings of associations between heavier alcohol use prior to and following victimization events have led to theorizing that a bidirectional or reciprocal relationship may exist between alcohol use and victimization (see Ullman, 2003). That is, alcohol use leads to greater likelihood of victimization and victimization leads to greater likelihood of subsequent increased alcohol use. However, few studies have explicitly tested this relationship longitudinally; we are aware of only two. Both found evidence to support drinking as a predictor of sexual victimization (Gidycz, Loh, Lobo, Rich, Lynn, & Pashdag, 2007; Testa, VanZile-Tamsen, & Livingston, 2007), but failed to find evidence that drinking increased following sexual victimization (Gidycz et al., 2007; Testa, Livingston, & Hoffman, 2007). Neither study assessed the relationship between drinking and physical victimization.

The purpose of the current study was to test the reciprocal relationship between alcohol use (drinking) and severe personal victimization (i.e., physical and sexual) with a large cohort of college women ($N = 989$) across multiple years of college (the year prior to entering college and 4 years of college). As defined by the Department of Justice, severe physical victimization or aggravated assault, includes an attempt or actual physical assault of an individual by another that involves the use of a weapon, considerable injury, or threat with a weapon or of injury (Rand, Klaus, & Taylor, 1983). Severe sexual victimization includes attempted or completed rape, including incapacitated rape. In the current analyses we have chosen to focus on the relationships between drinking and severe victimization as our dependent variables. We chose to focus on severe victimization given consistent findings in the literature of a positive relationship between severity of victimization (physical and sexual) and increased likelihood of post-traumatic stress disorder (PTSD) and other negative consequences (e.g., alcohol problems, depression, anxiety; Clum, Calhoun, & Kimerling, 2000; Kilpatrick & Koss, 2001; Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993; Ullman, Townsend, Filipas, & Starzynski, 2007).

In their study of sexual assault victims, Clum et al. (2000) found that the severity of the assault was significantly correlated with a number of negative health-related consequences including: depression ($r = .28$), PTSD ($r = .50$), and reproductive ($r = .43$) symptoms. Ullman et al. (2007) also found significant positive correlations between sexual assault severity and PTSD symptoms ($r = .14$ re-experiencing; $r = .23$ avoidance; $r = .17$ arousal symptoms). Similar findings have been reported for severity of physical assault. Resnick et

al. (1993) found that 31%–45% of women who experienced both physical injury and had a life threat during a victimization experience developed PTSD, while only 19% of women who did not experience either physical injury or a life threat during a criminal victimization developed PTSD. While victimization at any level can lead to negative consequences, these findings serve to highlight the consistent finding in the literature that increased severity of victimization increases the likelihood of negative consequences.

College Women as a Vulnerable Population

Physical and sexual victimization are serious threats facing college women. While rates of personal victimization are highest for young women between the ages of 16–24 (Rennison, 1999), research suggests college women are at an even greater risk than their non-college peers (DeKeseredy & Schwartz, 1998; Koss, 1988). The high levels of alcohol consumption on college campuses exacerbate the problem of personal victimization. In national samples of college students, over 50% of women indicated experiencing some form of sexual victimization, and as many as 15% reported a non-consensual sexual experience that met the legal criteria for rape (Koss, Gidycz, & Wisniewski, 1987; Fisher, Daigle, Cullen, & Turner, 2003). Several lifestyle characteristics of college women are factors that increase the likelihood of experiencing personal victimization. These include being young and single (Koss, 1988), drinking heavily (Harrington & Leitenberg, 1994), and drinking in risky contexts, such as bars, sorority, and fraternity parties (Cashin, Presley, & Meilman, 1998; Parks, 2000).

The Alcohol – Victimization Link

A number of studies have found a positive association between women's alcohol use and severe sexual victimization (attempted and completed rape; Abbey, 2002; Krebs, Lindquist, Warner, Fisher, & Martin, 2009; Norris, Nurius, & Dimeff, 1996; Testa & Dermen, 1999). College student drinking, more frequent binge drinking, and higher levels of weekly drinking have been associated with female college student experiences of sexual victimization (Dowdall, Crawford, & Wechsler, 1998), physical partner violence (Saewyc et al., 2009), and other physical victimization incidents perpetrated by other students (e.g., serious arguments, assaults; Dowdall et al., 1998; Palmer, 1996). Thus, alcohol appears to play a consistent role in both physical and sexual victimization of college women.

Alcohol Use as a Predictor of Victimization

Increased alcohol consumption leads to increased cognitive and physical impairment (Naranjo & Bremner, 1993; Walls & Brownlie, 1995). At the event level, a number of researchers have suggested that alcohol's impairing effects increase women's vulnerability for victimization by reducing their ability to recognize, avoid, or potentially escape victimization (Abbey, 1991; Testa, Livingston, & Collins, 2000; Testa, VanZile-Tamsen, Livingston, & Buddie, 2006). As Testa and Livingston carefully point out in their 2009 review, the majority of rapes of college women occur when women are incapacitated from drinking heavily and thus, too intoxicated to be able to physically resist their attacker.

While the role alcohol plays in physical and sexual victimization when it is consumed just prior to or concurrent with a victimization event is well documented, a limited number of longitudinal studies have examined alcohol use as a predictor of later (e.g., one month, next year) victimization. As a longitudinal predictor, it is most likely that alcohol use predicts later victimization because it is associated with a pattern of risk-taking behavior or other individual characteristics (e.g., ongoing heavy drinking, risky sexual behavior, drinking in bars, depression, and anxiety). Among those longitudinal studies that exist, a few have found evidence to support alcohol's role in increasing risk for later sexual victimization (Green & Navarro, 1998; Testa & Livingston, 2000), incapacitated rape (Kaysen, Neighbors, Martell, Fossos, & Larimer, 2006), and dating victimization (Stappenbeck & Fromme, 2010). However, other studies have found limited or no evidence to support the directionality of the relationship between alcohol use and sexual victimization (Gidycz et al., 1995; Kilpatrick et al., 1997; Testa, VanZile-Tamsen, & Livingston, 2007).

Victimization as a predictor of alcohol use and alcohol problems

Researchers have theorized that victimization increases subsequent alcohol use and may lead to alcohol problems as a result of the trauma experienced from the victimization event (e.g., PTSD, anxiety, depression, pain). In essence, women may experience high levels of negative consequences following a victimization event which create emotional pain/distress. As a result, women consume alcohol as a way of coping with this emotional distress (Lindgren, Neighbors, Blayney, Mullins, & Kaysen, 2012; Messman-Moore, Ward, & Brown, 2009; Nishith, Resick, & Mueser, 2001; Najdowski & Ullman, 2009). Several studies of both community and college women have examined the relationship between victimization and subsequent alcohol use and problems, however, the findings are equivocal. Studies with community samples suggest that histories of sexual victimization (childhood and adult) increase the likelihood of later substance abuse (Kilpatrick et al., 1997; Miller et al., 1993), while others find no relationship between sexual victimization history and later alcohol problems (Testa & Livingston, 2000; Testa et al., 2007).

Findings from studies using college samples have been more consistent using both cross-sectional and longitudinal methods. In two cross-sectional studies of college women, regardless of drinking measure, comparison of sexually victimized women to non-victimized women indicated that victimized women drank significantly more than non-victimized women (Bedard-Gilligan et al., 2011; Corbin et al., 2001). Using a prospective design, over a 9-month period, Gidycz et al. (1995) found that women who had been sexually victimized during adolescence were at increased risk for alcohol use in college.

In summary, a reciprocal relationship has been theorized between heavy alcohol use and sexual victimization for nearly twenty years (e.g., Kilpatrick, 1997). Researchers have suggested that, in general, alcohol use increases a woman's vulnerability for sexual victimization (e.g., through lifestyle, personality), and, once victimized, her drinking increases as a result of her attempt to cope with the negative consequences associated with the victimization experience (e.g., PTSD, anxiety, depression). To date, findings have been mixed in support of this reciprocal relationship for sexual victimization and we are unaware of any research that has assessed this reciprocal relationship for physical victimization. The

current study attempts to fill this gap in the literature by assessing the reciprocal relationships among alcohol use, and sexual and physical victimization experiences across 5-waves of data (last year of high school, 4 years of college) from a large cohort of college women. Evidence in support of this reciprocal model will be provided if we find that drinking in the prior year predicts victimization in the current year and victimization in the prior year predicts drinking in the current year.

Methods

Participants

During Year 1 of the study, all women who agreed to have their personal information published in the student directory (approximately 85%), had reached the age of 18 prior to October 31, and were first-time freshmen at a large state university in Western New York state ($N=1,554$) were invited to participate in a brief web-based survey. Of those invited, 1,140 (73.4%) entered and 995 (64%) women completed the survey. Each fall, for the next four years, women who completed the survey in Year 1 were once again invited to participate in the web survey, unless they had indicated that they no longer wished to participate in the study. Women were followed whether or not they remained at the original university. A total of 989 women (99.4%) who completed the initial (Year 1) survey provided sufficient data (i.e., data on all variables for a minimum of two years) to be included in the current longitudinal analysis assessing the reciprocal relationships between drinking and severe victimization. The average age of participants was 18.5 ($SD = 1.1$) years at the time they completed the Year 1 survey. The racial distribution of the sample was 76% White, 7.3% Black, 8.4% Asian, and 8.4% other or mixed racial backgrounds. Less than 5% of women identified as being of Hispanic ethnicity. This distribution is similar to that of the University's general student population.

Procedure

All procedures for the study were approved by the Institutional Review Board at the University where the research was conducted. Two weeks prior to receiving an e-mail invitation to participate in the project, all first-time freshmen women were sent letters, at both their home and campus addresses, introducing the project and informing them that they would be receiving a link to our survey through their university e-mail. Standard practices for ensuring confidentiality of responses and safety of data collection were implemented for the web survey (e.g., unique access codes for each participant; a secure, separate server with firewall protection for all data; data encryption; password protection for all data files). The procedures used for this study are described in greater detail in [place marker for citation].

Web Survey

Prior to entering the survey, women were provided with information consistent with that provided in a standard informed consent (i.e., the content of the survey questions, remuneration, and any anticipated risks and benefits associated with participating in the study), asked to indicate that they were over the age of 18, that they had the privacy to complete the survey, and to indicate their assent to participate in the survey prior to proceeding to the survey questions. They also were provided with information on how to re-

access the survey if they did not have sufficient time or privacy to complete the survey at that time. Contact information was collected in order to send remuneration and this information was immediately saved to a password protected file separate from the survey data. Survey data were only identifiable by unique alpha-numeric codes. The survey included questions about substance use (alcohol and drugs), academics, health, stress, psychological symptoms, relationships, and experiences with physical and sexual aggression in the year prior to beginning college (Year 1), or since beginning the fall semester at college the previous year (Years 2–5). The web survey was designed to be relatively brief, taking less than 25 minutes to complete in any given year.

Women were remunerated \$10 for the first year, received a free t-shirt with the project logo, and were entered into a lottery drawing for a \$500 cash prize. Each subsequent year they were paid \$5 more than the previous year, and entered into a lottery drawing for a \$500 cash prize. In addition, each summer, all women who did not decline participation (i.e., indicate they no longer wished to be contacted about the study) received a study newsletter with a small gift with the study logo printed on it (e.g., a lanyard, nail file, key chain) in an effort to promote continued contact and participation.

Measures

The Year 1 survey measures included participants' histories of alcohol and other drug use, psychological symptoms, and experiences with physical and sexual violence over the year prior to entering the university.

The survey measures for Years 2 through 5 remained the same as those for Year 1, however, the time frame of assessment changed. Participants were asked to report only those experiences and behaviors that had occurred during the one-year period between the date classes began the previous fall and the date classes began for the current fall semester. Where possible, we chose standardized measures to assess the variables of interest.

Alcohol Use

Alcohol use was assessed using the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). The DDQ measures typical drinking patterns per occasion, day of the week, weekly and monthly. Additional items assessed frequency of heavy episodic drinking (consumption of 4 or more drinks per occasion) over a typical 1-month period, maximum number of drinks on one occasion over the past year, and intoxication level after one's usual number of drinks, 4 drinks, and maximum number of drinks. The DDQ has good convergent validity with the longer Drinking Practices Questionnaire (DPQ – Cahalan, Cisin, & Crossley, 1969; Collins et al., 1985) and has been used extensively with college populations (e.g., Corbin, McNair, & Carter, 1996).

Psychological Symptoms

The 18-item short form of the Brief Symptom Inventory (BSI-18, Derogatis, 1993) was used to measure psychological symptoms. The BSI-18 consists of 18 items measured on a 5-point rating scale ("not at all" to "extremely") that encompass three primary symptom dimensions: somatization, depression, and anxiety. We modified the measure slightly by removing one

item from the depression dimension (“thoughts of ending your life”). This was done as a result of the method of survey administration (web-based) and our inability to provide immediate follow-up assessment and help in accessing community resources if a participant endorsed this item. Scores on the three individual dimensions have been found to be highly correlated ($r = .90$ or above) with comparable scores on the more detailed Symptom Check List; SCL-90-R (Pearson Assessments Website, retrieved 12/4/2012).

Personal Victimization

Experiences with severe personal victimization that had ever occurred, regardless of relationship to the perpetrator, prior to entering the university were measured using items patterned after questions from the National Crime Victim Survey (NCVS; US Department of Justice, 1993) in the Year 1 survey. The following three items comprised the severe physical victimization measure: being beaten, attacked, or hit with something, such as a rock or bottle; being knifed, shot at, or attacked with some other weapon; being threatened with being beaten up or threatened with a knife, gun or some other weapon. Two items were used to assess attempted and completed sexual assault (i.e., “Has anyone ever physically forced you to have sexual intercourse [oral, anal, or vaginal] against your will or without your consent?”; “Have you ever had any other experience(s) in which someone has tried to force you to have sex against your will or without your consent, but sex did not happen?”). The severe physical victimization items remained the same for the surveys in Years 2–5, and we continued to assess attempted and completed rape. An additional item to assess incapacitated rape (e.g., unaware/unable to consent due to alcohol or drug intoxication) was included in the surveys in Years 2–5. The addition of this item provided us with a measure of rape that was more representative of rape measures being used in other studies of young women (e.g., Kaysen et al., 2006; Testa, Livingston, & VanZile-Tamsen, & Frone, 2003).

Data Analyses

Given that we had multiple years of survey data for each participant (i.e., observations nested within individuals) we used hierarchical linear modeling (HLM) as our analytic technique (Raudenbush & Bryk, 2002). In order to determine whether drinking during the prior year influenced subsequent severe sexual and physical victimization, we conducted separate HLM analyses with current year severe sexual and physical victimization as the dependent variables. Severe physical victimization included assaults with and without the use of a weapon. Severe sexual victimization included attempted and completed rape. The drinking measure included in the HLM analysis was average weekly drinks. Additional variables included current year drinking, current year anxiety and depression, type of current year victimization not being analyzed, and prior year severe physical and sexual victimization. In order to determine whether prior year severe physical or sexual victimization influenced subsequent drinking, we conducted a third HLM analysis with current year weekly drinking as the dependent variable. The additional variables included: current year victimization (physical and sexual), prior year drinking, and current year anxiety and depression. We included year in all analyses to account for change in the dependent variable across time. For all analyses, dichotomous variables (i.e., current and prior victimization, year) were uncentered, whereas continuous variables (i.e., anxiety,

depression, current and prior year weekly drinking) were person centered. Missing values were not imputed.

Results

During the year prior to entering college 73.2% of the women reported any consumption of alcohol. This rate increased to 86.2% during the first semester at college and remained between 88.8% and 94.2% over the following three years. Table 1 provides descriptive statistics for all of the variables included in the multilevel regression models. Both anxiety and depression increased from the year before to the first year in college and then remained relatively stable across the four years in college. Weekly drinking also followed a similar pattern, increasing from an average of 4.5 drinks per week to an average of between 6 and 7 drinks per week over the four years of college. The prevalence rates for victimization are presented for severe physical and sexual victimization. The prevalence of physical victimization remained stable over the four-year period at college, while the prevalence of sexual victimization steadily decreased.

Table 2 provides the multilevel model assessing current and prior year influences on current year severe sexual victimization. Heavier weekly drinking and experiencing a severe physical victimization event during the current year significantly increased the likelihood of a severe sexual victimization during the current year. However, these effects need to be interpreted with caution as the temporal order cannot be determined. Of greater importance are the effects of prior year weekly drinking and prior year experiences with severe victimization on current year severe sexual victimization. Experiencing a severe sexual victimization in the prior year tripled the odds ($OR = 3.22$) that a woman would experience severe sexual victimization in the current year and having a prior year severe physical victimization nearly tripled the odds ($OR = 2.99$) that a woman would experience a severe sexual victimization in the current year. However, in this model past year weekly drinking ($OR = 1.01$) did not significantly increase the likelihood that a woman would experience severe sexual victimization in the current year. Finally, the odds of severe sexual victimization significantly decreased across years in college ($OR = 0.87$).

Table 3 provides the multilevel model assessing current and prior year influences on current year severe physical victimization. Experiencing a severe sexual victimization during the current year increased the likelihood of a severe physical victimization during the current year. Experiencing severe physical victimization in the prior year significantly increased the likelihood of experiencing severe physical victimization in the current year ($OR = 3.60$). Past year weekly drinking ($OR = 0.97$) did not significantly influence current year severe physical victimization. The odds of severe physical victimization did not decrease over time ($OR = 0.96$).

Table 4 provides the multilevel model for the effects of victimization on current year weekly drinking. Experiencing a severe victimization in the current year, either sexual or physical, was associated with heavier weekly drinking during the current year. Interestingly, prior year heavier drinking predicted a slight decrease in current year drinking ($B = -0.06$, $p < .$

05). In addition, prior year severe sexual victimization predicted an increase in current year weekly drinking ($B = 1.08, p < .01$).

Discussion

The current study is unique in providing five years of data (year prior to college, 4 years of college) on the drinking patterns and severe personal victimization experiences of a large cohort of college women. These data allowed us to examine the longitudinal relationships between drinking and severe physical and sexual victimization across multiple years at college, as well as the potential reciprocal nature of this relationship. These relationships have not been tested with multiple years of data from college women, for both severe physical and sexual victimization experiences. Thus, the current paper adds to the current state of knowledge in the field.

Consistent with other studies, the rates of drinking reported among our sample of college women were similar to those rates reported for college women in previous studies (e.g., NIAAA, 2012; Velazquez, Pasch, Laska, Lust, Story, & Ehlinger, 2011; Wechsler, Lee, Kuo, & Lee; 2000). In addition, we found that the prevalence of sexual victimization was highest during the first year at college and decreased each subsequent year. This finding is similar to that found by Humphrey and White (2000). We found evidence for a cross-sectional influence of drinking on risk for severe sexual victimization. However, the directionality of the cross-sectional relationship cannot be determined, given that we do not know whether heavy drinking or sexual victimization might have occurred first during the current year. The current study was not intended to test within year relationships as the temporal order could not be established. In a previous paper, we assessed the relationships between alcohol consumption and women's risk for victimization using daily data [place marker for citation]. We did not find evidence for a longitudinal influence of drinking on risk for either severe physical or sexual victimization. We found a strong relationship between prior year severe victimization on risk for current year severe victimization. This was strongest for the same type of severe victimization (i.e., sexual or physical) being predicted. This finding is not new and is supported by a substantial literature indicating that prior victimization is one of the strongest predictors of subsequent victimization (e.g., Gidycz, Coble, Latham, & Layman, 1993; Himlein, 1995; Parks & Zetes-Zanatta, 1999).

We also found evidence to support a causal, directional relationship between severe sexual victimization and subsequent increased drinking. The effect size of this relationship appears small ($d = 0.13$), however, as noted by Ahadi and Diener (1989), most behaviors have multiple determinants. As the number of determinants of a behavior increase, the effect size between a specific determinant and the outcome behavior decreases. Thus, we would not expect that an outcome behavior, such as drinking, which is likely to have multiple determinants, would be strongly predicted by a single determinant – severe sexual victimization. We should note however, that the beta coefficient indicates an increase in average weekly drinking of approximately 15% to 17% depending upon the year. This is the first study that we are aware of that has tested this relationship longitudinally, with multiple years of data using a large, single cohort of college women. In our earlier paper looking at the daily relationships between victimization and drinking during the 24 hours to 7 days

following a victimization event, we found that drinking did not significantly increase during the acute period following a victimization event [place marker for citation]. It is likely that measurable effects of a traumatic event, such as victimization, on behaviors such as drinking do not occur immediately (i.e., within a day or week) and thus are more likely to be captured when measured months or even a year after the event.

We did not find that anxiety or depression were associated with current year severe sexual or physical victimization or with current year drinking. The average scores for the sample did not suggest a level of anxiety or depression that was outside the normative range for college age women (Cochran & Hale, 1985; Derogatis, 1993). Our analyses do account for individual differences across time, thus it is unlikely that these individual psychological symptoms are having an impact on severe victimization. However, other research suggests that a constellation of symptoms associated with PTSD may be associated with increased drinking and increased risk for subsequent victimization (e.g., Kilpatrick, Edmunds, & Seymour, 1992; Messman-Moore et al., 2009; Ullman, 2003), thus, future studies should include measures of PTSD symptomatology assessed over time.

Our finding that severe sexual victimization led to a subsequent increase in drinking is consistent with some studies (e.g., Bedard-Gilligan et al., 2011; Gidycz et al., 1995), but not with others (e.g., Gidycz et al., 2007; Testa et al., 2007). Thus, additional studies are needed for a definitive answer; however, given our use of HLM with a large data set with multiple years of data, we believe that our findings add to the literature suggesting that severe sexual victimization increases the likelihood of drinking for some young women. We found no evidence to support a reciprocal relationship between drinking and severe physical or sexual victimization for college women. This may not be surprising given the large lag between drinking and victimization when using annual or yearly measures. Although drinking assessed in one year may reflect a riskier lifestyle or constellation of behaviors, it may not reflect what happens in all situations, thus it may be viewed more as a cross-sectional variable for a given year. In general, assessments of the relationship between alcohol and victimization have found the strongest relationships in event-level rather than cross-sectional analyses (Testa & Parks, 1996).

While our findings provide additional insight into the longitudinal relationship between drinking and severe victimization among college women, it should be noted that these findings may not be generalizable to all college women as our study was conducted at one 4-year university in the Northeastern United States with one cohort of women. Our sample was ethnically representative of the university from which it was drawn, however, additional studies at more diverse campuses are needed to replicate our findings, particularly with regard to physical victimization.

Severe sexual victimization decreased across the five years of the study and heavier drinking in the prior year predicted a decrease in drinking in the current year. These findings are interesting and suggest additional research directions to explore. Could it be that as women experience negative events early in their college years that this influences their drinking and other risk taking behaviors? Anecdotal evidence from interviews with college women would suggest that they do recognize and change some of their behaviors based on the

consequences of their actions. As one (3rd year) woman said “I don’t do that stupid [stuff] I used to do my freshman year”. Perhaps individuals who experience greater negative consequences as a function of their drinking are more inclined to decrease their drinking in subsequent years. Could it be that the mixed findings of an association between increased drinking and sexual victimization, in longitudinal studies, might reflect an increase in drinking during an immediate or limited time (e.g., months to a year) frame associated with a severe victimization event, during which a woman might be suffering from PTSD or other negative emotional symptoms and using alcohol as a coping mechanism? If so, if we do not assess women during this increased period of drinking to cope, or an analysis that accounts for individual differences is not used (i.e., HLM), the relationship between victimization and the increase in drinking will not be found. Additional studies are needed to explore this possibility.

From a theoretical perspective, our findings add to a growing body of research that suggests that the time frame in which variables are measured (daily, annually, etc.) as well as the techniques used to analyze them are critical for assessing the relationships among them. We believe that our research suggests that alcohol use measured at the event (i.e., incident, daily) level is critical for predicting victimization risk, while assessing alcohol use over a longer time frame (i.e., several months to a year) may be important for assessing the impact of victimization on subsequent drinking. From a practical perspective, women in our sample experienced the highest prevalence of severe sexual victimization during the first two years of college with alcohol involvement in more than 75% of these events. Thus, prevention interventions need to target students prior to college to begin to decrease drinking to intoxication and the increased risk of victimization associated with entry into college (see Testa & Livingston, 2009 for a review). In addition, once victimized, students need to be informed of campus resources that are available to help them cope with the sequelae of victimization in healthier ways.

Acknowledgments

Research reported in this manuscript was supported by the National Institute on Alcohol Abuse and Alcoholism of the National Institutes of Health under award number R01AA013986. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

The authors wish to thank Dr. Jaye Derrick for helpful comments on earlier versions of the manuscript.

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Table 1
Descriptive Statistics for the Variables Included in the Multilevel Regression Models.

Variable	Pre*	Year in College			
		1	2	3	4
<i>Continuous</i>					
Anxiety	0.27 (0.31)	0.84 (0.84)	0.85 (0.85)	0.79 (0.82)	0.80 (0.82)
Depression	0.36 (0.38)	1.17 (0.99)	1.13 (0.97)	1.08 (0.95)	1.09 (0.94)
Weekly Drinks	4.5 (6.2)	6.7 (7.7)	6.7 (7.6)	7.0 (7.5)	6.3 (6.4)
<i>Dichotomous</i>					
Severe PV	14.7	2.8	2.5	2.0	1.5
Severe SV	17.5	8.5	7.6	4.8	4.5

Note:

* indicates that rates of violence for pre-college include any experiences prior to entering college, not just those in the last year. Statistics are presented as *M (SD)* for continuous measures and 'Prevalence Rate' (%) for dichotomous measures.

'Drinking' = average weekly drinks; 'Severe PV' = women who experienced only severe physical violence (being physically assaulted/beaten or threatened with a weapon); 'Severe SV' = women who experienced only severe sexual violence (attempted or completed rape).

Table 2

Multilevel Regression Model for Effects of Drinking on Likelihood of Severe Sexual Victimization.

Fixed Effects	B	s.e.	t	OR	95% CIs	d
Intercept	-2.81	0.19	-15.06			
Current Year Drinking	0.07	0.02	3.95***	1.07	(1.03, 1.10)	0.16
Current Year Severe PV	1.12	0.36	3.13**	3.07	(1.52, 6.21)	0.13
Current Year Depression	0.02	0.17	0.13	1.02	(0.73, 1.43)	0.01
Current Year Anxiety	0.35	0.19	1.80	1.41	(0.97, 2.07)	0.07
Prior Year Drinking	0.01	0.02	0.27	1.01	(0.97, 1.05)	0.01
Prior Year Severe SV	1.17	0.17	6.81***	3.22	(2.30, 4.51)	0.27
Prior Year Severe PV	0.69	0.23	2.99**	1.99	(1.27, 3.13)	0.12
Year (1-5)	-0.14	0.07	-2.03*	0.87	(0.76, 0.99)	-0.08

Note: SV = Sexual Victimization; PV = Physical Victimization;

*
p < .05,**
p < .01,***
p < .001

Table 3
Multilevel Regression Model for Effects of Drinking on Likelihood of Severe Physical Victimization.

Fixed Effects	B	s.e.	t	OR	95% CIs	d
Intercept	-4.15	0.29	-14.49			
Current Year Drinking	0.04	0.02	1.65	1.04	(0.99, 1.09)	0.07
Current Year Severe SV	1.10	0.37	2.98**	3.02	(1.46, 6.25)	0.12
Current Year Depression	-0.15	0.25	-0.62	0.86	(0.52, 1.40)	-0.02
Current Year Anxiety	0.36	0.30	1.20	1.43	(0.80, 2.55)	0.05
Prior Year Drinking	-0.03	0.02	-1.15	0.97	(0.93, 1.02)	-0.05
Prior Year Severe SV	0.35	0.34	1.03	1.42	(0.73, 2.75)	0.04
Prior Year Severe PV	1.25	0.35	3.60***	3.49	(1.77, 6.89)	0.14
Year (1-5)	-0.04	0.10	-0.44	0.96	(0.78, 1.17)	-0.02

Note: SV = Sexual Victimization; PV = Physical Victimization;

* p < .05,

** p < .01,

*** p < .001,

Table 4

Multilevel Regression Model for Effects of Victimization on Drinking.

Fixed Effects	B	s.e.	t	95% CIs	d
Intercept	6.16	0.31	20.13		
Current Year Severe SV	2.21	0.93	2.37*	(0.39, 4.03)	0.10
Current Year Severe PV	3.04	0.58	5.29***	(1.90, 4.18)	0.21
Current Year Depression	0.17	0.19	0.87	(-0.20, 0.54)	0.03
Current Year Anxiety	0.24	0.24	1.01	(-0.23, 0.71)	0.04
Prior Year Drinking	-.06	0.03	-2.07*	(-0.12, 0.00)	-0.08
Prior Year Severe SV	1.08	0.34	3.21**	(0.41, 1.75)	0.13
Prior Year Severe PV	0.71	0.54	1.31	(-0.35, 1.77)	0.05
Year (1-5)	0.06	0.08	0.72	(-0.10, 0.22)	0.03

Note: SV = Sexual Victimization; PV = Physical Victimization;

*
p < .05,**
p < .01,***
p < .001