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Alcohol Consumption and Use of Sexual Assault and Drinking Protective Behavioral Strategies: A Diary Study

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Abstract

Heavy drinking is a risk factor for sexual assault. Although protective behavioral strategies (PBS) tend to be associated with reduced alcohol consumption, there are studies showing differential benefits for using these strategies. The current study extended the research on PBS and drinking by examining daily associations between alcohol consumption and sexual assault PBS (e.g., letting others know one's whereabouts) versus stopping or limiting drinking PBS (e.g., planning to stop drinking at a predetermined time) and manner of drinking PBS (e.g., avoiding mixing alcohol types). Women who are heavy episodic drinkers attending a northeastern university ($N = 69$) completed 14 daily reports of alcohol consumption and PBS use. Using multilevel modeling, we examined associations between alcohol consumption and PBS types across days and PBS users. Alcohol consumption increased with greater use of sexual assault PBS and decreased with greater use of stopping or limiting drinking and manner of drinking PBS. Findings suggest differential benefits for specific PBS. Clinicians, teachers, and parents can provide a menu of options for reducing sexual assault risk by encouraging women to use sexual assault and drinking PBS together.

Sexual assault on college campuses is a significant public health issue that disproportionately affects women (Fisher, Cullen, & Turner, 2000; Krebs et al., 2011). Female college students are five times more likely to be sexually assaulted than male college

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De-identified data will be made available upon request.

students (Krebs, Lindquist, Warner, Fisher, & Martin, 2007). The prevalence of sexual assault among college women has remained at about 20% for over two decades (Fisher et al., 2000; Kilpatrick, Resnick, Ruggiero, Conoscenti, & McCauley, 2007; Krebs et al., 2011), despite efforts to reduce perpetration at the community level (e.g., bystander intervention; Banyard, Moynihan, & Plante, 2007; Salazar, Vivolo-Kantor, Hardin, & Berkowitz, 2014) and with perpetrators themselves (e.g., Choate, 2003; Garrity, 2011). Individualized prevention and intervention efforts that focus on addressing risky and protective behaviors of potential victims may be useful adjuncts to community-focused and perpetrator-based efforts (for an example of an efficacious program, see Senn et al., 2017). Victim-focused approaches have received some criticism because they are sometimes perceived as victim-blaming (Gilmore et al., 2016; Neilson et al., 2015). Advocates of victim-focused approaches emphasize that although perpetrators are ultimately responsible for assaults, it is imperative to help empower women to reduce their likelihood of being targeted by perpetrators (Gilmore et al., 2016; Neilson et al., 2015).

Heavy drinking has been one of the strongest risk factors for sexual assault in college women (Abbey, 2002; Abbey, Zawacki, Buck, Clinton, & McAuslan, 2004). Studies show that women who engage in heavy episodic drinking (i.e., consume four or more drinks in two hours) are at increased risk of being targeted for sexual coercion and assault by perpetrators, relative to women who abstain or drink in moderation (e.g., Testa & Livingston, 2009). One study provided evidence that women were nine times more likely to report experiencing sexual aggression on heavy drinking days than on non-drinking days (Parks & Fals-Stewart, 2004). Researchers have offered some reasons that perpetrators are more inclined to prey on women during heavy drinking occasions. For example, men perceive intoxicated women as more interested in sex. Women are also less able to fend off unwanted sexual advances after heavy drinking (Abbey, 2002). An assault is never the victim's fault, but women can reduce their risk for being targeted by perpetrators by moderating their alcohol consumption.

Protective Behavioral Strategies

Protective behavioral strategies (PBS) are strategies people can use to reduce their risk for alcohol-related harm (e.g., Martens et al., 2005; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007). Although women can never have complete control over their personal safety in social and dating situations due to the existence of perpetrators, PBS empower women to have a greater degree of control. Recent research has differentiated between sexual assault PBS, which reduce harm by addressing contextual risk factors for victimization (e.g., meeting dates in public places instead of being alone with them) and drinking PBS, which reduce harm by minimizing alcohol consumption (e.g., pacing alcohol consumption; Neilson et al., 2015). Reports suggest both types of PBS may be useful in the prevention of sexual assault (e.g., Gilmore et al., 2016; Gilmore, Stappenbeck, Lewis, Granato, & Kaysen, 2015; Neilson et al., 2015).

PBS and Drinking

The strategies known as drinking PBS have been a cornerstone of public health prevention efforts to decrease college student drinking. Comprehensive reviews of the drinking PBS literature have concluded the majority of studies support an inverse association between drinking PBS and alcohol consumption (see Pearson, 2013; Prince, Carey, & Maisto, 2013). This relation has been observed in both etiological (e.g., LaBrie, Lac, Kenney, & Mirza, 2011; Martens, Ferrier, & Cimini, 2007; Sutfin et al., 2009) and prevention research (e.g., Baer et al., 1992; Borsari & Carey, 2005; Dimeff, Baer, Kivlahan, & Marlatt, 1999; Turrisi, Jaccard, Taki, Dunnam, & Grimes, 2001; Turrisi et al., 2013). There is also evidence that the utility of drinking PBS for reducing risky alcohol consumption may vary by PBS type. For example, the Protective Behavioral Strategies Scale (PBSS) distinguishes between stopping or limiting drinking PBS (e.g., leave the bar or party at a predetermined time), manner of drinking PBS (e.g., avoid mixing different types of alcohol), and serious harm reduction PBS (e.g., use a designated driver; Martens et al., 2005; Martens, Pederson, et al., 2007). Manner of drinking PBS have shown the strongest association with drinking, whereas stopping or limiting drinking PBS and serious harm reduction PBS have been weakly or less reliably associated with alcohol consumption (Martens et al., 2005; Napper, Kenney, Lac, Lewis, & LaBrie, 2014; Pearson, Kite, & Henson, 2012a, 2012b).

Although there have been many advances in the literature on drinking PBS and alcohol consumption, the association between sexual assault PBS and alcohol consumption has not been extensively studied. Sexual assault PBS are designed to minimize potential sexual assault risks, so it is plausible women who drink use sexual assault PBS to create an environment where they believe they can safely drink more. For example, the PBS “walking home with a trusted friend” likely would not reduce alcohol consumption because it is not focused on stopping, limiting, or altering the manner of drinking. However, it is plausible that using this PBS would lead women to feel safer engaging in heavier drinking. Women might plan ahead to use this PBS so that they can consume greater quantities of alcohol in a safer manner. Unfortunately, sexual assault PBS cannot guarantee women will not be assaulted. There is evidence that survivors of sexual assault use sexual assault PBS less often compared to women who have never been assaulted, perhaps because these strategies did not prevent an assault when used previously (Neilson et al., 2015). To the extent sexual assault PBS may encourage heavy alcohol consumption, these tactics may inadvertently increase women’s risk of being targeted by perpetrators and reduce their capacity to fight off unwanted sexual advances. Examination of the relation between sexual assault PBS and drinking seems warranted, given the well-documented association between heavy drinking and sexual assault.

Another important limitation of studies on the PBS-drinking association is that the majority have been cross-sectional and utilized global reports of PBS and drinking (e.g., averaged over the past 30-90 days; Pearson, 2013). There remains a gap in the research when it comes to examining variability in the association between different types of PBS and risky alcohol consumption across different individuals and across different occasions. A more nuanced examination of these relations could inform efforts to reduce drinking in college women and aid in the prevention of alcohol-related sexual assault. The present study attempted to extend

the literature through the examination of daily associations between sexual assault PBS, stopping or limiting drinking PBS, manner of drinking PBS, and risky alcohol consumption in women.

Variability in PBS Between Individuals

Studies have examined a range of factors that contribute to individual differences in PBS use, but gender has been the most commonly examined predictor of PBS use (see Pearson, 2013 for a review). Studies concur that women use PBS more often than men, on average (e.g., Benton et al., 2004; LaBrie et al., 2011; Lewis, Rees, Logan, Kaysen, & Kilmer, 2010; Nguyen, Walters, Wyatt, & DeJong, 2011). There is also evidence that between-person differences in PBS use are related to drinking. For example, Ray, Stapleton, Turrisi, and Pillion (2012) examined between-person variability in both risky drinking (e.g., drinking games; pregameing, or drinking alcohol before attending a social event where alcohol will be served) and PBS. They identified three subgroups of individuals who engaged in: 1) infrequent risky drinking and frequent PBS, 2) frequent risky drinking and infrequent PBS, and 3) frequent risky drinking and frequent PBS.

A limitation of the abovementioned studies on variability in PBS between individuals is that they tended to restrict their examination to primarily drinking PBS and used global measures of PBS use and drinking to examine the PBS-alcohol consumption relation. Although global measures are useful for assessing differences in PBS use between people (i.e., who uses more on average, relative to others), global reports limit the ability to examine variability across events (i.e., within-person), and how this variability may influence risky drinking on a given day.

Variability in PBS Across Events

There have been several studies that examined drinking behaviors using event-level designs (e.g., Collins et al., 1998; Ray, Stapleton, Turrisi, & Mun, 2014). The extent to which individuals drink has been shown to vary across occasions or events. However, only two published studies have examined PBS at the event-level (Lewis et al., 2012; Pearson, D'Lima, & Kelley, 2013), by asking college students to complete daily reports of their use of PBS from the PBSS (Martens et al., 2005; Martens, Pederson, et al., 2007). Findings from these studies showed PBS use varies across days; individuals utilized more PBS on some drinking days and fewer on others. Individuals also varied the types of PBS they used across drinking days. Manner of drinking PBS (e.g., avoiding mixing different types of alcohol) were negatively associated with drinking at both levels of analysis (i.e., between people and across days). In contrast, stopping or limiting drinking PBS (e.g., planning to stop drinking at a predetermined time) and serious harm reduction PBS (e.g., using a designated driver) were positively associated with drinking across days. Average (between-person) serious harm reduction PBS use was also positively associated with drinking. Although these studies provided valuable information on the global and event-level associations between drinking PBS and alcohol consumption, the absence of data on sexual assault PBS is an important omission.

The Current Study

The present study used a 14-day diary design to extend the research on sexual assault PBS, stopping or limiting drinking PBS, and manner of drinking PBS at the event-level. We examined associations between female college students' alcohol consumption and average PBS use (i.e., differences between people in the number of PBS used, on average; person-level associations); daily deviations from one's typical PBS use (i.e., using more or less PBS than usual on a given drinking day; event-level associations); and an interaction of the two (i.e., variation in the daily association between PBS and drinking based on an individual's average PBS use). The associations between each PBS type and drinking were examined when controlling for the influence of the other PBS types.

First, we hypothesized that women who used more sexual assault PBS, on average, would consume more drinks, whereas women who used more stopping or limiting drinking PBS and manner of drinking PBS, on average, would consume fewer drinks (person-level associations). Second, we hypothesized that women would consume more drinks on days when they used more sexual assault PBS and fewer drinks on days when they used more stopping or limiting drinking PBS and manner of drinking PBS (event-level associations). Finally, we expected to observe significant interaction effects, such that the daily association between each type of PBS and drinking would be strongest among women who used more PBS on average.

Method

Recruitment

All recruitment and study procedures were reviewed and approved by the university's Institutional Review Board. Female students ($N = 750$) were randomly selected from the university registrar's database of incoming freshmen at a large, public northeastern university and invited to participate in research about drinking and health behaviors. Students received a pre-notification letter and e-mail that described the research and provided a URL and PIN for accessing a consent form and web-based screening survey. A total of 436 students (58%) consented and completed the screening, a response rate that is consistent with other studies utilizing similar recruitment methods (e.g., Turrisi et al., 2013).

Two hundred and thirty-five respondents (54%) met eligibility criteria, which included: 1) reporting at least one heavy drinking episode in the past month (i.e., consuming four or more drinks in one sitting; Wechsler, Dowdall, Davenport, & Castillo, 1995) and 2) owning a 4G network smartphone. Ineligible students were paid \$5 for their time and removed from the participant list; eligible students were redirected to the baseline assessment. They were paid \$15, plus a \$5 rapid completion bonus if they completed the baseline survey within three days of the initial invitation. The pre-notification letter, e-mail, and consent form contained information on study compensation, including the opportunity to receive the \$5 bonus.

Study Procedures

At the end of the baseline survey, two-thirds of eligible students ($n = 156$) were randomized to participation in the current study, and one-third of students ($n = 79$) were randomized to a

reactivity control group as part of an unrelated study. Students assigned to the current study were routed to a scheduling tool, which invited them to continue in the study by signing up for a required training on Snap Mobile, a cellular application used for data collection. Those who did not initially complete training received up to three phone calls and two emails reminding them to schedule. A total of 84 students (54%) completed the training and were enrolled in the current study. There were no significant differences between students who enrolled and students who did not enroll on demographics, baseline alcohol consumption (i.e., peak drinking, typical weekly drinking, frequency of drunkenness), and baseline use of each PBS type.

The current study employed a 14-day diary protocol. Participants were trained to log into Snap Mobile and complete a short survey each morning upon waking. The survey asked them about their drinking and PBS use on the previous day. To encourage compliance, text message reminders were sent at 9 am on weekdays and 10 am on weekends, and the survey was disabled after 1 pm each day. At the end of the study, participants were compensated an additional \$30, with a \$20 bonus if they completed at least 12 of the 14 daily assessments. The consent form and training materials informed participants of the opportunity to receive the \$20 bonus.

Participants

PBS were not assessed for non-drinking days; therefore, the final sample consisted of 69 participants who reported at least one drinking event during the 14-day assessment period. Sixty-eight participants (98.6%) were retained from enrollment to the final survey. On average, participants were 18.06 ($SD = 0.24$) years old. A variety of racial backgrounds were represented, including six African Americans (8.7%), three multi-racial individuals (4.3%), and two Asians (2.9%), although 58 participants (84.1%) identified as Caucasian. Three participants (4.3%) were Hispanic. Sixty-eight participants (98.6%) lived on campus and 26 (37.7%) were affiliated with sororities. At baseline, participants reported an average weekly consumption of 8.49 ($SD = 5.72$) drinks.

Measures

Participants were asked to report the total number of drinks they consumed on the previous day. A standard drink was defined as 12 oz. beer, 8-9 oz. malt liquor, 5 oz. table wine, or 1.5 oz. 80-proof liquor (NIAAA, 2006). Participants who reported drinking on the previous day were prompted to indicate which PBS they used. They were asked, "Yesterday, when you were around alcohol, did you do any of the following?" with response options ranging from 0 (*no*) to 1 (*yes*). Sexual assault PBS, stopping or limiting drinking PBS, and manner of drinking PBS were measured separately as described below. For each type of PBS, briefer versions of established scales were used to keep daily assessments short and minimize response burden, as recommended in the literature (see Stone, Kessler, & Haythomthwatte, 1991). Selected PBS were frequently endorsed in preliminary studies and expected to have sufficient daily variability (e.g., Ray, Turrisi, Abar, & Peters, 2009; Scaglione et al., 2015).

Sexual assault PBS—Sexual assault PBS included four items adapted from the Dating Self-Protection Against Rape Scale (DSPARS; Moore & Waterman, 1999). These items

were “had a trusted friend walk home with me,” “let a friend or family member know where I was,” “talked to people who knew my potential hook-up or sexual partner to find out what he or she was like,” and “met others in a public place instead of a private place.” Endorsed items were summed to indicate the number of sexual assault PBS used on each drinking day (current sample, $M = 2.25$, $SD = 1.33$, baseline $\alpha = 0.90$; Moore & Waterman, 1999, $\alpha = 0.86$).

Stopping or limiting drinking PBS—Stopping or limiting drinking PBS included three items that each had a factor loading of at least 0.65 on the stopping or limiting drinking subscale of the PBSS (Martens, Pederson, et al., 2007). These items were “determined in advance not to exceed a set number of drinks,” “alternated alcoholic and nonalcoholic drinks,” and “stopped drinking at a predetermined time.” Endorsed items were summed to indicate the number of stopping or limiting drinking PBS used on each drinking day (current sample, $M = 1.04$, $SD = 1.11$, baseline $\alpha = 0.90$; Martens, Pederson, et al., 2007, $\alpha = 0.82$).

Manner of drinking PBS—Manner of drinking PBS included two items that each had a factor loading of at least 0.65 on the manner of drinking subscale of the PBSS (Martens, Pederson, et al., 2007). These items were “avoided mixing different types of alcohol” and “avoided trying to keep up with or out-drink others.” Endorsed items were summed to indicate the number of manner of drinking PBS used on each drinking day (current sample, $M = 0.95$, $SD = 0.84$, baseline $\alpha = 0.93$; Martens, Pederson, et al., 2007, $\alpha = 0.74$).

Analytic Strategy

The current study aimed to examine associations between the number of drinks consumed on a given day and daily use of each PBS type. A hierarchical linear model (HLM)¹ was estimated in SAS (version 9.4) to examine the association between each type of PBS and drinking when controlling for average-level use of the other types. Within these models, between-person refers to person-level associations (i.e., differences between people in the number of PBS used, on average), and within-person refers to event-level associations (i.e., using more or less PBS than usual on a given drinking day). PBS were centered around the individual’s mean at Level 1 (i.e., within-person association) and around the sample mean at Level 2 (i.e., between-person association). Deviations from the individual mean represented days on which an individual used more or less PBS than she did on average. Deviations from the sample mean represented an individual’s tendency to use more or less PBS than others, on average. All main effects and within-domain interactions (i.e., Level 1 sexual assault PBS use x Level 2 sexual assault PBS use; Level 1 stopping or limiting drinking PBS use x Level 2 stopping or limiting drinking PBS use; Level 1 manner of drinking PBS use x Level 2 manner of drinking PBS use) were estimated. The HLM is described below.

Level 1 (within-person)—At Level 1, the total number of drinks consumed on a given day (Y_{ij}) was modeled as a function of an intercept (π_{0i}); slopes describing how drinking changes on days when an individual reports greater sexual assault PBS use, given average

¹Because the outcome variable (i.e., number of drinks consumed daily) was a count variable, Poisson models were also estimated. Results were consistent across models. For ease of interpretation, only the linear model is discussed.

levels of stopping or limiting drinking PBS and manner of drinking PBS use (π_{1i}), greater stopping or limiting drinking PBS use, given average levels of sexual assault PBS and manner of drinking PBS use (π_{2i}), greater manner of drinking PBS use, given average levels of sexual assault PBS and stopping or limiting drinking PBS use (π_{3i}); and a within-person residual (ε_{ij}).

$$Y_{ij} = \pi_{0i} + \pi_{1i}(\text{sexual assault PBS}_{ij}) + \pi_{2i}(\text{stopping or limiting drinking PBS}_{ij}) + \pi_{3i}(\text{manner of drinking PBS}_{ij}) + \varepsilon_{ij}$$

Level 2 (between-person)—At Level 2, the drinking intercept (π_{0i}) was modeled as a function of the average number of drinks consumed daily for the sample (γ_{00}), between-person differences in sexual assault PBS use (averaged across the measured drinking occasions; γ_{01}), between-person differences in stopping or limiting drinking PBS use (averaged across the measured drinking occasions; γ_{02}), between-person differences in manner of drinking PBS use (averaged across the measured drinking occasions; γ_{03}), and between-person residuals (ζ_{0i}). The sexual assault PBS slope (π_{1i}) was modeled as a function of the average association between daily sexual assault PBS use and drinking across all individuals (γ_{10}) and the cross-level interaction of within-person and between-person sexual assault PBS use (γ_{11}). The stopping or limiting drinking PBS slope (π_{2i}) was modeled as a function of the average association between daily stopping or limiting drinking PBS use and drinking across all individuals (γ_{20}), the cross-level interaction of within-person and between-person stopping or limiting drinking PBS use (γ_{21}), and variability across individuals (ζ_{2i}). The manner of drinking PBS slope (π_{3i}) was modeled as a function of the average association between daily manner of drinking PBS use and drinking across all individuals (γ_{30}) and the cross-level interaction of within-person and between-person manner of drinking PBS use (γ_{31}).

$$\begin{aligned} \pi_{0i} &= \gamma_{00} + \gamma_{01}(\text{sexual assault PBS}_i) + \gamma_{02}(\text{stopping or limiting drinking PBS}_i) + \gamma_{03}(\text{manner of drinking PBS}_i) + \zeta_{0i} \\ \pi_{1i} &= \gamma_{10} + \gamma_{11}(\text{sexual assault PBS}_i) \\ \pi_{2i} &= \gamma_{20} + \gamma_{21}(\text{stopping or limiting drinking PBS}_i) + \zeta_{2i} \\ \pi_{3i} &= \gamma_{30} + \gamma_{31}(\text{manner of drinking PBS}_i) \end{aligned}$$

Results

Each participant reported between one and seven drinking days ($M = 3.13$; $SD = 1.59$), resulting in 215 observed drinking events over the 14-day study period. Examination of the unconditional means model revealed the intraclass correlation coefficient (ICC) was 0.38. This suggested 38% of the total variance in drinking was attributable to differences between persons, whereas the remaining 62% could be attributed to within-person variability.

Between-Person Associations

Results from the multilevel model predicting the number of drinks consumed are included in Table 1. Each association reported between a PBS type and drinking accounts for average-

level use of the other PBS types. There was a positive between-person association between sexual assault PBS and drinking ($\gamma_{01} = 0.50, p = .03$), suggesting that women who used more sexual assault PBS, on average, consumed more drinks. In contrast, the between-person association between stopping or limiting drinking PBS and drinking was negative ($\gamma_{02} = -0.57, p = .04$), suggesting that women who used more stopping or limiting drinking PBS, on average, consumed fewer drinks. There was also a negative between-person association between manner of drinking PBS and drinking ($\gamma_{03} = -1.07, p = .01$).

Within-Person Associations

The within-person association between sexual assault PBS and drinking was positive ($\gamma_{10} = 0.51, p = .03$), suggesting that on days when women used more than their typical (average) number of sexual assault PBS, they consumed more drinks. In contrast, there was a negative within-person association between stopping or limiting drinking PBS and drinking ($\gamma_{20} = -0.88, p = .004$), indicating that women consumed fewer drinks on days when they used more than their typical (average) number of stopping or limiting drinking PBS. There was also a negative within-person association between manner of drinking PBS and drinking ($\gamma_{30} = -0.75, p = .01$).

Between-Person X Within-Person Interaction Effect

There was a significant cross-level interaction of between-person X within-person stopping or limiting drinking PBS use ($\gamma_{21} = 1.00, p = .03$). Figure 1 shows the within-person association graphed at each of three conditional between-person levels of stopping or limiting drinking PBS use: average (at 0, the sample mean after centering), below-average ($-1 SD$), and above-average ($+1 SD$). Further analysis as described in Preacher, Curran, and Bauer (2006) revealed that the unstandardized simple slope was significant at below-average (slope = $-1.86, p = .003$) and average (slope = $-0.88, p = .004$) levels of stopping or limiting drinking PBS use, but not at above-average stopping or limiting drinking PBS use (slope = $0.10, p = .82$). This suggests that women who, on average, reported the lowest stopping or limiting drinking PBS use drank significantly less on days when they used more stopping or limiting drinking PBS, but women who, on average, reported the highest stopping or limiting drinking PBS use did not drink significantly less on days when they used more stopping or limiting drinking PBS.

Discussion

The purpose of the current study was to examine associations among sexual assault PBS, drinking PBS (i.e., stopping or limiting drinking PBS; manner of drinking PBS), and alcohol consumption between college women (i.e., at the person-level) and across their drinking days (i.e., at the event-level). Given the well-documented association between heavy drinking and sexual assault, we sought to conduct a nuanced examination of the relation between sexual assault PBS and drinking using a daily diary approach. No published research to date has investigated sexual assault PBS at the event-level.

We examined the conditional association between each type of PBS and drinking (i.e., accounting for use of the other types). As hypothesized, women who used more sexual

assault PBS, on average, consumed more drinks. Women also drank significantly more on days when they used more sexual assault PBS. Contrary to our hypothesis, the daily association between sexual assault PBS and drinking was the same for all women in the study, regardless of their typical sexual assault PBS use. This finding suggests most female college students may be receptive to, and capable of, using sexual assault PBS on nights they drink more heavily, even if they do not typically use many sexual assault PBS. Thus, encouraging the use of sexual assault PBS may be a practical way to empower young women to reduce the risk of being targeted by a perpetrator on occasions when they intend to drink heavily, or after heavy drinking has already occurred.

Despite the potential benefits of sexual assault PBS, anyone who encounters a perpetrator is at risk of being assaulted. Sexual assault is never the victim's fault, but alcohol impairs judgment and may diminish women's capacity to resist unwanted sexual advances (e.g., Norris et al., 2006; Testa, Livingston, & Collins, 2000). In addition, the ability to implement complex sexual assault PBS effectively may be compromised at increased levels of intoxication. For example, the PBS "talking to people who know one's potential hook-up or sexual partner to find out what he or she is like" involves several steps (e.g., identify a reliable referent; decide what questions to ask). Women may find it more difficult to execute these steps on occasions when they are more intoxicated than usual, especially if they do not have much prior experience with vetting potential sexual partners. Although implementation quality is an important consideration, this PBS likely cannot eliminate risk entirely. It is possible that even well-vetted individuals may commit sexual assault.

It is unclear why women drank more on days when they increased their use of sexual assault PBS, but we suspect that they may have ramped up their use of sexual assault PBS in anticipation of heavy drinking events. Other event-level studies have found that college students drank more on days they used more serious harm reduction PBS, such as arranging for a designated driver (Lewis et al., 2012; Pearson et al., 2013). Although sexual assault PBS is a different construct from serious harm reduction PBS, it seems plausible that women would also plan ahead to use increased amounts of sexual assault PBS on days they plan to drink more, in order to reduce the risk for alcohol-related sexual assault. In this regard, sexual assault PBS may serve as a compensatory health behavior (i.e., a healthy behavior that is viewed as compensating for an unhealthy one; Knauper, Rabiau, Cohen, & Patriciu, 2004). A possible alternative explanation is that women may choose to increase their use of sexual assault PBS during or after a period of heavy drinking. However, drinking tends to impair women's sexual risk perception (e.g., Testa et al., 2000), so it seems more probable that women would plan ahead to use more sexual assault PBS.

It is also possible that women who use sexual assault PBS drink more unintentionally. For example, women may feel safer after arranging to meet others in a public setting and walk home with a trusted friend, and this perception of safety may contribute to heavier drinking even on days when women do not plan ahead to drink heavily. To elucidate why increased sexual assault PBS use was associated with increased drinking, researchers should explore the timing of sexual assault PBS use (i.e., before, during, or after drinking) and the motivational and decisional processes underlying both sexual assault PBS use and alcohol consumption.

Turning to drinking PBS, we found support for our hypothesis that women who used more stopping or limiting drinking PBS or manner of drinking PBS, on average, would drink less than women who used fewer of these drinking PBS. Also, as expected, both stopping or limiting drinking PBS and manner of drinking PBS were associated with reduced alcohol consumption on specific drinking days; women drank less on days when they used a greater number of stopping or limiting drinking PBS or manner of drinking PBS. Although previous event-level studies of mixed-sex samples found that individuals actually drank more on days when they used more stopping or limiting drinking PBS (Lewis et al., 2012; Pearson et al., 2013), we were unable to replicate this finding in our exclusively female sample. It seems plausible that whether stopping or limiting drinking PBS are positively or negatively associated with drinking in a particular sample may depend on the timing of their use. For example, planning ahead to use stopping or limiting drinking PBS from the onset of drinking would tend to be associated with reduced drinking. Initiating stopping or limiting drinking PBS use after heavy drinking has already occurred (e.g., after feeling the negative physiological effects of alcohol) would tend to be associated with increased drinking. In the future, researchers should explore the timing of the onset of stopping or limiting drinking PBS use in female drinkers to elucidate whether the relation between stopping or limiting drinking PBS and drinking changes as a function of one's degree of planfulness.

Although the daily association between manner of drinking PBS and drinking was the same for all women in the study, regardless of their typical manner of drinking PBS use, there was a significant interaction of person-level and event-level effects for stopping or limiting drinking PBS. Examination of the interaction effect revealed the daily association between stopping or limiting drinking PBS and drinking was strongest for the women who used the least stopping or limiting drinking PBS, on average (i.e., below-average use). Among women who used the most stopping or limiting drinking PBS, on average (i.e., above-average use), drinking remained relatively constant on days stopping or limiting drinking PBS use was increased (i.e., the association was not significant). This finding suggests that women who routinely use low amounts of stopping or limiting drinking PBS may benefit from ramping up their use of these PBS. In contrast, women who already use above-average levels of these PBS may not benefit from increasing their use. Above-average stopping or limiting drinking PBS users tended to consume between 4 and 5 drinks per day, regardless of the number of stopping or limiting drinking PBS used that day. It is possible that women who have more practice using stopping or limiting drinking PBS employ these PBS in a strategic manner to stay within a desired drinking range. However, it should be noted that this range exceeds daily drinking limits that are generally considered safe for female drinkers (NIAAA, 2009).

Practice Implications

Findings provided support that sexual assault PBS and drinking PBS had different associations with alcohol consumption. Whereas drinking PBS were associated with reduced alcohol consumption, sexual assault PBS were associated with increased drinking. It is unclear why women drank more on days when they used more sexual assault PBS, but perceived safety was likely an important consideration. From an early age, most women are taught that behaviors such as letting others know their whereabouts and walking home with

a trusted friend can empower them to protect themselves from perpetrators of sexual assault. Although it is important that young women are made aware of the potential safety benefits of using sexual assault PBS, we encourage clinicians, teachers, and parents to simultaneously educate women that drinking itself is one of the most significant risk factors for being targeted by a perpetrator. It is likely sexual assault PBS do not entirely eliminate the risk conferred by heavy drinking.

Our findings suggest it may be beneficial for clinicians to provide a menu of options for reducing sexual assault risk by encouraging women to use drinking PBS in conjunction with sexual assault PBS. This dual approach could be incorporated into various interventions (e.g., brief motivational interviewing; personalized feedback), and would likely appeal to a range of female drinkers. It may be especially beneficial to promote concurrent use of manner of drinking PBS (e.g., refraining from mixing different types of alcohol), which were consistently associated with reduced drinking across people and events in this study and other diary studies (Lewis et al., 2012; Pearson et al., 2013). Finally, because little is currently known about how different types of PBS are used together in the real world, future studies might benefit from exploring women's utilization of specific combinations of sexual assault PBS, stopping or limiting drinking PBS, and manner of drinking PBS across drinking events. This could help inform practice by identifying the patterns of PBS use that are most effective in reducing drinking. Specific, highly efficacious PBS combinations could then be taught to incoming college students as part of sexual assault prevention programming.

Limitations and Future Research Directions

First, the study used a modestly sized sample of first-year women from one university, so it is possible that the results may not generalize to all female college student drinkers. Efforts should be made to replicate these findings in larger samples spanning multiple class years. Second, to keep the response burden manageable for participants, the daily surveys included PBS that women endorsed using most frequently in our previous studies. Although it is unlikely that participants used other PBS, this possibility cannot be ruled out. Future studies might benefit from examining these effects using a wider range of PBS. Third, the study did not measure how consistently or well strategies were implemented on days they were used. Despite the benefits of PBS, there remains a sizeable gap in the literature detailing how consistently and how well drinkers use specific PBS. It is reasonable to think that PBS are most effective when implemented with high consistency and quality and least effective when implemented with low consistency and quality. However, it is plausible that many individuals implement PBS consistently but with relatively poor quality, or inconsistently regardless of the quality. Understanding specific implementation patterns that predict risky outcomes can help guide prevention and intervention efforts.

Finally, we were unable to examine sexual assault as an outcome because none of our participants reported being sexually assaulted on any of the 14 measured occasions. Most studies of sexual assault have utilized cross-sectional or non-diary longitudinal designs that follow participants over extended periods of time, such as several months or more. Although sexual assault rates tend to be higher with longer follow-up periods, non-diary studies lack the ability to provide a nuanced understanding of upstream factors associated with sexual

assault, such as sexual assault PBS and drinking. Our major contribution is the examination of these upstream factors. Future diary research may benefit from following participants over a longer interval (e.g., 30 days) to capture greater variability in drinking and allow for a more robust examination of daily associations among PBS, alcohol consumption, and sexual assault. In addition, it may be informative to examine daily associations among PBS, drinking, and various alcohol-related consequences, such as unprotected sex and regretted sex.

Conclusion

The current study examined the effects of sexual assault PBS, stopping or limiting drinking PBS, and manner of drinking PBS on alcohol consumption between women and across their drinking days. Findings suggest sexual assault PBS and drinking PBS have different associations with drinking. A more in-depth examination of sexual assault PBS seems warranted to enhance our understanding of associations among sexual assault PBS, drinking, and sexual assault risk in female drinkers. In the meantime, clinicians, teachers, and parents can provide a menu of options for reducing sexual assault risk by encouraging concurrent use of drinking PBS and sexual assault PBS.

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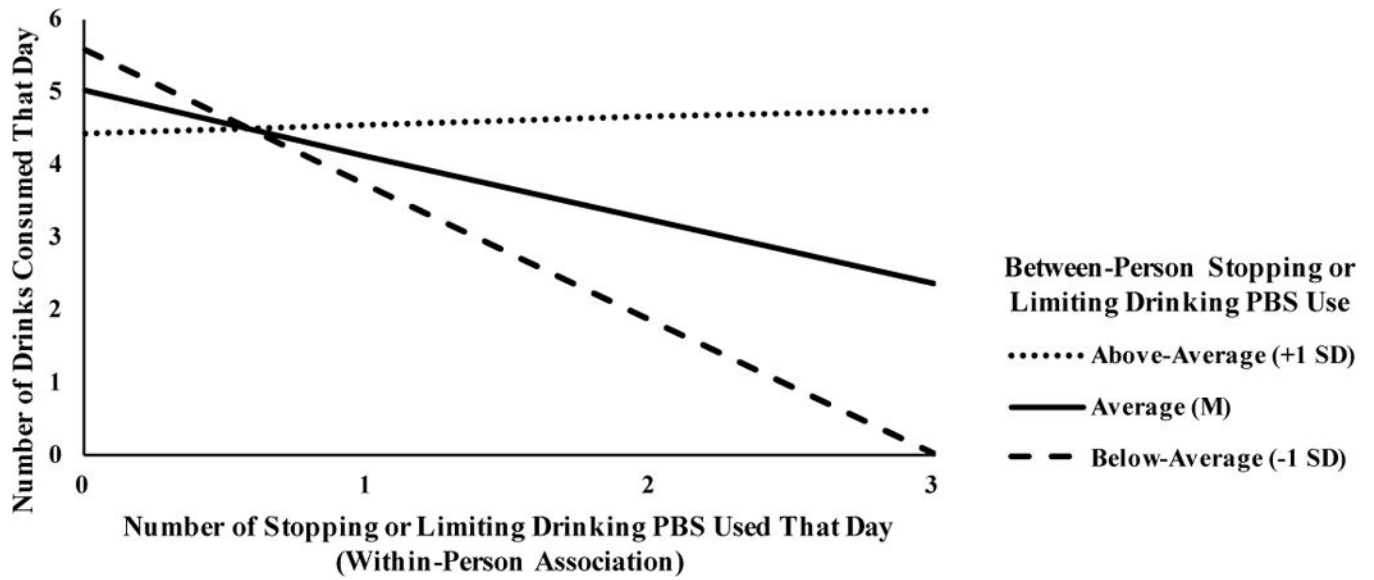


Figure 1. The Daily (Within-Person) Association Between Stopping or Limiting Drinking PBS and Drinking at Three Conditional Levels of Between-Person Stopping or Limiting Drinking PBS Use. *M* = Mean. *SD* = Standard Deviation. PBS = Protective Behavioral Strategies.

Table 1

Multilevel Model Examining Associations Between Protective Behavioral Strategies and Drinking.

Model Component	<i>b</i>	<i>SE</i>	<i>p</i>
Intercept, γ_{00}	4.99	0.20	<.0001
Between-person association for sexual assault PBS, γ_{01}	0.50	0.22	.03
Between-person association for stopping or limiting drinking PBS, γ_{02}	-0.57	0.27	.04
Between-person association for manner of drinking PBS, γ_{03}	-1.07	0.42	.01
Within-person association for sexual assault PBS, γ_{10}	0.51	0.23	.03
Within-person association for stopping or limiting drinking PBS, γ_{20}	-0.88	0.30	.004
Within-person association for manner of drinking PBS, γ_{30}	-0.75	0.27	.01
Between-person X within-person interaction for sexual assault PBS, γ_{11}	-0.45	0.24	.06
Between-person X within-person interaction for stopping or limiting drinking PBS, γ_{21}	1.00	0.47	.03
Between-person X within-person interaction for manner of drinking PBS, γ_{31}	0.45	0.55	.41

Note. Models are based on a total of 215 observed drinking events across 69 participants. *b* = regression coefficient for number of drinks. *SE* = Standard Error. PBS = Protective Behavioral Strategies.

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