

BRIEF COMMUNICATION

Protective Behavioral Strategies and Alcohol-Related Regretted Sex
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Regretted sexual experiences are reported at higher rates among sexually active female college students than by their male counterparts. Moreover, alcohol is involved in approximately one third of regretted sex experienced by college students. Previous research has shown that students who implement protective behavioral strategies (PBS) while drinking are able to reduce alcohol-related negative consequences, including regretted sex. In order to compare differences in associations among alcohol use, PBS, and regretted sex, the current study examined these associations as a function of gender. Results were analyzed for each of the 3 subtypes of PBS: Manner of Drinking (MD); Stopping/Limiting Drinking (SLD) and Serious Harm Reduction (SHR). The current study included 371 college students (64.15% female) from a moderate-sized Midwest university. Participants completed a series of online surveys that assessed drinking habits, alcohol-related consequences (i.e., regretted sex), and PBS use. A multigroup path analysis found that alcohol use was positively associated with regretted sex, however, 2 of the 3 PBS subtypes (MD and SLD) were negatively associated with alcohol use. The third PBS subtype (SHR) yielded a direct negative relationship with regretted sex for women, but not for men. Lastly, the interaction of SHR and alcohol use was significantly associated with regretted sex, which was moderated by gender. These results suggest an among PBS use, decreased alcohol use, and fewer instances of regretted sex. Further examination of the differences in relationships among PBS subtypes, alcohol use, and regretted sex for men and women is warranted.

Public Health Significance

This study corroborates the finding that use of protective behavioral strategies by college students who drink alcohol has the potential to reduce alcohol-related consequences, specifically regretted sex. Usefulness of PBS interventions have different effects for both men and women, depending on the PBS subtype utilized.

Keywords: alcohol use, college students, protective behavioral strategies, regretted sex, substance use and abuse

Regret is a negative emotional construct often involving self-blame linked to past behaviors (Connolly & Zeelenberg, 2002; Gilovich & Medvec, 1995). Adults experience regret in many areas of life, but regret becomes problematic when it is in relation to education, career, and romantic relationships (Roese & Summerville, 2005). One of the most pervasive/disruptive forms of

regret, often related to alcohol use, is regretted sex (Barnett et al., 2014; Merrill, Rosen, Boyle, & Carey, 2018). There are two distinct types of regretted sex. The first is regrets of action (commission), which includes behaving in a way one believes they should not (e.g., having sex with someone when they believe they should not have; Gilovich & Medvec, 1995; Zeelenberg, van den Bos, van Dijk, & Pieters, 2002). The second is regrets of inaction (omission), which includes failing to act and later wishing one had acted (e.g., regretting not acting during a consensual sexual encounter; Gilovich & Medvec, 1994; Oswalt, Cameron, & Koob, 2005). Sexual regret differs from sexual risk in that regretted sex leads to a different type of psychological sequelae (e.g., maladaptive personal self-evaluation, symptoms of anxiety or symptoms of depression, poorer mental health in general, and less use of responsible drinking behaviors; Brahm, Ahl, Reed, & Amaro, 2011; Oswalt et al., 2005), whereas risky sex

This article was published Online First April 22, 2019.

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is more aligned with risk-related health behaviors (e.g., STDs, unwanted pregnancies; Brown & Vanable, 2007; MacDonald, Zanna, & Fong, 1996). Understanding factors that may prevent/reduce the occurrence of regretted sex is important as these may provide insight into intervention targets (Read, Wardell, & Bachrach, 2013).

Sexual regrets of both omission and commission are frequently associated with alcohol use (Orchowski, Mastroleo, & Borsari, 2012; Oswalt et al., 2005). Lifetime prevalence of regretted sex among college students has been found to be as high as 72%, with 31.7% stating alcohol negatively influenced their decision making (Oswalt et al., 2005). In a sample of college women drinkers, 35% reported regretting a sexual situation after drinking, 23% neglected to use birth control or protect from STDs, and 22% had sex with someone they would not ordinarily have sex with (Moorer, Madson, Mohn, & Nicholson, 2013). In another sample of college students, 25% reported at least one instance of alcohol-related regretted sex in the past month, with women reporting higher rates than men (Orchowski et al., 2012). Some previous research has focused on the notion that men and women experience regret differently. Men are more likely to experience regrets of omission, whereas women are more likely to experience regrets of commission (Dickson, Paul, Herbison, & Silva, 1998; Klassen, Williams, & Levitt, 1989; Roese et al., 2006). Further research shows that women are more prone to regretted sex than men (Dickson et al., 1998; Klassen et al., 1989; Sawyer & Smith, 1996). It is unclear if PBS use is differentially related to regretted sex across men and women. For the purposes of this study, we focus on both regrets of omission and commission, as both occur in the context of alcohol use.

Protective behavioral strategies (PBS) are behaviors that individuals can engage in while drinking to reduce the likelihood of experiencing alcohol-related consequences (Pearson, 2013). Increasing PBS use is a basic harm reduction approach (Marlatt, Baer, & Larimer, 1995) and is a useful component of alcohol prevention and intervention programs (Lewis, Rees, Logan, Kay-sen, & Kilmer, 2010; Martens et al., 2005). The most common subtypes of protective behavioral strategies include (a) Manner of Drinking (MD; e.g., avoiding drinking games), (b) Stopping/Limiting Drinking (SLD; e.g., alternating alcoholic/nonalcoholic drinks), and (c) Serious Harm Reduction (SHR; e.g., using a designated driver; Martens et al., 2005). Students who implement PBS are able to reduce the negative consequences associated with alcohol (Cronce & Larimer, 2011; Lewis et al., 2010; Pearson, 2013; Prince, Carey, & Maisto, 2013; Treloar, Martens, & McCarthy, 2015). Furthermore, research has revealed inverse relationships between the two PBS subtypes, MD and SLD, and alcohol use, with SHR PBS being inversely related to alcohol-related consequences (DeMartini et al., 2013; Moorer et al., 2013; Pearson, 2013). This association is likely due to the nature of these factors. MD and SLD PBS specifically ask about strategies to limit the consumption of alcohol, while SHR targets strategies more directly linked to consequences (see examples above).

In a study examining associations between use of PBS and sex-related alcohol consequences among sexually active college students, PBS use was related to fewer sex-related consequences when drinking (Lewis et al., 2010). For women, (but not men), this finding was mediated by the number of drinks consumed during sexual behavior (Lewis et al., 2010). A separate study found that

increased PBS use was related to lower expectancies of sexual risk and disinhibition, as well as decreased perceptions of sexual-related risks and some alcohol-related sexual behaviors (Logan, Koo, Kilmer, Blayney, & Lewis, 2015).

Limited research has examined how each of the three PBS subtypes differentially relate to specific alcohol-related consequences (Martens, Martin, Littlefield, Murphy, & Cimini, 2011; Pearson, D'Lima, & Kelley, 2013). Although a retrospective study of females found a significant link between controlled consumption (a combination of the SLD and MD PBS subtypes) and SHR for alcohol-sexual victimization, but not for alcohol-risky sexual behavior (Moorer et al., 2013), very little research has examined differential associations between PBS subtype and adverse sex-related outcomes. Furthermore, no studies have examined differences in PBS subtype and sexual regret. The current study addresses this gap in the literature.

The goal of the present study was to examine differences in associations between alcohol use, PBS, and regretted sex. Based on previous research, it was expected that alcohol use would mediate the relationship between MD and SLD PBS and regretted sex while SHR PBS would be directly related to sexual regret and moderate the link between alcohol use and sexual regret. Specifically, it was hypothesized that students who endorse higher MD and SLD PBS use will have fewer instances of regretted sex through lower alcohol use. Students with higher SHR PBS were expected to experience lower sexual regret via (a) a direct inverse association with sexual regret and (b) attenuating effects on the association between alcohol use and sexual regret. Finally, we compared these associations across gender using a multigroup approach, although we made no specific hypotheses regarding gender differences.

Method

Participants

Participants were college student drinkers ($n = 349$; 63.90% female) from a Midwest university in 2015. For the purposes of the current study, we use the term "gender" to describe the dichotomous variable biological sex, so as not to confuse gender with our outcome variable, regretted sex. Participants ranged in age from 18 to 32 ($M = 19.34$ $SD = 1.77$). The sample was 91.12% Caucasian, 4.30% Asian, 1.72% Black/African American, and 2.58% other or did not wish to respond. The university IRB approved all study procedures prior to recruitment under the study name "Longitudinal Use of Protective Strategies" (protocol number: SM14005).

Procedure

Participants completed an online screen assessing alcohol use and consequences, use of PBS, and demographic information. This data is part of a larger study for a PBS-based intervention (see Dvorak et al., 2018). The screen was available to $N = 1,163$ participants registered with the university's online subject pool; however, only $n = 532$ enrolled for the screen and $n = 514$ completed the screen. Of the sample that completed the screen, $n = 366$ (68% of the sample) endorsed current alcohol involvement. As PBS use occurs in the context of alcohol use, the analysis was restricted to this sample. Finally, to isolate "sexual regret"

versus “sexual risk.” individuals who endorsed engaging in sexual activity without protection against STD and/or pregnancy were removed from the analysis ($n = 17$), resulting in an analysis sample of $n = 349$.

Measures

Alcohol use. Alcohol consumption was assessed via participant self-report using the Alcohol Use Disorders Identification Test—Consumption Scale (AUDIT-C; Saunders, Aasland, Babor, de la Fuente, & Grant, 1993). The AUDIT-C is a 3-item measure assessing alcohol use frequency, intensity, and heavy episodic use. Previous research supports the reliability and validity of the AUDIT-C as a measure of alcohol consumption among college students (DeMartini & Carey, 2012). The AUDIT-C had acceptable internal consistency in the current sample ($\alpha = .79$).

Regretted sex. Regretted sex was assessed by a single item from the Young Adult Alcohol Consequences Questionnaire (YA-ACQ; Read, Kahler, Strong, & Colder, 2006). The item states, “My drinking has gotten me into sexual situations I later regretted,” with participants responding yes or no. Participants referenced the past six months in response to this item (Read et al., 2006). Previous research has used this item as an outcome for regretted sex in college student samples (see Simons, Maisto, & Wray, 2010).

Protective behavioral strategies. The Protective Behavioral Strategies Survey (PBSS; Martens et al., 2005) assesses use of PBS while drinking. Three subtypes of PBS are assessed in the 15-item survey: (a) MD (five items, e.g., “Avoid mixing different types of alcohol”), (b) SLD (seven items, e.g., “Drink water while drinking alcohol”), and (c) SHR (three items, e.g., “Use a designated driver”). Responses were 1 (*Never*), 2 (*Rarely*), 3 (*Occasionally*), 4 (*Sometimes*), 5 (*Usually*) and 6 (*Always*). Reliability and validity of the PBSS among college students has been supported by previous research (Martens et al., 2005; Martens, Pederson, LaBrie, Ferrier, & Cimini, 2007). Internal consistency was acceptable for all three subscales in the current sample: MD $\alpha = .70$, SLD $\alpha = .82$, and SHR $\alpha = .87$.

Data Preparation and Analysis Overview

The analysis utilized a multigroup (grouped by gender) observed variable path model in Mplus 8.11 (Muthén & Muthén, 2017). The WLSMV estimator was utilized, which is appropriate for categorical outcomes. Missing data (0–1.35% across measures) was replaced using multiple imputation. Conditional effects were examined at high (+1 *SD*) and low (–1 *SD*) levels of moderator variables across gender. Indirect effects were tested using bootstrapped bias corrected 95% confidence intervals from 5,000 random draws (MacKinnon, 2008). Below we report standardized coefficients (β) and Odds Ratios (*OR*) for ease of interpretation.

Results

Descriptive and Bivariate Statistics

Descriptive statistics and bivariate correlations are listed in Table 1. Age differed by gender in the overall sample, $t(347) = -2.25$, $p = .025$, Cohen’s $d = -0.25$. Men reported higher alcohol consumption rates ($M = 5.39$, $SE = 0.23$) than women ($M = 3.65$, $SE = 0.14$; $t(369) = -6.96$, $p < .001$, Cohen’s $d = 0.71$). Women (18.47%) experienced slightly higher rates of regretted sex than men (15.20%); these rates did not differ significantly, $\chi^2(1) = 0.60$, $p = .440$.

Multigroup Path Analysis

We tested a multigroup path model that allows for the examination of indirect effects of PBS subtypes (i.e., MD and SLD) through alcohol use, as well as conditional effects at high and low levels of SHR PBS, across men and women. Regretted sex in the past 6 months was specified as a dichotomous outcome variable, with alcohol use as a mediator between the MD and SLD PBS subtypes and regretted sex. We initially tested a model in which all three PBS subtypes acted as moderators on the alcohol use \rightarrow regretted sex path and had direct paths to both alcohol use and regretted sex. Only SHR PBS significantly moderated the alcohol

Table 1
Descriptive Statistics and Bivariate Correlations

Variables	1	2	3	4	5	6	7
1. Age	—						
2. Gender	.12*	—					
3. AUDIT-C Score	.03	.34*	—				
4. SLD PBS	-.03	-.10	-.23*	—			
5. MD PBS	.03	-.16*	-.47*	.47*	—		
6. SHR PBS	-.04	-.34*	-.26*	.43*	.47*	—	
7. Regretted Sex	-.11*	-.04	.23*	-.04	-.09	-.07	—
Mean	19.35	.36	4.28	2.80	2.98	4.31	.17
<i>SD</i>	1.78	.48	2.46	.86	.82	.77	.38
Skew	2.63	.58	.47	.20	.18	-1.78	1.73
Range: Lower Limit	18	0	1	1	1	1	0
Range: Upper Limit	32	1	11	5	5	5	1

Note. AUDIT-C = Alcohol Use Disorders Identification Test—Consumption Scale; SLD = stopping/limiting drinking; PBS = protective behavioral strategy; MD = manner of drinking; SHR = serious harm reduction; *SD* = standard deviation.

* $p < .05$.

→ regretted sex association, thus the other interactions were removed from the model. In addition, only SHR PBS had a significant direct effect on regretted sex; we trimmed direct paths from MD and SLD to sexual regret for model parsimony. All paths were initially constrained to be equal across gender. The initial model showed adequate fit to the data, $\chi^2(20) = 26.72, p = .143, CFI = .99, RMSEA = .04$ (90% CI = .00, .08), SRMR = 0.39. Modification indices indicated significant gender differences in the SHR → regretted sex path and the SHR × alcohol use → regretted sex path. These paths were freed across gender, and the model was reestimated. Freeing these paths improved model fit (see Figure 1), $\Delta\chi^2(2) = 7.53, p = .023; \chi^2(18) = 18.80, p = .403, CFI = 1.00, RMSEA = .02$ (90% CI = .00, .04), SRMR = 0.39.

There was a direct inverse association between alcohol use and MD, but not SLD PBS. In addition, alcohol use was positively associated with the likelihood of regretted sex over the past six months. Indirect associations from MD PBS to regretted sex, via alcohol use, were tested using bias corrected SEs. MD PBS was indirectly associated with a lower likelihood of regretted sex via alcohol use (IND = -0.14, 95% CI = -0.21, -0.07). There was a direct inverse association between SHR PBS and regretted sex for women; this association was not significant for men.

Finally, we examined the alcohol use × SHR PBS interaction across genders. Among men, SHR PBS did not moderate the association between alcohol use and regretted sex ($\beta = 0.05, p = .776$). Among women, SHR PBS significantly moderated the association between alcohol use and regretted sex ($\beta = -0.29, p = .008$). This relationship was examined at high (+1 SD) and low (-1 SD) levels of SHR PBS (see Figure 2). At low levels of SHR PBS, there was a positive association between alcohol use and regretted sex ($\beta = 0.50, OR = 1.27, p < .001$). This association was diminished and no longer statistically significant at high levels of SHR PBS ($\beta = -0.05, OR = 0.97, p = .776$). Additionally, indirect effects from MD PBS to regretted sex, via alcohol use, were not statistically significant for women at high levels of SHR PBS, as alcohol consumption was no longer associated with regretted sex (IND = 0.03, 95% CI = -0.18, 0.25).

Discussion

The current study investigated the relationship between different subtypes of PBS, alcohol use, and alcohol-related regretted sexual experiences, as well as gender differences in these associations. Results revealed two of the three PBS subtypes (MD and SLD) was negatively associated with alcohol use, and alcohol use was positively associated with regretted sex. Furthermore, there was a direct, negative relationship between SHR PBS and regretted sex for women, but no direct relationship for men. Lastly, although SHR PBS was not associated with alcohol use directly, the interaction between these two variables was significantly associated with regretted sex, and this interaction varied by gender.

The present findings are partially consistent with previous research that has found that MD PBS and SLD PBS are inversely related to alcohol use, while SHR PBS is inversely related to alcohol consequences (DeMartini et al., 2013; Moorer et al., 2013; Pearson, 2013). Also consistent with past research (Lewis et al., 2010), alcohol use positively predicted consensual sex related alcohol negative consequences, regardless of gender. Importantly, overall model fit improved after freeing two paths across gender, indicating some relationships among PBS, alcohol use, and regretted sex vary across gender.

The relationship between alcohol use and regretted sex was moderated by SHR PBS for women, but not men. This association was potentiated for women who reported using less SHR strategies. Among women who reported using more SHR strategies, the relationship between alcohol use and regretted sex was diminished and nonsignificant. Thus, there is a connection between SHR PBS and regretted sex, which may be broadly protective for women, but not men. This finding is consistent with previous literature suggesting that, for women, increased alcohol use is a risk factor for, and PBS is protective against, regretted sexual experiences, specifically regrets of commission (Gilovich & Medvec, 1995; Zeelenberg et al., 2002). Among men, the results could reflect the previous finding that men are more likely to regret inaction (regrets of omission), which may not have been reported in response

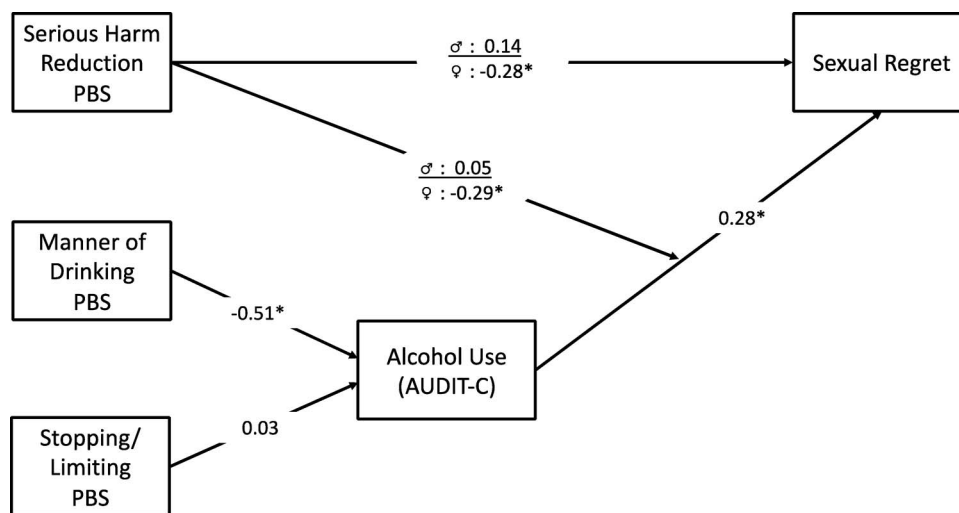


Figure 1. Multigroup path analysis of regretted sexual experiences. All paths listed above are standardized for ease of interpretation. Men are listed above, and women below, the vinculum where paths differ by gender. * $p \leq .008$.

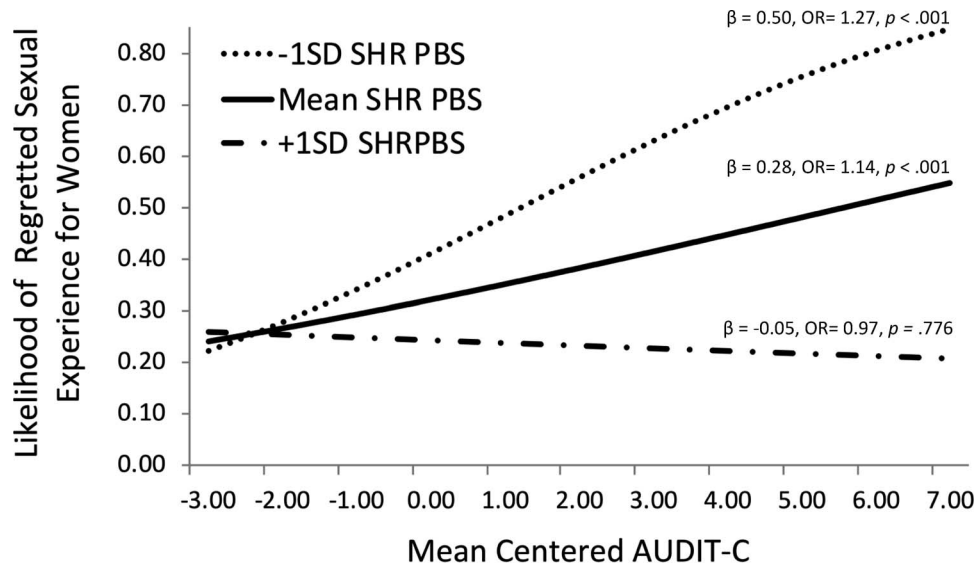


Figure 2. Association between alcohol use and regretted sexual experiences at high (+1 SD) and low (−1 SD) levels of Serious Harm Reduction Protective Behavioral Strategy use among women. Beta Coefficient is standardized. OR = Odds Ratio.

to the item used in this study to measure sexual regret (“My drinking has gotten me into sexual situations I later regretted”). This question does not encompass regrets of omission as these regrets assume individuals did not find themselves acting in a sexual situation. Future research should seek to tease apart the reasons (i.e., omission or commission) participants endorse a positive response to this question.

Of particular interest is the magnitude of effect of SHR PBS for women. First, despite the interaction with alcohol use, SHR PBS had a direct, robust, negative association with sexual regret for women. Thus, women who implement more SHR PBS concurrently experience less sexual regret. This was not true for men, who had virtually no direct relationship between SHR and sexual regret. In addition, among women we found that SHR effectively eliminated the positive robust association between alcohol consumption and sexual regret. This too was not observed for men, which could, again be due to the difference in type of regret experienced by men and women. These findings may have important clinical implications, as it appears that increasing use of SHR PBS among women may reduce the role of the most salient risk factor (alcohol use) for sexual regret.

Given these results, future research should evaluate the utility of PBS as an intervention for both alcohol use and regretted sex. Because PBS is a behavioral construct, it has been found to be a malleable intervention target (Pearson, 2013). Indeed, previous PBS-based interventions have been effective in reducing alcohol use and related consequences (Dvorak, Kramer, Stevenson, Sargent, & Kilwein, 2017; Dvorak et al., 2018; Lewis et al., 2010; Martens et al., 2005). However, there are currently no PBS interventions directly focused on regretted sex.

The present study is not without its limitations. The sample was primarily Caucasian, thus generalizing across other racial/ethnic groups should be done with caution. Additionally, the study was cross-sectional, precluding any conclusions regarding causality.

Finally, the measurement of regretted sex was a single item from the YAACQ. However, previous research has noted adequate measurement of a construct with a single-item question, if said construct is sufficiently narrow and well-defined (Sackett & Larson, 1990; Wilson & Scarpa, 2012). Given group differences in men and women surrounding regrets of omission and commission, future research should aim to measure a broader construct of sexual regret.

Conclusion

Findings from this study support the influence of PBS on instances of regretted sex as a result of alcohol use in college students. The current study supports previous findings that MD strategies have a negative relationship with alcohol use (and, indirectly, alcohol-related consequences), and that SHR strategies are directly inversely related to alcohol-related consequences (such as regretted sex). In addition, for women, the robust relationship between alcohol use and regretted sex was attenuated in those reporting high use of SHR, but not for men. These results suggest that SHR strategies may be especially protective against regretted sexual experiences for women. Although the current study presents promising findings regarding a potentially effective intervention target for a serious alcohol-related problem such as regretted sex, further research is needed in order to better understand the multitude of factors that contribute to regretted sexual experiences.

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Received October 25, 2018

Revision received March 20, 2019

Accepted March 21, 2019 ■

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