Published in final edited form as:

J Drug Educ. 2018 ; 48(1-2): 3–17. doi:10.1177/0047237918800505.

Protective Behavioral Strategies and Hazardous Drinking Among College Students: The Moderating Role of Psychological Distress

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Abstract

There is increasing evidence that mental health problems may attenuate the relationship between protective behavioral strategies (PBS) and alcohol outcomes. However, psychological distress may also affect these relationships. Further, it appears that different types of PBS have differential relationships with alcohol outcomes. The current study examined the degree to which psychological distress moderated the associations PBS subtypes had with hazardous drinking and alcohol-related negative consequences. Participants were 632 traditional-age undergraduate students ($M = 20.04$, standard deviation = 1.48) who had consumed alcohol within the past 30 days and completed online self-report measures designed to assess PBS use, level of psychological distress, hazardous drinking patterns, and alcohol-related negative consequences. Serious harm reduction PBS were associated with less hazardous drinking and less alcohol-related negative consequences, and these associations were strengthened for those experiencing greater psychological distress. Controlled consumption PBS were associated with less hazardous drinking, but this association was not moderated by psychological distress. These findings highlight the potential benefit of teaching serious harm reduction PBS to college students experiencing elevated levels of psychological distress.

Keywords

psychological distress; PBS; alcohol abuse

Hazardous drinking patterns by college students are an ongoing public health concern. Almost 60% of students have consumed alcohol at least once during a 30-day period, and approximately 40% of student drinkers also engage in heavy episodic drinking (four/five drinks in one sitting for women/men) within a 2-week period (National Institute of Alcohol Abuse and Alcoholism, 2015). Hazardous drinking patterns broadly comprise typical drinking rates, rates of heavy episodic drinking, and symptoms of alcohol dependence (e.g., need a drink in the morning to get going; Saunders, Aasland, Amundsen, & Grant, 1993).

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Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Further, students who drink at these hazardous levels tend to experience high rates of associated alcohol-related negative consequences, ranging from missing class or having a hangover to physical injury, sexual assault, or even death (Borden et al., 2011; A. White & Hingson, 2013). Yet, college students rarely seek treatment for alcohol use disorders during their college years (~5%; Blanco et al., 2008). Therefore, it is important to determine what strategies students are using on their own to help minimize alcohol-related harm.

Protective behavioral strategies (PBS) are specific strategies that college students can use prior to or while drinking to mitigate alcohol-related harm (Martens et al., 2004; Martens, Martin, Littlefield, Murphy, & Cimini, 2011). In fact, PBS have been identified as an effective component of brief alcohol interventions with college students (Barnett, Murphy, Colby, & Monti, 2007; Larimer et al., 2007; Murphy et al., 2012). Yet, a more fine-grained evaluation of PBS has revealed differential associations between specific types of PBS and alcohol-related outcomes. Direct, or controlled consumption, PBS (e.g., drinking water while drinking alcohol, avoiding shots) are more strongly associated with alcohol use, whereas indirect, or serious harm reduction, PBS (e.g., using a designated driver) are more strongly associated with alcohol-related negative consequences (DeMartini et al., 2013; Madson, Arnau, & Lambert, 2013). Clearly, PBS are important self-initiated strategies that help reduce alcohol-related harm. However, evidence is emerging that mental health issues may impact PBS use (Pearson, 2013).

There has been increased attention on the association between mental health issues and alcohol-related outcomes among the college student population. For example, students with more severe mental health issues tend to be at an increased (i.e. 49%) likelihood of having co-occurring alcohol use problems (Lo, Monge, Howell, & Cheng, 2013). Despite the different methods for operationalizing mental health issues, students with poorer mental health tend to engage in more hazardous drinking and experience more alcohol-related negative consequences, regardless of their level of use (Bravo, Villarosa-Hurlocker, Pearson, & Protective Strategies Study Team, 2018; LaBrie, Kenney, Lac, & Garcia, 2009). Although students with these co-occurring issues are more likely to seek help for their mental health concerns (Capron, Bauer, Madson, & Schmidt, 2018), less than 20% of college students receive any mental health treatment each year (Auerbach et al., 2016). Therefore, it is critical to assess the utility of PBS in alleviating alcohol-related behaviors among students with mental health issues.

Existing research on mental health issues have demonstrated associations with PBS and alcohol-related outcomes (Linden, Barraco, & Millettich, 2013). For example, Kenney and LaBrie (2013) found the negative association between PBS and alcohol-related consequences was stronger among students with elevated depression and anxiety symptoms, whereas LaBrie et al. (2009) found the association between PBS and binge drinking was stronger among students with poorer mental health. Less is known about the impact of mental health issues on the association between PBS subtypes and alcohol-related outcomes. Preliminary research has focused on specific mental health issues. Specifically, Napper, LaBrie, and Hummer (2015) found strategies while drinking, but not selective avoidance strategies nor alternative strategies, predicted fewer alcohol-related consequences among students with elevated anxiety symptoms. Villarosa, Messer, Madson, and Zeigler-Hill

(2018) found PBS subtypes differentially mediated the association between depressive symptoms and alcohol-related outcomes, such that controlled consumption PBS mediated the depression-hazardous drinking association and serious harm reduction PBS mediated the depression-alcohol-related consequences association. Given the high co-occurrence of mental health issues, specifically depression and anxiety symptoms (Eisenberg, Hunt, & Speer, 2013), it is important to examine the impact of a collection of mental health symptoms on the relationship between PBS subtypes and alcohol-related outcomes.

For the purpose of the current study, we used the term *psychological distress* to represent the composition of depression, anxiety, and stress symptoms, which is consistent with validation studies that examined the total score of the Depression, Anxiety, and Stress Scales (DASS-21; Henry & Crawford, 2005; Osman et al., 2012). In addition, given that students with elevated psychological distress tend to endorse higher rates of hazardous drinking and more alcohol-related negative consequences, regardless of their level of alcohol use (e.g., LaBrie, Kenny, & Lac, 2010), we included participants who endorsed any rate of alcohol use in the past month. The purpose of this study was to evaluate the moderating role of psychological distress on the relationship between PBS subtypes and alcohol outcomes (i.e. hazardous drinking and alcohol-related negative consequences). For the current study, hazardous drinking was defined as a composition of typical and heavy episodic drinking rates. Specifically, we hypothesized that the inverse association between controlled consumption PBS and hazardous drinking would be stronger for students with higher levels of psychological distress. We also hypothesized that the inverse association between serious harm reduction PBS and alcohol-related negative consequences would be stronger for students with higher levels of psychological distress.

Method

Participants and Procedure

Participants were 632 undergraduate students (78.8% women) recruited through the psychology subject pool (SONA System) at a university in the southeastern region of the United States and received credit for a research participation requirement through their psychology courses. Eligible participants were between 18 and 25 years old ($M=20.04$, standard deviation [SD]=1.48) who reported consuming alcohol at least once within the past 30 days. Most participants identified as White (63.3%) or Black (28.3%), while 2.4% identified as Hispanic, 1.3% as American Indian or Alaska Native, 1.1% as Asian, 0.3% as Native Hawaiian or other Pacific Islander, and 3.3% as other. The majority of participants were freshmen (37%), yet sophomores, juniors, and seniors were well represented (24.8%, 22.4%, and 15.9%, respectively). After signing up for the study, eligible participants were directed to a secure web-based survey (Qualtrics) where they signed the institutional review board–approved online consent form and completed measures of psychological distress, hazardous drinking, alcohol-related negative consequences, and PBS use. The survey was approximately 45 minutes in duration to minimize participant burden, and items were presented in random order to mitigate order effect bias.

Measures

Protective behavioral strategies.—The 18-item PBS Scale-revised (PBSS-r) was used to assess PBS use (Madson et al., 2013). Participants indicated the degree to which they engage in specific PBS strategies while drinking using a 5-point scale ranging from 1 (*never*) to 6 (*always*). Higher scores are indicative of more PBS use. The PBSS-r contains two subscales: controlled consumption (e.g., “avoiding drinking games”; “stop drinking at a predetermined time”) and serious harm reduction (“make sure you go home with a friend”; “know where your drink has been at all time”). The PBSS-r has been demonstrated to have an average interitem correlation of .58, invariance between gender and race, acceptable internal consistency for serious harm reduction PBS ($\alpha=.79$), excellent internal consistency for controlled consumption PBS ($\alpha=.90$), and good convergent validity in a college sample (Madson et al., 2013). For the current sample, internal consistencies were good for controlled consumption PBS ($\alpha=.93$) and serious harm reduction PBS ($\alpha=.89$).

Psychological distress.—The 21-item Depression, Anxiety and Stress Scale (DASS-21) was used to assess psychological distress (Antony, Bieling, Cox, Enns, & Swinson, 1998). Participants were asked to rate the extent to which they experienced each symptom or state over the past week, such as “I felt scared without any good reason,” “I felt that I had nothing to look forward to,” and “I found myself getting agitated” using a 4-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). A total score was used (range: 0–63), with higher scores indicating higher levels of psychological distress. When used with a college sample, the DASS-21 total scale had a mean score of 12.61 ($SD=10.23$) and a high coefficient omega (ω) estimate of .89 (Osman et al., 2012). The internal consistency of the DASS-21 total score was good with the current sample ($\alpha=.95$).

Hazardous drinking.—The 3-item Alcohol Use Disorder Identification Test–Consumption (AUDIT-C) consists of the first three items from the 10-item AUDIT (Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). The AUDIT-C was designed to identify hazardous drinking patterns and function as a screener for possible alcohol use disorders and has been shown to be appropriate for use with college populations (DeMartini & Carey, 2012; Hagman, 2015). Participants are asked, in regard to the past year, “How often do you have a drink containing alcohol?” “How many standard drinks containing alcohol do you have on a typical day?” and “How often do you have six or more drinks on one occasion?” and respond using a 5-point scale ranging from 0 to 4, with higher scores indicating more hazardous drinking. The internal consistency for the AUDIT-C in the current sample was acceptable ($\alpha=.73$).

Alcohol-related negative consequences.—The 23-item Rutgers Alcohol Problem Index (RAPI) was used to measure alcohol-related negative consequences (H. R. White & Labouvie, 1989). Participants rate how often they have experienced specific alcohol-related negative consequences such as “noticed a change in your personality” and “caused shame or embarrassment to someone” within the past year using a scale ranging from 0 (*never*) to 4 (*more than 10 times*). Total scores range from 0 to 92; higher scores indicate greater experience of alcohol-related negative consequences. The RAPI has been demonstrated to

have good factorial validity, convergent validity, and internal consistency in college populations (Martens, Neighbors, Dams-O'Connor, Lee, & Larimer, 2007), and using total scores on the RAPI to measure alcohol-related negative consequences is a common practice with college student populations (e.g., Devos-Comby & Lange, 2008; Turrise et al., 2009). The internal consistency of the RAPI in the current sample was good ($\alpha=.95$).

Data Analytic Approach

A hierarchical multiple regression analysis was conducted to assess whether psychological distress moderated the relationships between PBS subtypes and hazardous drinking. All continuous variables were centered. The main effect terms for controlled consumption PBS, serious harm reduction PBS, and psychological distress were entered on Step 1. The two interaction terms (controlled consumption PBS $\times$ psychological distress; serious harm reduction PBS $\times$ psychological distress) were entered on Step 2. Simple slopes procedures (Aiken & West, 1991) were then performed to further describe the interaction between serious harm reduction PBS use and psychological distress, such that values one *SD* above and below the mean were used to represent those with high and low levels of psychological distress.

A second hierarchical multiple regression analysis was conducted to assess whether psychological distress moderated the relationships between PBS subtypes and alcohol-related negative consequences. The analysis followed the same procedure as described earlier, except with inclusion of alcohol-related negative consequences as the outcome measure. Simple slopes tests were also conducted following the same procedure described earlier to further describe the interaction between psychological distress and alcohol-related consequences, such that values one *SD* above and below the mean were used to represent those using high and low levels of serious harm reduction PBS.

Results

Means, *SDs*, and intercorrelations for the study measures are presented in Table 1. Nearly three-fourths of the female sample (68.9%) scored at or above the suggested cutoff score of 3 for undergraduate college women on the AUDIT-C, whereas approximately two-fifths of the male sample (41.5%) scored at or above the suggested cutoff score of 5 for undergraduate college men (Hagman, 2015). As expected, greater psychological distress was associated with increased hazardous drinking, more alcohol-related negative consequences, and less serious harm reduction PBS use. Contrary to expectation, increased psychological distress was associated with more controlled consumption PBS use. Consistent with previous findings (Madson et al., 2013), both controlled consumption and serious harm reduction PBS subtypes were inversely correlated with hazardous alcohol use ($r=-.33$, $p<.001$; $r=-.22$, $p<.001$, respectively) and alcohol-related negative consequences ($r=-.22$, $p<.001$; $r=-.35$, $p<.001$, respectively).

Hazardous Drinking

There were main effects for controlled consumption PBS ($\beta=-.39$, $t=-8.35$, $p<.001$), serious harm reduction PBS ($\beta=.13$, $t=2.69$, $p=.007$), and psychological distress ($\beta=.11$, $t=2.77$,

$p=.006$) on hazardous drinking. These main effects were moderated by a two-way interaction of serious harm reduction PBS $\times$ psychological distress ($\beta=-.16$, $t=-3.41$, $p=.001$). These results are presented in Table 2. Simple slopes tests revealed a significant association between serious harm reduction PBS and hazardous drinking for participants with low levels of psychological distress ($\beta=.30$, $t=4.33$, $p<.001$), but not for those with high levels of psychological distress ($\beta=-.02$, $t=-.37$, $p=.71$). Simple slopes analyses also revealed that although there was no main effect for psychological distress and hazardous drinking, there was a significant relationship between psychological distress and hazardous drinking when serious harm reduction PBS use is low ($\beta=.15$, $t=2.73$, $p=.007$). Results from the simple slopes analyses are presented in Figure 1.

Alcohol-Related Negative Consequences

There were main effects for serious harm reduction PBS ($\beta=-.26$, $t=-6.03$, $p<.001$) and psychological distress ($\beta=.43$, $t=12.59$, $p<.001$). These main effects were moderated by the two-way interaction of serious harm reduction PBS $\times$ psychological distress ($\beta=-.22$, $t=-5.40$, $p<.001$). Results from these analyses are presented in Table 2. As seen in Figure 2, simple slopes tests revealed a significant association between serious harm reduction PBS and alcohol-related negative consequences when participants endorsed high levels of psychological distress ($\beta=-.47$, $t=-8.27$, $p<.001$), but not for those with low levels of psychological distress ($\beta=-.02$, $t=-.30$, $p=.76$). Simple slopes tests also revealed the association between psychological distress and alcohol-related negative consequences was significant for those using low levels of serious harm reduction PBS ($\beta=.51$, $t=10.84$, $p<.001$) and for those using high levels of serious harm reduction PBS ($\beta=.22$, $t=4.26$, $p<.001$).

Discussion

The purpose of this study was to examine the moderating effects of psychological distress on the associations between PBS subtypes and alcohol-related outcomes (i.e., hazardous drinking and alcohol-related negative consequences) because such symptoms appear to impact the utility of PBS for college students. Previous literature has demonstrated that the relationship between controlled consumption PBS and hazardous drinking is strengthened by mental health symptoms (Villarosa et al., 2018; Villarosa-Hurlocker, Whitley, Capron, & Madson, 2018). Mental health symptoms also strengthen the relationship between serious harm reduction PBS and alcohol-related negative consequences (Villarosa et al., 2018; Villarosa, Moorer, Madson, Zeigler-Hill, & Noble, 2014). Taken together, specific PBS may be particularly important in mitigating problematic drinking outcomes for those students who experience elevated psychological distress.

Consistent with our hypothesis, students who reported using more controlled consumption PBS endorsed less hazardous drinking, which supports previous findings (e.g., DeMartini et al., 2013; Pearson, D'Lima, & Kelley, 2013). Students using more controlled consumption PBS may engage in less hazardous drinking because of the restrictive nature of controlled consumption PBS (e.g., avoiding shots, alternating alcoholic and nonalcoholic drinks). These results support the use of PBS among college students in an attempt to ease hazardous

drinking. However, psychological distress did not moderate this relationship as hypothesized. This finding is inconsistent with studies supporting the value of overall PBS use among students with general mental health concerns (LaBrie et al., 2009) and with studies that explored the controlled consumption subtype of PBS with specific mental health problems such as depression (Villarosa et al., 2018). Perhaps dismantling the controlled consumption subtype of PBS into the stopping and limiting PBS and the manner of drinking PBS as outlined in the PBSS-20 (Treloar, Martens, & McCarthy, 2015) may have differential effects in relation to psychological distress. In addition, the DASS-21 assessed experiences within the past week whereas the PBSS-r assessed behaviors over the past month. As a result, differential measurement timeframes may have contributed to the inconsistency of these results with previous findings. Future studies should consider using the PBSS-20 and consistent measurement timeframes.

Interestingly, and contrary to our predictions, we found that increased serious harm reduction PBS use was associated with greater hazardous drinking for students reporting low psychological distress. One potential explanation is that although students reporting various levels of psychological distress engage in hazardous drinking, those experiencing less psychological distress may focus more on preventing harm than students experiencing more psychological distress. We also found that students using less serious harm reduction PBS reported engaging in more hazardous drinking as psychological distress increased. Given that students who use less serious harm reduction strategies are drinking more as psychological distress levels increase, their risk of experiencing alcohol-related consequences also increases, and likely needs to be attended to by those attempting to prevent hazardous alcohol use on college campuses.

As predicted and consistent with previous literature, serious harm reduction PBS use was associated with fewer alcohol-related negative consequences (e.g., DeMartini et al., 2013; Madson et al., 2013). Also as predicted, psychological distress strengthened the relationship between serious harm reduction PBS and alcohol-related negative consequences, which mirrors previous findings that assessed association among mental health, PBS, and alcohol-related problems (LaBrie et al., 2009, 2010). Furthermore, this finding expands on those of LaBrie et al. (2009, 2010) by highlighting the unique value of one specific type of PBS—serious harm reduction. Thus, this finding adds to the overall utility of students using serious harm reduction PBS, particularly emphasizing the importance for those experiencing greater psychological distress.

These findings have several clinical implications. First, these results highlight the need for alcohol prevention/intervention programming to acknowledge and better address the interplay of psychological distress and hazardous alcohol use among college students. For example, regardless of students' presenting concerns, intervention efforts should assess for both mental health and alcohol use issues. Second, these findings support the importance of discussing the use of PBS—especially serious harm reduction—among those with psychological distress in an effort to reduce harm. For example, modifying brief motivational interventions such as the Brief Alcohol Screening and Intervention for College Students program (Marlatt et al., 1998) to include screening for psychological distress, discussing the link between psychological distress and alcohol use/consequences, and

teaching PBS—especially serious harm reduction PBS—could expand the reach of these programs, which evidence suggests are effective for interventions targeting young people with comorbid alcohol use and psychological distress (Hides et al., 2013). This may be particularly important given recent findings that college students are more likely to seek treatment for emotional problems than alcohol problems (Capron et al., 2018). Given that PBS education may not necessarily translate into PBS use, incorporating motivational feedback may increase the likelihood of students engaging in strategies discussed in interventions (Miller et al., 2013). Tailoring this feedback to focus on psychological distress, in addition to alcohol use, may also prove beneficial.

These findings should be interpreted within the limitations of the study. First, data were collected from a single university, and may not generalize to other regions. Second, the sample was predominantly White, non-Hispanic women, and thus findings may not generalize to students of other demographics. Further, we assessed different timeframes on constructs (i.e. past week for DASS, past month for PBSS) limiting the interpretation of results. Future research should focus on measuring the exact timeframe (e.g., past week). Finally, the study design was cross-sectional and correlational, meaning we cannot make causal inferences. Future research could address these limitations by examining a more regionally and demographically diverse, or mental health treatment seeking sample, as well as employing experimental or longitudinal study designs that allows us to more closely approximate a causal link.

As this is the first study to examine the moderating role of psychological distress on the link between PBS subtypes and alcohol-related outcomes, it is important that this study be replicated. In particular, it would be important to use a national sample of college students to enhance generalizability. It would also be important to look at how demographic variables such as race, sex, Greek organization affiliation, or involvement in athletics may also moderate these relationships. In addition, it may be valuable to explore psychological distress, PBS, and other social cognitive factors such as drinking motives, outcome expectancies, and norm perception.

Acknowledgments

Funding

The authors disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Margo Villarosa-Hurlocker's work on this manuscript was supported in part by a training grant (T32-AA018108) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA) in the United States.

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Figure 1. Interaction of PBS-SHR and psychological distress on hazardous drinking. AUDIT-C = Alcohol Use Disorder Identification Test-Consumption. SHR = serious harm reduction.

Figure 2. Interaction of PBS-SHR and psychological distress on alcohol-related negative consequences. RAPI = Rutgers Alcohol Problem Index; SHR = serious harm reduction.

Table 1.

Means, Standard Deviations, and Intercorrelations.

Scale	1	2	3	4	5
1. DASS	—				
2. PBS-CC	.15 [*]	—			
3. PBS-SHR	-.21 [*]	.61 [*]	—		
4. AUDIT-US-C	.14 [*]	-.33 [*]	-.13 [*]	—**	
5. RAPI	.49 [*]	-.22 [*]	-.35 [*]	.34 [*]	—
<i>M</i>	13.05	45.29	29.83	3.79	10.83
<i>SD</i>	12.38	15.18	7.09	2.10	13.16

Note. DASS = Depression, Anxiety, and Stress Scale; PBS-CC = protective behavioral strategies-controlled consumption; PBS-SHR = protective behavioral strategies-serious harm reduction; AUDIT-USC = Alcohol Use Disorder Identification Test-United States-Consumption, RAPI = Rutgers Alcohol Problem Index; *SD*= standard deviation.

^{*}
p<.001.

Table 2.

Regressions of Alcohol-Related Outcomes on Psychological Distress and Protective Behavioral Strategy Subtypes.

	Hazardous drinking			Alcohol-related negative consequences		
	<i>R</i> ²	<i>R</i> ²	β	<i>R</i> ²	<i>R</i> ²	β
Step 1	.13 ***	.13 ***		.30 ***	.30 ***	
DASS			.11 **			.43 ***
PBS-CC			-.39 ***			-.003
PBS-SHR			.13 **			-.26 ***
Step 2	.14 **	.02 **		.34 ***	.04 ***	
DASS × PBS-CC			.07			.05
DASS × PBS-SHR			-.16 **			-.22 ***

Note. DASS = Depression, Anxiety, and Stress Scale; PBS-CC = protective behavioral strategies-controlled consumption; PBS-SHR = protective behavioral strategies-serious harm reduction.

*
p < .05

**
p < .01

p < .001.