Protective behavioral strategies and alcohol outcomes: Impact of mood and personality disorders

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HIGHLIGHTS

- Men with borderline personality disorders evince stronger negative PBS-alcohol link.
- The PBS-alcohol link is not significant in men with depression.
- The PBS-consequences link is not significant in men with bipolar spectrum disorder.
- Social anxiety does not significantly moderate PBS-alcohol outcomes associations.

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ABSTRACT

Although young men or young adults with mental health disorders are at higher risk to engage in problematic drinking, they typically evince stronger associations between protective behavioral strategies (PBS) and fewer alcohol outcomes. This study aimed to contribute to this line of research by examining the moderating effect of depression, bipolar spectrum disorder, borderline personality disorder and social anxiety disorder on the association between PBS and alcohol outcomes. Participants ($N = 4,960$; mean age $= 25.43$) were young men participating in the Cohort Study on Substance Use Risk Factors. Measures of PBS use, typical drinks per week, alcohol-related consequences, depression, bipolar spectrum disorder, borderline personality disorder and social anxiety disorder were used from the second follow-up assessment. Main results indicated that the negative association between PBS and alcohol use was stronger in participants with borderline personality disorder than among those without this disorder. Unexpectedly, in participants with depression, PBS were not significantly associated with alcohol use, whereas they were related to fewer drinks among those without the disorder. Similarly, in participants with bipolar spectrum disorder, the association between PBS and alcohol-related consequences was not significant, whereas PBS were associated with fewer consequences in those without the disorder. Finally, findings indicated that social anxiety disorder did not significantly moderate the associations between PBS and alcohol outcomes. If replicated by future research, these findings imply that PBS-intervention may not equally impact young adults with diverse mental health disorders.

1. Introduction

Excessive drinking is common among young adults (i.e., aged 19–30) and leads to a variety of problems, such as health-related consequences, risky behaviors and injuries (Abbey, 2002; Gmel, Kuendig, & Notari, 2017; Schulenberg et al., 2018; World Health Organization, 2014). These risks are even more salient in certain groups of young adults, such as men and those with mental health disorders (e.g., Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2014; Markman Geisner, Larimer, & Neighbors, 2004; Schulenberg et al., 2017). In response, research identified protective factors mitigating harm from alcohol use, such as protective behavioral strategies (PBS). PBS are

cognitive-behavioral strategies that can be used while drinking to reduce alcohol use and related consequences (e.g., *avoiding drinking games, stop drinking at a predetermined time*; Martens, Pederson, Labrie, Ferrier, & Cimini, 2007). There is evidence that PBS is negatively related to alcohol use and related consequences (e.g., Araas & Adams, 2008; Benton et al., 2004; Delva et al., 2004; Martens, Pederson, Labrie, Ferrier, & Cimini, 2007).

PBS may be particularly relevant for certain groups of young adults, such as young men who typically evince higher levels of problematic drinking (Schulenberg et al., 2017). Despite these known risks however, they endorse less positive attitudes toward PBS (Demartini, Carey, Lao, & Luciano, 2011) and engage in PBS less often (Jongenelis et al., 2016; Walters, Roudsari, Vader, & Harris, 2007) than women. Further studying PBS use in young men is therefore warranted to gauge whether they may benefit from interventions promoting PBS. Relatedly, researchers examined when and for whom PBS are most strongly related to decreased alcohol outcomes. Part of this research focused on mental health status impact on the PBS-alcohol outcomes association. This study aimed to contribute to this line of research by testing the moderating effect of four mood and personality disorders on the PBS-alcohol outcomes association among young men in Switzerland.

1.1. The associations of mood and personality disorders with problematic drinking

Bipolar spectrum disorder (bipolar-SD) is characterized by extreme changes of mood, behavior (e.g., high energy vs. lethargy) and cognition (e.g., inflated self-esteem vs. worthlessness); social anxiety disorders (SAD) refer to fear of negative evaluation by others, resulting in significant distress or functional impairment; borderline personality disorder (borderline-PD) is characterized by instability of affect, cognitive deficits, impulsivity and dysfunctional interpersonal relationships (American Psychiatric Association, 2013). These disorders are related to increased risks to engage in problematic drinking. For instance, a US cohort study showed that among drinkers, higher level of late childhood depressed mood was associated with alcohol-related problems and alcohol use disorders in young adulthood (AUD; Crum et al., 2008). Another cohort study involving young adults in Switzerland found participants with bipolar-SD to be at higher risk to engage in future alcohol abuse (Merikangas et al., 2008). Relatedly, a US cohort study following young adults showed that SAD are related to greater odds of future AUD (Buckner et al., 2008). Similarly, findings yielded in a previous study conducted with the sample of this study showed higher proportions of depression, bipolar-SP and SAD disorders in young men with AUD (Marmet, Studer, Grazioli, & Gmel, 2018). Finally, a US study involving young adults found that endorsing borderline personality features related to subsequent alcohol-related consequences (Stepp, Trull, & Sher, 2005). Consistent with these results, a recent study conducted with the current sample showed that young men with AUD scored higher on borderline-PD (Baggio et al., 2020).

1.2. Health belief Model, PBS and mental health disorders

According to the Health Belief Model (Rosenstock, 1990), preventive health practices (e.g., using PBS) depend on individual levels of perceived vulnerability and the belief that the practice is beneficial. Perceived vulnerability may be particularly relevant for young adults with depression, bipolar-SP, SAD or borderline-PD given their shared particularity to be at risk to experience alcohol-related harm. Such experience may increase levels of perceived vulnerability thereby impacting the likelihood of engaging in preventive health practice. Consistent with this hypothesis, a recent study involving heavy drinker students found stronger associations between PBS and alcohol outcomes in participants with higher levels of perceived vulnerability (i.e., when drinking in unfamiliar social situations; Garcia, Fairlie, Litt, Waldron, & Lewis, 2018).

Other PBS findings demonstrated that mental health status similarly impacted the negative associations between PBS and alcohol outcomes. For instance, LaBrie and colleagues tested the moderating effect of mental health status (i.e., assessed with a broad measure; Parkerson, Broadhead, & Tse, 1990) on the association between PBS and alcohol outcomes among female students in the US (LaBrie, Kenney, Lac, Garcia, & Ferraiolo, 2009). Findings showed that the negative associations between PBS and alcohol use and consequences were stronger among students with poorer mental health than among those with better mental health. Similar moderating effects were found for consequences among heavy drinker male and female students in a subsequent study (LaBrie, Kenney, & Lac, 2010).

Another study found the negative association between PBS and problematic drinking to be stronger in students experiencing greater psychological distress (i.e., depression, anxiety and stress symptoms; Jordan, Villarosa-Hurlocker, Ashley, & Madson, 2018). Similarly, two studies documented stronger negative associations between PBS and alcohol outcomes in students with elevated depression and anxiety (Kenney & LaBrie, 2013; Linden, Lau-Barraco, & Milletich, 2013).

Although promising, these findings were yielded among college students in the US exclusively. Research replicating these examinations in other populations is needed to ensure findings' generalizability. Further, scarce studies used distinct measures of mental health disorders. Using specific and diverse array of psychopathology measures is important to identify distinct mental health disorders that may impact the negative PBS-alcohol outcomes association (Pearson, 2013). Doing so will help identify who, among individuals with mental health disorders, may benefit the most from PBS-interventions. In response, this study aimed to assess the moderating effects of depression, bipolar-SD, SAD and borderline-PD on the associations between PBS and alcohol use and related consequences in a sample of young men from the general population in Switzerland. Based on previous research, we hypothesized that the negative associations between PBS and alcohol outcomes would be stronger among participants with these disorders than among those without.

2. Material and method

2.1. Assessment and procedures

The data of this study are part of the Cohort Study on Substance Use Risk Factors (C-SURF), which aims to examine substance-use trajectories among young men in Switzerland. C-SURF enrollment was conducted in three of six army recruitment centers (covering 21 of the 26 Swiss cantons). In Switzerland, all male Swiss citizen aged around 19 follow a mandatory recruitment procedure to determine their eligibility for military service. Hence, virtually all Swiss men aged 19–20 in the 21 covered cantons were eligible. More details regarding the C-SURF study procedures are provided elsewhere (Gmel et al., 2015). All procedures were approved by the Human Research Ethics Committee of Lausanne University Hospital.

2.2. Participants

Of the 7,556 young men who provided written informed consent, 5,987 (79.2%) completed the baseline assessment between September 2010 and March 2012 and 5,445 the second follow-up assessment between April 2016 and November 2017. This study involved data from the second follow-up because PBS was measured at this assessment only. Consistent with Martens and colleagues (2007), abstainers ($n = 361$, 6.6%) were not included. The sample included 123 partial completers (2.3%). Given the low percentage of missing data, they were listwise deleted, resulting in a final sample of 4,960 participants. The mean age of participants was 25.43 ($SD = 1.24$). More than half of the sample was French-speaking (57.2%; 42.8% German-speaking). Primary school (i.e., obligatory school; 3%), was the least commonly

Table 1
Descriptive Statistics and Bivariate Correlations among Key Variables (N = 4,960).

Variable	M/%	SD	Correlations[a]										
			1	2	3	4	5	6	7	8	9	10	11
Mental health conditions													
1. Depression[b]	2.8		–										
2. Bipolar-SD[b]	2.6		0.14***	–									
3. Borderline-PD[b]	4.6		0.26***	0.26***	–								
4. SAD[b]	16.5		0.17***	0.10***	0.20***	–							
PBS use													
5. PBS-total	3.3	0.98	− 0.06***	− 0.03*	− 0.02	− 0.01	–						
6. PBS − MoD	3.27	1.26	− 0.06***	− 0.03*	− 0.02	0.01	0.82***	–					
7. PBS − SHR	3.77	1.19	− 0.07***	− 0.04***	− 0.03*	− 0.05**	0.88***	0.59***	–				
8. PBS-LSDm	3.43	1.23	− 0.04***	− 0.01	0.01	− 0.04**	0.70***	0.45***	0.48***	–			
9. PBS-LSDp	2.3	1.1	− 0.01	− 0.02	0.01	0.08***	0.70***	0.52***	0.48***	0.42***	–		
Alcohol outcomes													
10. Drinks/week	7.71	9.41	0.02	0.04**	0.05**	0.01	− 0.15***	− 0.16***	− 0.11***	− 0.04**	− 0.08***	–	
11. Consequences	1.1	1.51	0.07***	0.11***	0.12***	0.06***	− 0.13***	− 0.18***	− 0.11***	− 0.03	− 0.02	0.44***	–

Note. [a]Spearman-rank order correlations. [b]Percentage of participants screening positive. * $p < .05$, ** $p < .01$, ***$p < .001$. PBS: protective behavioral strategies; PBS-MoD; PBS-Manner of drinking; PBS-SHR: PBS-Serious harm reduction; PBS-LSDm: PBS-Limiting Stopping Drinking: Mixing nonalcoholic drinks with alcohol;, PBS-LSDp: PBS-Limiting Stopping Drinking: Planned limits on drinking.

reported highest level of education completed, followed by secondary school (apprenticeship or vocational school, 12 years; 40%) and tertiary school (vocational school diploma, high school diploma or bachelor; 57%).

2.3. Measures

Protective Behavioral Strategies. PBS use was assessed with the French and German version of the Protective Behavioral Strategies Scale-20, which was translated from the PBSS-20 and previously validated (PBSS-20; Grazioli et al., 2019; Treloar, Martens, & McCarthy, 2015). This scale assesses strategies used to be safer *when drinking* in the past year on a scale ranging from 1 (*never*), to 6 (*always*). In addition to a total score, (α = 0.89), this measure includes four subscales: PBS-Manner of drinking (PBS-MoD, 5 items; α = 0.79), PBS-Serious harm reduction (PBS-SHR; 8 items; α = 0.8), PBS-Limiting Stopping Drinking: Mixing nonalcoholic drinks with alcohol (PBS-LSDm; 3 items; α = 0.64), PBS-Limiting Stopping Drinking: Planned limits on drinking (PBS-LSDp; 4 items; α = 0.75). Mean scores served as independent variables in the analyses.

Alcohol outcomes. Participants were asked to indicate their typical alcohol use quantity and frequency over the past year. The average number of drinks per week was computed by multiplying the typical frequency (rescaled to days per week) and the usual quantity (number of drinks per typical drinking occasion) (Gmel et al., 2014). Alcohol-related consequences (consequences) experienced over the past year was assessed with 9 items adapted from Knight and colleagues (e.g., *getting in trouble with the police, having unplanned sex;* Knight et al., 2002). Participants were asked to indicate whether they had experienced these consequences. Drinks per week and consequences (i.e., sum scores) served as dependent variables in the analyses.

Depression. Depression as referred to the DSM-IV, was measured with the Major Depressive Inventory, which includes 12 items that were dichotomized to indicate the absence or presence of each statement in the previous 2 weeks (Bech, Rasmussen, Olsen, Noerholm, & Abildgaard, 2001). Following the cut-off proposed by the authors, depression was defined as endorsing at least 5 items, including either item 1 or item 2.

Bipolar-SD. Bipolar-SD as referred to the DSM-IV, was assessed with the Mood Disorder Questionnaire (Hirschfeld et al., 2000). Participants were asked to indicate whether *there has been a period of time when they were not themselves and experienced* 13 statements. When participants answered yes to more than one item, two additional questions examined whether several of those happened during the same

period of time and the extent to which these items caused problems. Consistent with the original measure, no time frame was indicated and Bipolar-SD was defined as endorsing at least 7 items, with some of them having to occur in the same time and to cause at least moderate problems

Borderline-PD. We used the McLean Screening Instrument to measure Borderline-PD as defined by the DSM-IV (Zanarini et al., 2003). Participants were asked to indicate whether 10 statements correspond to them. Consistent with the original scale, no time frame was indicated and borderline-PD was defined as endorsing 7 items or more.

SAD. SAD as defined by the DSM-IV was assessed in the past week with the Clinically Useful Social Anxiety Disorder Outcome Scale, which comprises 12 statements evaluated on a 5-point scale ranging from 0-*not at all true*, to 4-*almost always true* (Dalrymple et al., 2013). As recommended by the authors, a cut-off of 16 was used to define SAD.

2.4. Data analysis plan

Analyses were conducted with STATA 12. Drinks per week ($S = 2.92$, $K = 14.02$) and consequences ($S = 1.63$, $K = 2.66$) showed positively skewed distributions approximating a negative binomial distribution with the exception of a disproportionately large number of zero values for consequences (50.5%). Therefore, negative binomial regressions were used to test the associations between PBS and drinks per week and zero-inflated negative binomial regressions (ZINB) to examine the association between PBS and consequences (Atkins & Gallop, 2007; Hilbe, 2007).

For each mental health disorder, drinks and consequences were tested for five PBS measures (i.e., PBS-total, four PBS subscales) in two Steps. In Step 1, the dependent variable was examined as a function of PBS and mental health disorder. In Step 2, the mental health disorder by PBS interaction was added. Moderation analyses were used to test for the interactions. Significant interactions were followed with an examination of the simple slopes. All continuous covariates were mean-centered. The significance level was set at $p = .05$. All models were adjusted for age, linguistic region, and education. The models testing consequences were additionally adjusted for drinks.

3. Results

Descriptive statistics and correlations among key variables are presented in Table 1. Tables 2–5 display negative binomial regression and zero-inflated results.

Table 2

Negative Binomial Regression Models Predicting Total drinks per Week with PBS-total Scores.

	Total drinks per week			
	b	*Z*	*95% CI*	*IRR*
Predictors				
Depression (dep)				
Step 1				
Dep	**0.35*****	3.77	[0.17, 0.54]	1.43
PBS-total	**−0.22*****	−11.67	[−0.25, −0.18]	0.81
Step 2				
Dep	**0.41*****	4.09	[0.21, 0.60]	1.51
PBS-total	**−0.22*****	−11.86	[−0.26, −0.19]	0.80
Dep by PBS-total	**0.22***	2.08	[0.01, 0.43]	1.25
Bipolar-SD				
Step 1				
Bipolar-SD	**0.48*****	4.92	[0.29, 0.67]	1.62
PBS-total	**−0.22*****	−11.61	[−0.25, −0.18]	0.81
Step 2				
Bipolar-SD	**0.49*****	4.88	[0.29, 0.69]	1.63
PBS-total	**−0.22*****	−11.51	[−0.25, −0.18]	0.81
Bipolar-SD by PBS-total	0.05	0.67	[−0.17, 0.27]	1.05
Borderline-PD (BorPD)				
Step 1				
BorPD	**0.40*****	5.39	[0.26, 0.54]	1.49
PBS-total	**−0.21*****	−11.39	[−0.25, −0.18]	0.81
Step 2				
BorPD	**0.36*****	4.87	[0.22, 0.51]	1.44
PBS	**−0.20*****	−10.45	[−0.24, −0.17]	0.82
BorPD by PBS-total	**−0.22****	−2.67	[−0.38, −0.06]	0.80
SAD				
Step 1				
SAD	0.07	1.67	[−0.01, 0.15]	1.07
PBS-total	**−0.22*****	−11.81	[−0.26, −0.18]	0.80
Step 2				
SAD	0.07	1.66	[−0.01, 0.15]	1.07
PBS-total	**−0.22*****	−10.72	[−0.26, −0.18]	0.80
SAD by PBS-total	−0.01	−0.24	[−0.11, 0.09]	0.99

Note. * *p* < .05. ** *p* < .01. *** *p* < .001. IRR = incident rate ratios. All models were adjusted for age, linguistic region and education; PBS: protective behavioral strategies.

3.1. Negative binomial regression models: typical drinks per week

In Step 1, PBS-total and PBS subscales were significantly associated with fewer drinks across all Models. Depression, bipolar-SD, borderline-PD were related to more drinks. The latter associations were not significant for SAD, except in the SAD PBS-LSDp Model in which SAD was related to more drinks.

In Step 2, the likelihood ratio for Models ranged from X^2 (7) = 75.46 to 264.4, *p* < .001. The depression by PBS-total and PBS-LSDm interactions were significant. Simple slopes revealed significant associations of PBS-total ($b = −0.22$, 95% CI [−0.26, −0.19]) and PBS-LSDm ($b = −0.07$, 95% CI [−0.10, −0.04]) with fewer drinks among participants without depression. Among participants with depression, PBS-LSDm were related to more drinks ($b = 0.13$, 95% CI [0.01, 0.26]), whereas the association was not significant with PBS-total association ($b = 0.00$, 95% CI [−0.21, 0.20]).

Findings revealed that the borderline-PD by PBS-total, PBS-MoD, PBS-SHR and PBS-LSDp interactions were significant. The associations between PBS-total ($b = −0.42$, 95% CI [−0.57, −0.26]), PBS-MoD ($b = −0.38$, 95% CI [−0.51, −0.26]), PBS-SHR ($b = −0.29$, 95% CI [−0.42, −0.15]), PBS-LSDp ($b = −0.33$, 95% CI [−0.46, −0.19]) and fewer drinks were stronger among participants with borderline-PD than among those without (PBS-total: $b = −0.20$, 95% CI [−0.24, −0.16]; PBS-MoD: $b = −0.18$, 95% CI [−0.21, −0.16]; PBS-SHR: $b = −0.10$, 95% CI [−0.13, −0.07]; PBS-LSDp ($b = −0.15$, 95% CI [−0.18, −0.12]).

Table 3

ZINB Models Predicting Alcohol-related Consequences with PBS-total Scores.

	Alcohol-related consequences			
	b	*Z*	*95% CI*	*IRR/OR*
Predictors				
Depression (Dep)				
	Logistic Portion of the Models			
Step 1				
Dep	−0.69	−1.86	[−1.41, 0.04]	0.50
PBS-total	−0.13	−1.91	[−0.25, 0.00]	0.88
Step 2				
Dep	−0.81	−1.65	[−1.76, 0.15]	0.44
PBS-total	−0.12	−1.88	[−0.26, 0.01]	0.89
Dep by PBS-total	−0.17	−0.37	[−1.08, 0.74]	0.84
	Counts Portion of the Models			
Step 1				
Dep	**0.24****	2.60	[0.06, 0.42]	1.27
PBS-total	**−0.13*****	−5.48	[−0.26, −0.09]	0.87
Step 2				
Dep	**0.26**	2.63	[0.07, 0.46]	1.30
PBS-total	−0.14	−5.53	[−0.19, 0.09]	0.87
Dep by PBS-total	0.09	0.72	[−0.15, 0.33]	1.09
Bipolar-SD				
	Logistic Portion of the Models			
Step 1				
Bipolar-SD	**−0.95***	−2.33	[−1.75, −0.15]	0.39
PBS-total	−0.12	−1.88	[−0.25, 0.01]	0.89
Step 2				
Bipolar-SD	**−0.86***	−2.09	[−1.68, −0.05]	0.42
PBS-total	**−0.14***	−2.09	[−0.27, −0.01]	0.87
Bipolar-SD by PBS-total	0.34	0.69	[−0.62, 1.30]	1.40
	Counts Portion of the Models			
Step 1				
Bipolar-SD	**0.46*****	5.20	[0.29, 0.63]	1.58
PBS-total	**−0.14*****	−5.55	[−0.18, −0.09]	0.87
Step 2				
Bipolar-SD	**0.51*****	5.69	[0.33, 0.68]	1.66
PBS-total	**−0.15*****	−6.07	[−0.20, −0.10]	0.86
Bipolar-SD by PBS-total	**0.32****	2.91	[0.10, 0.54]	1.38

	Alcohol-related consequences			
	b	*Z*	*95% CI*	*IRR/OR*
Predictors	Logistic Portion of the Models			
Borderline-PD (BorPB)				
Step 1				
BorPD	**−1.11****	−3.29	[−1.77, −0.45]	0.33
PBS-total	−0.10	−1.63	[−0.23, 0.02]	0.90
Step 2				
BorPD	**−1.33***	−2.19	[−2.52, −0.14]	0.26
PBS-total	−0.10	−1.49	[−0.263, 0.03]	0.90
BorPD by PBS-total	−0.69	−1.16	[−1.85, 0.48]	0.50
	Counts Portions of the Models			
Step 1				
BorPD	**0.35*****	5.07	[0.22, 0.49]	1.43
PBS-total	**−0.13*****	−5.43	[−0.18, −0.08]	0.88
Step 2				
BorPB	**0.35*****	4.63	[0.20, 0.50]	1.42
PBS-total	**−0.14*****	−5.52	[−0.19, −0.09]	0.87
BorPD by PBS-total	0.06	0.66	[−0.11, 0.23]	1.06
SAD				
	Logistic Portion of the Models			
Step 1				
SAD	−0.16	−0.99	[−0.46, 0.15]	0.85
PBS-total	−0.12	−1.87	[−0.25, 0.01]	0.89
Step 2				
SAD	−0.33	−1.60	[−0.73, 0.07]	0.72
PBS-total	−0.06	0.82	[−0.19, 0.08]	0.94
SAD by PBS-total	**−0.52***	−2.29	[−0.96, −0.07]	0.59
	Counts Portions of the Models			
Step 1				
SAD	**0.24*****	4.98	[0.14, 0.33]	1.27
PBS-total	**−0.14*****	−5.69	[−0.19, −0.09]	0.87
Step 2				
SAD	**0.20*****	4.12	[0.11, 0.30]	1.23

Table 3 (*continued*)

	Alcohol-related consequences			
	b	*Z*	*95% CI*	*IRR/OR*
PBS-total	− **0.12*****	− 4.61	[−0.17, −0.07]	0.88
SAD by PBS-total	− 0.13	− 1.91	[−0.25, 0.01]	0.88

Note. * $p < .05$. ** $p < .01$. *** $p < .001$. IRR = incident rate ratios, OR = odds ratios. All models were adjusted for age, linguistic region and education and total drinks per week. PBS: protective behavioral strategies.

3.2. ZINB: Consequences – Step 1

Logistic results. Results indicated that the associations between PBS and the latent class of excess zeroes were not significant across all Models except in PBS-LSDm Models. Unlike depression and SAD, bipolar-SD and borderline-PD were significantly associated with zero inflation.

Count results. PBS-total, PBS-MoD and PBS-SHR and PBS-LSDm were related to fewer consequences, whereas the associations between PBS-LSDp and consequences were not significant across all Models. Depression, bipolar-SD, borderline-PDs and SAD were consistently associated with more consequences.

3.3. ZINB Models: Consequences – Step 2

The likelihood ratio for Models 2 ranged from X^2 (8) = 243.06 to 311.23, $p < .001$.

Logistic results. The bipolar-SD by PBS-MoD interaction was significant. Simple slopes indicated that the association between PBS and zero inflation was significant among participants with bipolar-SD ($b = 1.76$, 95% CI [0.35, 3.18]), yet not in those without ($b = -0.05$, 95% CI [−0.16, 0.06]). Next, the PBS by SAD interactions were significantly related to zero-inflation in PBS-total, PBS-SHR and PBS-LSDm Models, such that for PBS-total and PBS-SHR Models, the associations were significant among participants with SAD (PBS-total: $b = -0.57$, 95% CI [−1.00, −0.15]; PBS-SHR ($b = -0.39$, 95% CI [−0.68, −0.1]), but not among those without SAD (PBS-total: $b = -0.06$, 95% CI [−0.19, 0.08]; PBS-shr: ($b = -0.04$, 95% CI [−0.15, 0.07]). Regarding PBS-LSDm by SAD interaction, simple slopes showed a stronger association among participants with SAD ($b = -0.4$, 95% CI [−0.64, −0.17]) than among those without ($b = -0.1$, 95% CI [−0.21, −0.01]).

Count results. Findings revealed significant interactions between PBS-total, PBS-MoD and PBS-SHR and bipolar-SD. Simple slopes showed a significant association between PBS and fewer consequences among participants without bipolar-SD (PBS-total: $b = -0.15$, 95% CI [−0.20, −0.10]; PBS-MoD: $b = -0.16$, 95% CI [−0.20, −0.12; PBS-SHR: $b = -0.11$, 95% CI [−0.15, −0.07]). Among participants with bipolar-SD, the association was not significant in PBS-total Model (PBS-total: $b = 0.17$, 95% CI [−0.04, 0.38]; PBS-SHR: $b = 0.12$, 95% CI [−0.05, 0.29]), whereas PBS were significantly related to more consequences in PBS-MoD Model ($b = 0.18$, 95% CI [0.03, 0.33]).

4. Discussion

Consistent with past research that found stronger negative associations between PBS and alcohol outcomes in young adults with poorer mental health (e.g., LaBrie et al., 2010; Linden et al., 2013), results indicated that the negative associations of PBS-total, PBS-MoD, PBS-LSDp and PBS-SHR with alcohol use were stronger in participants with borderline-PD. These findings indicate that these PBS may be particularly effective in decreasing amount of drinking in young men endorsing borderline-PD.

In participants without depression, PBS-total and PBS-LSDm were related to fewer drinks, whereas in participants with depression, the PBS-total and alcohol association was not significant and PBS-LSDm were related to more drinks. Similarly, in participants with bipolar-SD, PBS-total, PBS-MoD and PBS-SHR were associated with fewer consequences, whereas the PBS-total and PBS-SHR–consequences associations were not significant and PBS-MoD were related to more consequences in participants with the disorder. These findings are incongruent with past research that found stronger negative PBS-consequences associations in participants scoring higher in depression (Kenney & LaBrie, 2013). These inconsistencies may pertain to the fact this sample included men exclusively. In their study testing the moderating effect of depression and anxiety, Kenney and LaBrie (2013) showed that women experienced more benefit from PBS than men; additional analyses showed, however, that this interaction effect was not contingent on mental health status. Inconsistences may also relate to differences in measures. Kenney and LaBrie used a depression severity score, whereas we utilized a diagnostic score. Participants in our study were maybe more severely affected by depression. Individuals with depression or bipolar-SD are prone to poor judgement and hypomanic episodes are characterized by impulsiveness. These symptoms may make it difficult, or irrelevant, for individuals to activate the cognitive and behavioral responses needed to use PBS. Consistent with this explanation, our descriptive findings as well as past results (Martens, Ferrier, & Cimini, 2007) revealed significant negative associations between depression (and Bipolar-SD) and PBS.

Although counterintuitive, our results that PBS-LSDm and PBS-MoD were related to more alcohol outcomes (in participants with depression or bipolar-SD) are congruent with past research in college students (Lewis et al., 2012). Participants using the most PBS may be those who drink the most. Although not tested in this study, it is possible that participants with depression or bipolar-SD decide to use more PBS because they plan to drink heavily to cope with negative affect. Drinking to cope is common in young adults with depressive symptoms (Gonzalez, Reynolds, & Skewes, 2011). Hence, the motivation to decrease harm from drinking may be coupled with the plan to drink heavily to cope with negative affect. If confirmed by future research, this explanation implies that intervention should include discussions of motivation to use PBS, thereby potentially pointing to the plan to drink heavily to cope with negative affect.

Unexpectedly, SAD did not significantly moderate the PBS-alcohol outcomes association. It may also be that socially anxious young drinkers underutilize PBS. Because of the nature of their disorder, they may be less likely to go out, making most PBS irrelevant. Consistent with this explanation, recent findings showed that the association between SAD and heavy drinking and problems was partially mediated by PBS, such that social drinkers using fewer PBS reported more alcohol outcomes (Terlecki, Ecker, & Buckner, 2020).

If replicated by future research, results of this study suggest that equipping young men endorsing borderline-PD with most PBS (MoD, SHR, LSDp) may represent a promising way to decrease alcohol use. A similar approach may also benefit young men without depression or bipolar-SDs. This may be accomplished through one-on-one PBS skills training, providing participants with personalized feedback of PBS use and discussion around PBS benefits. Findings suggest however that this approach may not be sufficient to help decrease alcohol-related harm in young men with depression, bipolar-SD or SAD. Taken together with past research, findings suggest that they may need broader interventions including for instance, components targeting coping drinking motives besides PBS promotion (LaBrie, Napper, Grimaldi, Kenney, & Lac, 2015).

This study is not without limitations. The sample was limited to young men, precluding generalizability of findings to young women or other age groups. Additional limitations include the cross-sectional design of the study precluding temporal interpretations of the observed association as well as different timeframes among predictors and dependent variables. Furthermore, whereas prevalence rates of depression, bipolar-SD and borderline-PD were consistent with past research

Table 4
Negative Binomial Regression Models Predicting Total drinks per Week with PBS subscale Scores.

Predictors	PBS-MoD				PBS-SHR				PBS-LSDm				PBS-LSDp			
	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR
Depression (dep)																
Step 1																
Dep	0.33**	3.48	[0.14, 0.51]	1.38	0.37***	3.87	[0.18, 0.55]	1.44	0.40***	4.19	[0.21, 0.58]	1.49	0.40***	4.26	[0.22, 0.59]	1.49
PBS	−0.20***	−14.30	[−0.22, −0.17]	0.82	−0.11***	−7.28	[−0.14, −0.08]	0.82	−0.06***	−4.43	[−0.09, −0.03]	0.90	−0.16***	−10.55	[−0.19, −0.13]	0.85
Step 2																
Dep	0.35***	3.58	[0.16, 0.54]	1.42	0.43***	4.14	[0.22, 0.63]	1.53	0.42***	4.35	[0.22, 0.61]	1.52	0.40***	4.24	[0.22, 0.58]	1.49
PBS	−0.20***	−14.24	[−0.23, −0.17]	0.82	−0.11***	−7.47	[−0.14, −0.08]	0.82	−0.07***	−4.95	[−0.10, −0.04]	0.89	−0.17***	−10.6	[−0.20, −0.14]	0.85
Dep by PBS	0.08	0.99	[−0.07, 0.23]	1.08	0.17	1.80	[−0.02, 0.35]	1.08	0.20**	2.94	[0.07, 0.34]	1.18	0.10	1.27	[−0.06, 0.26]	1.11
Bipolar-SD																
Step 1																
Bipolar-SD	0.49***	4.98	[0.29, 0.68]	1.62	0.50***	5.01	[0.30, 0.69]	1.62	0.52***	5.26	[0.33, 0.72]	1.64	0.51***	5.14	[0.31, 0.70]	1.66
PBS	−0.20***	−14.35	[−0.22, −0.17]	0.82	−0.11***	−7.20	[−0.14, −0.08]	0.82	−0.06***	−4.32	[−0.09, −0.03]	0.90	−0.16***	−10.38	[−0.19, −0.13]	0.85
Step 2																
Bipolar-SD	0.50***	5.01	[0.30, 0.69]	1.64	0.49***	4.81	[0.29, 0.70]	1.64	0.52***	5.25	[0.33, 0.72]	1.64	0.51***	5.16	[0.32, 0.7]	1.67
PBS	−0.20***	−14.27	[−0.23, −0.17]	0.82	−0.11***	−7.10	[−0.14, −0.08]	0.82	−0.06***	−4.23	[−0.09, −0.03]	0.90	−0.16***	−10.32	[−0.19, −0.13]	0.85
Bipolar-SD by PBS	0.06	0.68	[−0.11, 0.23]	1.06	−0.01	−0.07	[−0.2, 0.19]	1.06	−0.01	−0.06	[−0.15, 0.14]	0.99	0.05	0.48	[−0.14, 0.23]	1.05

Predictors	PBS-MoD				PBS-SHR				PBS-LSDm				PBS-LSDp			
	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR
BorPD[1]																
Step 1																
BorPD	0.38***	5.15	[0.23, 0.52]	1.46	0.42***	5.65	[0.28, 0.57]	1.52	0.45***	6.07	[0.31, 0.60]	1.57	0.43***	5.79	[0.28, 0.57]	1.53
PBS	−0.19***	−14.04	[−0.22, −0.17]	0.82	−0.11***	−7.01	[−0.13, −0.08]	0.82	−0.06***	−4.31	[−0.09, −03]	0.90	−0.16***	−10.26	[−0.19, −0.13]	0.85
Step 2																
BorPD	0.33***	4.43	[0.18, 0.48]	1.39	0.38***	5.00	[0.23, 0.52]	1.46	0.45***	6.06	[0.31, 0.60]	1.57	0.41***	5.6	[0.27, 0.56]	1.51
PBS	−0.18***	−13.07	[−0.21, −0.16]	0.83	−0.10***	−6.23	[−0.13, −0.07]	0.83	−0.06***	−3.92	[−0.08, −0.03]	0.91	−0.15***	−9.45	[0.18, −0.12]	0.95
BorPD by PBS	−0.20**	−3.05	[−0.33, −0.07]	0.82	−0.19**	−2.74	[−0.33, −0.05]	0.82	−0.04	−0.84	[−0.15, 0.06]	0.83	−0.18*	−2.52	[−0.32, −0.04]	0.96
SAD																
Step 1																
SAD	0.06	1.53	[−0.02, 0.15]	1.07	0.07	1.54	[−0.02, 0.15]	1.07	0.07	1.67	[−0.01, 0.16]	1.07	0.11**	2.67	[0.03, 0.20]	1.12
PBS	−0.20***	−14.8	[−0.23, −0.17]	0.82	−0.11***	−7.40	[−0.14, −0.08]	0.82	−0.06***	−4.35	[−0.09, −0.03]	0.89	−0.17***	−10.7	[−0.20, −0.14]	0.85
Step 2																
SAD	0.06	1.49	[−0.10, 0.15]	1.06	0.07	1.51	[−0.02, 0.15]	1.06	0.07	1.75	[−0.01, 0.16]	1.07	0.11*	2.55	[0.03, 0.19]	1.07
PBS	−0.19***	−12.65	[−0.22, −0.16]	0.83	−0.11***	−6.77	[−0.14, −0.08]	0.83	−0.07***	−4.42	[−0.10, −0.04]	0.90	−0.17***	−10.02	[−0.20, −0.14]	0.84
SAD by PBS	−0.05	−1.31	[−0.12, 0.02]	0.95	−0.01	−0.21	[−0.09, 0.08]	0.95	0.04	1.15	[−0.3, 0.11]	0.99	0.03	0.76	[−0.08, 0.11]	1.03

Note. [1]Borderline-PD; * p < .05. ** p < .01. *** p < .001. IRR = incident rate ratios. All models were adjusted for age, linguistic region and education. PBS: protective behavioral strategies; PBS-MoD; PBS-Manner of drinking; PBS-SHR: PBS-Serious harm reduction; PBS-LSDm: PBS-Limiting Stopping Drinking; PBS-LSDp: PBS-Limiting Stopping Drinking; PBS-LSDp: PBS-Limiting Stopping Drinking: Mixing nonalcoholic drinks with alcohol; PBS-LSDm: PBS-Limiting Stopping Drinking: Planned limits on drinking.

Table 5
ZINB Models Predicting Alcohol-related Consequences with PBS Subscale Scores.

Predictors	PBS-MoD b	Z	95% CI	IRR	PBS-SHR b	Z	95% CI	IRR	PBS-LSDm b	Z	95% CI	IRR	PBS-LSDp b	Z	95% CI	IRR
Depression (dep)																
Logistic Portion of the Models																
Step 1																
Dep	−0.61	−1.67	[−1.33, 0.1]	0.54	−0.72	−1.92	[−1.46, 0.01]	0.49	−0.75*	−2.02	[−1.47, −0.02]	0.47	−0.73	−1.9	[−1.49, 0.02]	0.48
PBS	−0.03	−0.59	[−0.14, 0.08]	0.97	−0.09	−1.73	[−0.19, 0.01]	0.9	−0.16**	−3.27	[−0.25, −0.06]	0.85	−0.02	−0.41	[−0.13, 0.08]	0.98
Step 2																
Dep	−0.65	−1.57	[−1.45, 0.16]	0.52	−0.82	−1.54	[−1.87, 0.22]	0.44	−0.98	−1.49	[−2.27,0.31]	0.38	−0.83	−1.71	[−1.78, 0.12]	0.44
PBS	−0.04	−0.62	[−0.15, 0.08]	0.96	−0.09	−1.69	[−0.19, 0.01]	0.91	−0.15**	−3.18	[−0.25, −0.06]	0.86	−0.02	−0.36	[−0.13, 0.08]	0.98
Dep by PBS	−0.05	−0.15	[−0.72, 0.62]	0.95	−0.11	−0.29	[−0.9, 0.67]	0.95	−0.25	−0.51	[−1.21,0.71]	0.78	−0.42	−0.6	[−1.8, 0.96]	0.66
Counts Portion of the Models																
Step 1																
Dep	0.23*	2.53	[0.05, 0.41]	1.26	0.23*	2.47	[0.05, 0.41]	1.26	0.25**	2.71	[0.07, 0.43]	1.29	0.24**	2.62	[0.06, 0.43]	1.28
PBS	−0.15***	−7.7	[−0.19, −0.11]	0.86	−0.1***	−5.14	[−0.13, −0.06]	0.91	−0.05**	−2.77	[−0.08, −0.01]	0.95	0.03	1.31	[−0.01, 0.07]	1.03
Step 2																
Dep	0.27**	2.7	[0.07, 0.47]	1.31	0.24*	2.27	[0.03, 0.44]	1.27	0.25**	2.6	[0.06, 0.45]	1.28	0.24*	2.58	[0.06, 0.43]	1.27
PBS	−0.15***	−7.73	[−0.19, −0.12]	0.86	−0.1***	−5.12	[−0.14, −0.06]	0.91	−0.05**	−2.8	[−0.08, −0.01]	0.95	0.02	1.15	[−0.02, 0.06]	1.02
Dep by PBS	0.09	0.98	[−0.09, 0.26]	1.09	0.03	0.26	[−0.18, 0.23]	1.03	0.02	0.23	[−0.14, 0.18]	1.02	0.03	0.33	[−0.16, 0.23]	1.03

Predictors	PBS-MoD b	Z	95% CI	IRR	PBS-SHR B	Z	95% CI	IRR	PBS-LSDm b	Z	95% CI	IRR	PBS-LSDp b	Z	95% CI	IRR
Bipolar-SD																
Logistic Portion of the Models																
Step 1																
Bipolar-SD	−0.91*	−2.23	[−1.71, −0.11]	0.4	−0.96*	−2.35	[−1.76, −0.16]	0.38	−0.92*	−2.27	[−1.72, −0.13]	0.4	−0.95*	−2.29	[−1.77, −0.14]	0.39
PBS	−0.03	−0.58	[−0.14, 0.08]	0.97	−0.09	−1.73	[−0.19, 0.01]	0.91	−0.15**	−3.08	[−0.24, −0.05]	0.86	−0.02	−0.42	[−0.13, 0.08]	0.98
Step 2																
Bipolar-SD	−2.38*	−2.22	[−4.49, −0.28]	0.09	−0.84*	−2.04	[−1.65, −0.03]	0.43	−0.93*	−2.25	[−1.74, −0.12]	0.39	−1.03*	−2.29	[−1.92, −0.15]	0.36
PBS	−0.05	−0.85	[−0.16, 0.06]	0.95	−0.1	−1.9	[−0.2, 0.01]	0.9	−0.15**	−3.1	[−0.25, −0.06]	0.86	−0.03	−0.48	[−0.13, 0.08]	0.97
Bipolar-SD by PBS	1.81*	2.5	[0.39, 3.23]	1.16	0.27	0.75	[−0.44, 0.98]	1.31	−0.05	−0.18	[−0.62, 0.52]	0.95	−0.19	−0.42	[−1.07, 0.69]	0.83
Counts Portion of the Models																
Step 1																
Bipolar-SD	0.46***	5.28	[0.29, 0.63]	1.58	0.45***	5.13	[0.28, 0.62]	1.57	0.46***	5.19	[0.28, 0.63]	1.58	0.46***	5.15	[0.28, 0.63]	1.57
PBS	−0.15***	−7.81	[−0.19, −0.11]	0.86	−0.10***	−5.19	[−0.13, −0.06]	0.91	−0.05**	−2.77	[−0.08, −0.01]	0.95	0.03	1.34	[−0.01, 0.07]	1.03
Step 2																
Bipolar-SD	0.51***	5.8	[0.34, 0.69]	1.67	0.5***	5.8	[0.33, 0.68]	1.65	0.46***	5.24	[0.29, 0.63]	1.58	0.45***	5.14	[0.28, 0.63]	1.57
PBS	−0.16***	−8.23	[−0.2, −0.12]	0.85	−0.11	−5.64	[−0.15, −0.07]	0.9	−0.05**	−3.01	[−0.09, −0.02]	0.95	0.02	0.91	[−0.02, 0.06]	1.02
Bipolar-SD by PBS	0.34***	4.27	[0.19, 0.5]	1.41	0.23*	2.57	[0.05, 0.4]	1.25	0.09	1.31	[−0.04, 0.22]	1.09	0.16	1.79	[−0.02, 0.34]	1.77

Predictors	PBS-MoD b	Z	95% CI	IRR	PBS-SHR b	Z	95% CI	IRR	PBS-LSDm b	Z	95% CI	IRR	PBS-LSDp b	Z	95% CI	IRR
BorPD[1]																
Logistic Portion of the Models																
Step 1																
BorPD	−1.14**	−3.26	[−1.82, −0.45]	0.32	−1.13**	−3.33	[−1.79, −0.46]	0.32	−1.10**	−3.35	[−1.75, −0.46]	0.33	−1.17**	−3.38	[−1.85, −0.49]	0.31
PBS	−0.02	−0.34	[−0.13, 0.9]	0.98	−0.08	−1.46	[−0.18, 0.03]	0.98	−0.15**	−3.09	[−0.24, −0.05]	0.86	−0.01	−0.022	[−0.12, 0.09]	0.99

Table 5 (continued)

	PBS-MoD				PBS-SHR				PBS-LSDm				PBS-LSDp			
	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR
Step 2																
BorPD	-1.13**	-2.91	[-1.89, -0.37]	0.32	-13.25	-1.16	[-35.6, 9.1]	0.00	-1.6	-1.94	[-3.21, 0.02]	0.00	-1.1**	-3.22	[-1.77, -0.43]	0.33
PBS	-0.02	-0.35	[-0.14, 0.09]	0.98	-0.07	-1.29	[-0.17, 0.04]	0.98	-0.14**	-2.86	[-0.24, -0.04]	0.93	-0.01	-0.06	[-0.11, 0.11]	0.99
BorPD by PBS	-0.21	-0.55	[-0.94, 0.53]	0.81	-6.71	-1.23	[-17.43, 4]	0.00	-0.71	-1.27	[-1.81, 0.38]	0.49	-0.33	-1.09	[-0.93, 0.26]	0.72
	Counts Portion of the Models				Counts Portion of the Models				Counts Portion of the Models				Counts Portion of the Models			
Step 1																
BorPD	0.35***	4.99	[0.21, 0.48]	1.41	0.35***	4.94	[0.21, 0.48]	1.41	0.36***	5.15	[0.22, 0.5]	1.43	0.34***	4.9	[0.21, 0.48]	1.41
PBS	-0.15***	-7.63	[-0.19, -0.11]	0.86	-0.1***	-5.04	[-0.13, -0.06]	0.86	-0.05**	-2.92	[-0.08, -0.02]	0.91	0.03	1.37	[-0.01, 0.07]	1.03
Step 2																
BorPD	0.36***	4.83	[0.21, 0.51]	1.44	0.27***	4.04	[0.14, 0.4]	1.31	0.34***	4.65	[0.19, 0.48]	1.4	0.35***	4.96	[0.21, 0.48]	1.41
PBS	-0.15***	-7.64	[-0.19, -0.11]	0.86	-0.1***	-4.99	[-0.14, -0.06]	0.91	0.06**	-3.1	[-0.09, -0.02]	0.91	0.02	1.15	[-0.02, 0.06]	1.02
BorPD by PBS	0.06	0.78	[-0.09, 0.2]	1.06	-0.03	-0.47	[-0.16, 0.1]	1.06	0.04	0.7	[-0.07, 0.15]	0.97	0.03	0.48	[-0.1, 0.16]	1.03

	PBS-MoD				PBS-SHR				PBS-LSDm				PBS-LSDp			
Predictors SAD	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR	b	Z	95% CI	IRR
	Logistic Portion of the Models				Logistic Portion of the Models				Logistic Portion of the Models				Logistic Portion of the Models			
Step 1																
SAD	-0.17	-1.08	[-0.48, 0.14]	0.84	-0.16	-1.03	[-0.47, 0.15]	0.85	-0.16	-1.07	[-0.47, 0.14]	0.85	-0.16	-1.06	[-0.47, 0.14]	0.85
PBS	-0.03	-0.48	[-0.14, 0.08]	0.97	-0.09	-1.69	[-0.19, 0.01]	0.91	-0.15**	-3.23	[-0.25, -0.06]	0.86	-0.02	-0.34	[-0.12, 0.09]	0.98
Step 2																
SAD	-0.29	-1.5	[-0.66, 0.09]	0.75	-0.31	-1.64	[-0.68, 0.06]	0.73	-0.24	-1.44	[-0.56, 0.09]	0.79	-0.13	-0.86	[-0.44, 0.17]	0.88
PBS	0.004	0.07	[-0.11, 0.12]	1	-0.04	-0.67	[-0.15, 0.07]	1	-0.1*	-1.99	[-0.21, -0.01]	0.96	0.01	0.14	[-0.11, 0.12]	0.9
SAD by PBS	-0.27	-1.43	[-0.63, 0.1]	0.76	-0.36*	-2.28	[-0.66, -0.05]	0.76	-0.3*	-2.27	[-0.56, -0.04]	0.7	-0.17	-1.12	[-0.48, 0.13]	0.84
	Counts Portion of the Models				Counts Portion of the Models				Counts Portion of the Models				Counts Portion of the Models			
Step 1																
SAD	0.23***	4.9	[0.14, 0.32]	1.26	0.23***	4.80	[0.13, 0.32]	1.26	0.23***	4.85	[0.14, 0.32]	1.25	0.22***	4.64	[0.13, 0.32]	1.25
PBS	-0.15***	-7.83	[-0.19, -0.11]	0.86	-0.1***	-5.24	[-0.14, -0.06]	0.86	-0.05**	-2.78	[-0.08, -0.01]	0.95	0.02	0.9	[-0.02, 0.06]	1.02
Step 2																
SAD	0.19***	3.82	[0.09, 0.29]	1.22	0.2***	4.08	[0.1, 0.3]	1.22	0.22***	4.72	[0.13, 0.32]	1.25	0.22***	4.65	[0.13, 0.32]	1.25
PBS	-0.14***	-6.56	[-0.2, -0.1]	0.87	-0.09***	-4.22	[-0.13, -0.05]	0.87	-0.04*	-2.29	[-0.13, -0.05]	0.92	0.02	0.91	[-0.02, 0.06]	1.02
SAD by PBS	-0.1	-1.89	[-0.2, 0.003]	0.9	-0.09	-1.75	[-0.2, 0.01]	0.9	-0.01	-0.35	[-0.1, 0.07]	0.91	-0.2	-0.33	[-0.12, 0.08]	0.98

Note. [1]Borderline-PD; * $p < .05$. ** $p < .01$. *** $p < .001$. IRR = incident rate ratios, OR = odds ratios. All models were adjusted for age, linguistic region and education and total drinks per week. PBS: protective behavioral strategies; PBS-MoD; PBS-Manner of drinking; PBS-SHR: PBS-Serious harm reduction; PBS-LSDm: PBS-Limiting Stopping Drinking: Mixing nonalcoholic drinks with alcohol; PBS-LSDp: PBS-Limiting Stopping Drinking: Planned limits on drinking.

(Barth, Hofmann, & Schori, 2014; Dell'Aglio, Basso, Argimon, & Arteche, 2013; Grant et al., 2008; Meaney, Hasking, & Reupert, 2016; Merikangas et al., 2011), it was higher regarding SAD (i.e., 16.5% and between 2.4 and 6.6% in past research; Somers, Goldner, Waraich, & Hsu, 2006), which may relate to the measure's relatively low specificity (i.e., 0.74; Dalrymple et al., 2013). Future research replicating this study using a longitudinal design, consistent timeframes across measures and an alternative measure of SAD are necessary to further confirm findings.

5. Conclusions

This study makes an interesting contribution to the PBS literature by demonstrating that young men with borderline-PD evinced stronger negative associations between most PBS and alcohol use than those without this disorder. Further findings showed that PBS were protective against alcohol outcomes in young men without depression or bipolar-SD, but not among those with the latter disorders. These findings suggest that interventions aiming to promote PBS use may not impact equally young adults with different mental health disorders.

Contributors

VG conceived the study and its design, conducted the background literature review and the statistical analyses, and drafted the manuscript. JS helped conceive the study and its design, edited the manuscript, and critically reviewed the manuscript. MEL, MAL, NB, SM and JBD helped conceive the study and its design, edited and critically reviewed the manuscript. GG acquired study funding, helped conceive the study and its design, supervised statistical analysis, and edited and critically reviewed the manuscript. All authors read and approved the manuscript.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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