Published in final edited form as:

Subst Use Misuse. 2019 ; 54(2): 214–224. doi:10.1080/10826084.2018.1512627.

Use of Alcohol Protective Behavioral Strategies as a Moderator of the Alcohol Use-Consequences Relationship: Evidence from Multiple Replications

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Abstract

Background: The use of protective behavioral strategies (PBS) have been found to attenuate the relationship between alcohol use and related consequences.

Objectives: The current study examined PBS use as a moderator of the association between alcohol use and consequences in multiple samples ($N=9$) of different sizes (e.g., ns 125–736) between male and female college students. We also examined sex as a moderator of the PBS moderation analyses. Across all samples, we predicted that the use of more PBS would attenuate the use-consequences relation.

Methods: In total, 3,524 college students completed online measures of alcohol use, consequences, and PBS use (i.e., PBSS) across two sites.

Conclusions/Importance: In the analyses, 3 two-way interactions were consistent with the literature (i.e., use-consequences relation weakest among those with high PBS use), 6 were opposite of what was reported in the literature (i.e., use-consequences relation strongest among those with high PBS use), and 39 were not statistically significant. These results corroborate, contradict, and extend the current body of knowledge in the extant alcohol PBS literature. In the examination of three-way interactions in the combined sample, serious harm reduction (SHR) PBS was found to moderate the use-consequences relation among female, but not among male students. Specifically, the use-consequences relation was weakest among female students who used more SHR PBS indicating that SHR PBS may be an important intervention target for female college students. Additional experimental and longitudinal studies are needed to examine the effects of PBS use on the use-consequences relation.

Keywords

Protective Behavioral Strategies; Alcohol Use; Negative Alcohol-Related Consequences; Moderation

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Authors' Note

KSM and AJB are supported by a training grant (T32-AA018108; PI: McCrady) from the National Institute on Alcohol Abuse and Alcoholism (NIAAA). MRP is supported by a career development grant (K01-AA023233) from the NIAAA.

1. Introduction

College students continue to use alcohol at high rates and experience a wide range of negative consequences (Johnston, O'Malley, Bachman, Schulenberg, & Miech, 2015). Due to the public health concern regarding the association between alcohol use and alcohol-related consequences, researchers have been interested in moderators of this relationship. Among college samples, increasing evidence suggests that alcohol protective behavioral strategies (PBS) use is a robust protective factor associated with lower alcohol use and fewer alcohol-related consequences (see Pearson, 2013; Prince, Carey, & Maisto, 2013 for reviews). PBS represent "behaviors used immediately prior to, during, and/or after drinking that reduce alcohol use, intoxication, and/or alcohol-related harm" (Pearson, 2013, p. 1030). Despite these robust findings, few studies have examined PBS use as a moderator of the use-consequences relation.

To date, we know of three studies that have examined the extent to which PBS moderates the use-consequences relation. In the first study, Benton, Benton, and Downey (2004) examined the extent to which PBS use moderates the use-consequences relation in two large samples of 3,851 and 4,151 undergraduate students, respectively. They used the 34-item Campus Alcohol Survey (CAS) to measure alcohol consumption as well as PBS (i.e., 10-item total score) and harm (i.e., consequences) due to drinking. The results indicated that PBS use moderated the use-consequences relation across both samples. Specifically, it was concluded that college students who consumed more than six alcoholic drinks when partying experienced fewer alcohol-related consequences if they used more PBS. In a subsequent study, Benton et al. (2006) continued their examination of PBS use as a moderator of the use-consequences relation in two samples of 276 and 216 undergraduate students. Consistent with Benton et al.'s (2004) findings, the use-consequences relation was weakest among students who used more PBS. Lastly, Borden et al. (2011) examined PBS use as a moderator (total score from a 7-item measure) of the relationship between four indices of binge drinking and alcohol-related consequences in a sample of 4,151 college students. The four indices of binge drinking included the consumption of five or more drinks in: (1) one sitting (dichotomous), (2) one sitting (continuous), (3) two-hour period (dichotomous), and (4) a two-hour period (continuous). PBS use was found to buffer the binge drinking-consequence relation for each of the four indices of binge drinking (i.e., PBS use weakened the alcohol use-consequences relation; for a general discussion on buffering interactions, see Andersson, Cuervo-Cazurra, & Nielsen, 2014).

Despite providing preliminary evidence for the moderating effects of PBS, none of the studies above utilized the most widely used measure of PBS, the Protective Behavioral Strategies Scale (PBSS; Martens et al., 2005). The PBSS captures three dimensions of protective behavioral strategies that individuals report using in drinking contexts, including Limiting/Stopping Drinking (LSD; e.g., limiting the number of drinks consumed per hour), Manner of Drinking (MOD; e.g., alternating between alcoholic and non-alcoholic drinks), and Serious Harm Reduction (SHR; e.g., using a designated driver). The PBSS has been shown to have strong psychometric properties, outperforming other measures of PBS (Kite, Pearson, & Henson, 2013; Pearson, Kite, & Henson, 2013), and each subscale has been shown to predict alcohol-related outcomes (Martens et al., 2005; Pearson, D'Lima, &

Kelley, 2013; Pearson, Kite, & Henson, 2012). Using the PBSS would provide an opportunity to examine the extent to which different types of PBS use differentially moderate the use-consequences relation through the examination of subscales of the PBSS, as well as determine the replicability of previous findings using a total score. Moreover, to the authors' knowledge, analyses examining sex differences in PBS use as a moderator of the use-consequences relationship have not been conducted. These analyses may elucidate different types of PBS that should be targeted for male and female college students in PBS interventions (e.g., Dvorak, Pearson, Neighbors, & Martens, 2015; Kenney, Napper, LaBrie, & Martens, 2014). From a theoretical perspective, harm reduction approaches such as PBS use have gained momentum in relation to abstinence-based goals. If multiple sources converge on the finding that PBS use attenuates the use-consequences relation, the present study will provide further support for harm reduction approaches.

1.1. Present Study

The present study examined PBS use as a moderator of the use-consequences relation in multiple samples ($N=9$) of different sizes (e.g., $ns=125-736$) to corroborate or contradict findings in the extant literature using the PBSS. Interaction effects were examined within each of the 9 datasets, with multiple moderation analyses conducted in three datasets that contained different measures of alcohol-related consequences. To increase statistical power, all datasets were combined to examine PBS moderation effects in the full sample. Moreover, sex was examined as a moderator of these associations in the combined sample to examine if sex differences exist in the PBS moderation effects. Across all analyses, we predicted that higher levels of PBS use (including subscales) would attenuate (i.e., buffer and/or weaken) the use-consequences relation. The present study provides the most comprehensive and nuanced examination of alcohol PBS use as a moderator of the use-consequences relation in the existing literature.

2. Method

2.1. Participants and Procedure

We analyzed data from nine distinct datasets comprising 3,524 college student drinkers (i.e., students who reported consuming alcohol at least one day in the previous month) from two U.S. universities. Demographics across datasets are described in Table 1. All participants were recruited through Psychology department participant pools at either a large southwestern university, a large southeastern university, or both. Similar recruitment methods were utilized across the cross-sectional studies. We refer readers to the original studies using these datasets for additional information: Project Beliefs (Pearson, Brown, Bravo, & Witkiewitz, 2015), Project Drinking (Pearson, Prince, & Bravo, 2017), Project Trust (Bravo, Pearson, & Stevens, 2016), Project Jorge (Bravo, Pearson, & Henson, 2017), Project Kite 2 (Kite et al., 2013), Project Brown (Brown, Bravo, Roos, & Pearson, 2015), Project Kite 1 (Pearson & Henson, 2013), Project Pace (Pearson, Kite, et al., 2013), and Project PBS (Bravo, Pearson, Stevens, & Henson, 2017). IRB approval was obtained prior to data collection for each study.

2.2. Measures

2.2.1. Alcohol Consumption—To assess quantity of alcohol consumption, participants completed the Daily Drinking Questionnaire (DDQ; Collins, Parks, & Marlatt, 1985). We used the DDQ to estimate number of drinks consumed during a typical week over the past 30 days.

2.2.2. Protective Behavioral Strategies—The 15-item PBSS (Martens et al., 2005) was administered to assess cognitive-behavioral strategies that individuals have used to reduce heavy drinking and negative alcohol-related consequences in the past 30 days. Items were averaged to create four composite measures: LSD (7 items), MOD (5 items), SHR (3 items), and PBSS total score (15 items). Participants were asked to indicate the degree to which they engaged in these behaviors when using alcohol or ‘partying’. Participants responded using a 6-point response scale ranging from 1 (*never*) to 6 (*always*).

2.2.3. Negative Alcohol-Related Consequences—Across datasets, negative alcohol-related consequences were assessed with at least one of three different alcohol consequences measures: 23-item Rutgers Alcohol Problem Index (RAPI; White & Labouvie, 1989), 24-item Brief Young Adult Alcohol Consequences Questionnaire (B-YAACQ; Kahler, Strong, & Read, 2005), or the 48-item Young Adult Alcohol Consequences Questionnaire (YAACQ; Read, Kahler, Strong, & Colder, 2006). Each of these measures were given in a checklist format or had a dichotomous response scale (*Yes*=1, *No*=0). We summed responses on these measures so that composite scores reflected the number of distinct consequences experienced in the past 30 days.

2.3. Statistical Analyses

Moderation analyses were conducted using the PROCESS macro for SPSS (Hayes, 2012). Independent models were conducted predicting alcohol-related consequences from PBS use (both specific subscales and total score), alcohol use, and their interactions (e.g., MOD $\times$ alcohol use). In all models, participants who reported consuming more than 70 drinks in the past 30 days were removed from the analyses because they were statistical outliers. All variables were standardized (i.e., z-scores) to produce standardized regression coefficients (betas). Significant interaction terms were interpreted by examining the simple slopes of the effects of alcohol use on alcohol-related consequences at high (1 standard deviation above the mean) and low (1 standard deviation below the mean) levels of PBS use.

Given that alcohol consequences was a count variable with positive skewness (e.g., B-YAACQ in the combined sample, skewness = 1.501, SE = .041, $z=36.61$) and significant overdispersion ($M=6.10$; $SD=5.90$), we also conducted our moderation analyses using negative binomial regression in *Mplus* 7.3 (Muthén & Muthén, 1998–2015). For these analyses, a maximum likelihood estimator with robust standard errors controlling for data collection site was used. Given the number of moderation effects to be compared utilizing ordinary least squares (OLS) and negative binomial regression, we only compared findings from the OLS and negative binomial regression models for the combined sample. In the combined sample, we also examined three-way interactions between sex, PBS use (i.e.,

LSD, MOD, SHR, and Total PBS) and alcohol use to examine if sex differences exist regarding whether PBS use was a moderator of the use-consequences relation.

3. Results

Conditional main effects and interaction effects across datasets and in the combined sample are shown in Table 2. Across all models, alcohol use was significantly positively associated with alcohol-related consequences, and the PBS total score was significantly negatively associated with alcohol-related consequences in five of the nine datasets. In terms of specific PBS subscales, LSD, MOD, and SHR were negatively associated with alcohol-related consequences; however, statistical significance of these paths varied by sample size (i.e., not significant in smaller datasets; see Table 2). Within five of the nine datasets, we found significant interactions between alcohol use and PBS use in the prediction of alcohol-related consequences (we provide a more detail summary below of observed statistically significant interaction effects). In the combined sample, the main effects for alcohol and PBS (i.e., subscales and total score) were statistically significant; however, we did not find any significant interaction effects in either the ordinary least squares or negative binomial regression models.

3.1. Significant Interactions Across Samples

3.1.1. Project Drinking—As depicted in Figure 1, we found three buffering interactions in our second largest dataset. LSD moderated the use-consequences relation such that this association was strongest among those with low LSD subscale scores ($\beta=.45$; $p<.001$) and weakest among those with high LSD subscale scores ($\beta=.25$; $p<.001$). SHR moderated the use-consequences relation such that this association was strongest among those with low SHR subscale scores ($\beta=.48$; $p<.001$) and weakest among those with high SHR subscale scores ($\beta=.27$; $p<.001$). Total PBS use moderated the use-consequences relation such that this association was strongest among those with low total PBS use ($\beta=.40$; $p<.001$) and weakest among those with high total PBS use ($\beta=.22$; $p=.001$).

3.1.2. Project Trust—We found two significant interaction effects in the Project Trust dataset. LSD moderated the use-consequences relation such that this association was weakest among those with low LSD subscale scores ($\beta=.38$; $p<.001$) and strongest among those with high LSD subscale scores ($\beta=.60$; $p<.001$). MOD moderated the use-consequences relation such that this association was weakest among those with low MOD subscale scores ($\beta=.37$; $p<.001$) and strongest among those with high MOD subscale scores ($\beta=.55$; $p<.001$).

3.1.3. Project Jorge—SHR moderated the use-consequences relation such that this association was weakest among those with low SHR subscale scores ($\beta=.26$; $p<.001$) and strongest among those with high SHR subscale scores ($\beta=.53$; $p<.001$). Total PBS use moderated the use-consequences relation such that this association was weakest among those with low total PBS use ($\beta=.28$; $p<.001$) and strongest among those with high total PBS use ($\beta=.48$; $p<.001$).

3.1.4. Project Brown—SHR moderated the use-consequences relation such that this association was weakest among those with low SHR subscale scores ($\beta=.42$; $p<.001$) and strongest among those with high SHR subscale scores ($\beta=.61$; $p<.001$).

3.1.5. Project PBS—As depicted in Figure 2, we found one significant interaction in our smallest dataset. Specifically, SHR moderated the use-consequences relation such that this association was weakest among those with low SHR subscale scores ($\beta=.26$; $p=.02$) and strongest among those with high SHR subscale scores ($\beta=.63$; $p<.001$).

3.1.6. Sex Differences in PBS Use as a Moderator of the Use-Consequences Relation—We examined three-way interactions between sex, PBS use, and alcohol use in the combined dataset. None of the three-way interactions with LSD, MOD, or PBS total score were statistically significant. However, the three-way interaction term examining sex differences in SHR PBS as a moderator of the use-consequences relation was statistically significant ($\beta=-.12$; $p<.001$). This interaction could be explained by the fact that the two-way interaction between SHR PBS and alcohol use was significant among females ($\beta=-.09$; $p<.001$), but not among males ($\beta=.02$; $p=.25$). That is, the relationship between alcohol use and consequences was not statistically different among males who endorsed low (use-consequences relation: $\beta=.32$; $p<.001$) compared to high (use-consequences relation: $\beta=.36$; $p<.001$) SHR PBS use. However, the relationship between alcohol use and consequences was statistically different among females who endorsed low (use-consequences relation: $\beta=.64$; $p<.001$) compared to high (use-consequences relation: $\beta=.45$; $p<.001$) SHR PBS use.

4. Discussion

The focus of the present study was to examine PBS use as a moderator of the use-consequences relation among college students. Examining 9 separate samples, we aimed to corroborate and extend previous findings in the extant literature using the most widely used PBS measure – the PBSS. In terms of main effects, we found that all facets of PBS were fairly robustly associated (negatively) with alcohol-related consequences, although these effects were sometimes non-significant in smaller datasets. Among interaction effects, in one sample (e.g., Project Drinking), we corroborated moderation findings reported in the literature (Benton et al., 2006; Benton et al., 2004; Borden et al., 2011). Specifically, two subscales (LSD and SHR) and total PBS use were found to attenuate the use-consequences relation. However, in four different samples we found six significant interactions in the opposite direction of the extant literature, with alcohol use having a stronger association with alcohol-related consequences among individuals who use more PBS (e.g., LSD [in 1 sample], MOD [in 1 sample], SHR [in 3 samples], or total PBS use [in 1 sample]). In four other samples as well as in the combined dataset, we found no support for PBS use as a moderator of the use-consequences relation.

Of 48 interactions examined across individual datasets, 3 were consistent with the literature (6.25%), 6 were opposite of what is reported in the literature (12.50%), and 39 were non-significant (81.25%). We did not discern a parsimonious explanation for these differences as they do not follow a consistent pattern. Examined in this way, one may conclude from the preponderance of evidence that PBS use does *not* moderate the use-consequences relation.

In this case, we would conclude that alcohol use is a risk factor, PBS use is a protective factor, and that they simply have additive effects in the prediction of alcohol-related consequences. However, in our four largest datasets (i.e., the datasets with the most substantial statistical power), we found three interactions consistent with the literature (18.75%), four interactions opposite of what is reported in the literature (25.00%), and just over half of the interactions were non-significant (56.25%). When examining effects in the combined sample, none of the interaction effects were statistically significant which may be a function of the inclusion of samples where non-statistically significant interaction effects were present. Therefore, there is a clear, albeit imperfect, association between sample size and our ability to detect statistically significant interaction effects.

McLelland and Judd (1993) reviewed some of the statistical difficulties of detecting moderation effects, highlighting that detection of moderation effects can require prohibitively large sample sizes. Based on the present study, combining samples to increase statistical power may not increase the detection of moderation effects if moderating effects across samples are heterogeneous. In the PBS field, previous work has failed to replicate other moderation effects with PBS use (Pearson, Prince, & Bravo, 2017) suggesting that the heterogeneity in effects observed in the current study may be the norm, not the exception.

4.1. Sex Moderation Findings

In the examination of the sex moderation analyses, sex differences were found. Specifically, SHR PBS was found to moderate the use-consequences relation among females, but not among males. Interpreting the simple slopes analyses, the use-consequences relation was statistically weaker among female participants who endorse higher SHR PBS use. This finding may be a function of distinct alcohol-related consequences that males and females experience and how specific PBS can be used to reduce the likelihood that alcohol use results in such consequences. Specifically, female college students have reported experiencing alcohol-related sexual regret to a greater extent than males (Barnett et al., 2014). Although speculative, it may be that PBS related to SHR (e.g., “Know where your drink has been at all times”, “Make sure that you go home with a friend”, “Use a designated driver”) may confer greater protection against the experiencing of alcohol-related sexual regret among women even during episodes of heavy drinking. These findings have potential to inform PBS interventions (e.g., Dvorak et al., 2015; Kenney et al., 2014) by indicating that perhaps different forms of PBS should be targeted for male and female college students. Specifically, increased efficacy of PBS interventions may be observed by attempting to focus to a greater extent on increasing SHR PBS use among female college students.

4.2. Clinical Implications

Although the associations between PBS use and alcohol use were not a primary focus of the present study, it is important to note that most PBS are directly or indirectly related to drinking less (e.g., setting a drinking limit, avoiding taking shots), so using several PBS and drinking at high levels may indicate that one is ineffectively selecting PBS based on specific drinking contexts. One possible clinical strategy would be to work with clients to select specific PBS that may work best in different drinking contexts. If a client expresses an inability to implement a specific PBS (e.g., not taking shots of liquor) in a specific drinking

context (e.g., prepartying), a clinician could work with the client to implement other strategies from a harm reduction perspective (e.g., drinking only beer while prepartying and throughout the night). In addition, the use of ecological momentary assessment within a clinical setting could provide clinicians with valuable, near real-time data on PBS use and alcohol-related consequences experienced by clients which a clinician could then use to help a client both increase PBS use and reduce alcohol-related consequences in specific, high risk drinking contexts.

4.3. Limitations and Future Directions

It is important that the strengths of the current study are understood in light of its limitations. All of these studies were cross-sectional and all participants were undergraduate college students; thus we are unable to make causal inferences and caution should be exercised when attempting to generalize these findings to individuals not in college. Results from the present study along with calls from others (e.g., Pearson, 2013) indicate that longitudinal (including ecological momentary assessment), experimental, and meta-analytic studies are needed to move the field forward in the examination of PBS use as a moderator of the use-consequences relation. Moreover, rather than examining PBS use as a moderator, the equivocal findings from the present study indicate that alcohol use may be a mediator of the relationship between PBS use and alcohol-related consequences (e.g., DeMartini et al. 2013; Pearson, 2013). Importantly, mediation findings in this domain may hold potential to inform the moderation findings in the present study. The mediational framework also provides opportunities to examine sex differences as a moderator in a mediational framework to better assess whether sex influences the extent to which PBS is a mechanism of change with respect to alcohol-related consequences. Furthermore, caution should be exercised when interpreting main and interaction effects when multiple statistical tests are conducted (e.g., 48 statistical tests across all datasets and 40 in the sex-stratified moderation analyses). We have attempted to ameliorate concerns associated with the likelihood of incorrectly rejecting the null hypothesis when multiple hypotheses are examined (i.e., Type 1 error) by denoting robust effects (e.g., see effects in bold that have an asterisk in Table 2) that were statistically significant when evaluated against a Bonferroni-adjusted critical p -value.

In addition, we used a single indicator of alcohol use that was available across all samples, and it could be the case that different alcohol use indicators may interact differentially with PBS use in the prediction of alcohol-related consequences. Relatedly, our measure of alcohol use was not sensitive to differences in patterns of weekly alcohol consumption. For example, an individual who consumed one drink each day of the week would be treated similarly in the analyses with respect to quantity of alcohol consumption than an individual who consumed seven drinks on one day (and no drinks throughout the week). Moreover, we examined interaction effects in relation to total scores on different alcohol-related consequences measures (e.g., B-YAACQ, YAACQ, and RAPI) but a more nuanced investigation would be to examine interaction effects in relation to specific alcohol-related consequences subtypes (e.g., physical, social, academic, serious [e.g., drunk driving] vs. less serious [embarrassment]). Future research should examine the extent to which PBS moderates the use-consequences relation with respect to different subtypes of alcohol-related consequences and alcohol use indicators. Finally, although we had nine distinct samples

with which to examine these associations, the sample sizes were in the small-to-medium range in comparison to other studies that examined PBS as moderator of the use-consequences relation (e.g., Benton et al., 2006; Benton et al., 2004; Borden et al., 2011).

Across models, alcohol use, PBS use, and their interaction accounted for 16.37% to 27.37% of the variance in alcohol-related consequences. This finding highlights the need to examine a comprehensive set of other risk/protective factors to explain the approximately 72.63% to 83.63% of the variability in alcohol-related consequences that was not accounted for in the present study. Furthermore, another scientifically rigorous approach would involve conducting a meta-analysis, which has been shown to have merit even when only two studies have been conducted (Valentine, Pigott, & Rothstein, 2010). A meta-analysis can provide estimates of common effects (e.g., the mean effect of all main and interaction effects from samples examined in the current study) as well as dispersion in these common effects across studies. However, it has been noted that caution should be exercised when conducting a meta-analysis when the number of studies is small given that parameter estimation is likely to be poor, rendering suppositions that are highly uncertain (Borenstein, Hedges, Higgins, & Rothstein, 2009; Valentine et al., 2010). Given the paucity of published studies in this domain and the reporting of unpublished results from secondary datasets available to the authors, we elected to present the results in their current form rather than conducting a systematic meta-analysis. When a sufficient number of studies are available, a meta-analytic approach to estimate common effects – and heterogeneity in these effects across populations – would represent an important addition to the extant literature.

4.4. Conclusions

In absolute terms, our results corroborate, contradict, and extend the current body of knowledge pertaining to PBS use as a moderator of the use-consequences relation in the alcohol literature. Of 48 interactions examined, 3 were consistent with the literature, 6 were opposite of what is reported in the literature, and 39 were non-significant. Sex-stratified analyses indicated that different PBS moderate the use-consequences relation for male and female college students. Within the context of previous research (Pearson, 2013; Pearson et al., 2017), our mixed findings suggest the importance of replicating moderation effects in longitudinal and experimental studies – as well as conducting meta-analytic studies once more studies have been conducted. The fact that both alcohol use and PBS use tended to predict alcohol-related consequences highlights that researchers and clinicians should address both factors in harm reduction interventions.

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Figure 1.
Simple Slopes of Alcohol Use (i.e., quantity) and Limiting/Stopping Drinking (LSD), Manner of Drinking (MOD), Serious Harm Reduction (SHR), and PBSS Total Score on Negative Alcohol-Related Consequences from Project Drinking.

Figure 2. Simple Slopes of Alcohol Use (i.e., quantity) and Limiting/Stopping Drinking (LSD), Manner of Drinking (MOD), Serious Harm Reduction (SHR), and PBSS Total Score on Negative Alcohol-Related Consequences from Project PBS.

Table 1.

General demographics.

<i>Projects</i>	<i>Beliefs</i> (<i>n</i> =737)	<i>Drinking</i> (<i>n</i> =535)	<i>Trust</i> (<i>n</i> =481)	<i>Jorge</i> (<i>n</i> =444)	<i>Kite 2*</i> (<i>n</i> =414)	<i>Brown</i> (<i>n</i> =290)	<i>Kite 1*</i> (<i>n</i> =273)	<i>Pace*</i> (<i>n</i> =225)	<i>PBS</i> (<i>n</i> =125)	<i>Combined Sample</i> (<i>n</i> =3524)
<i>Gender</i>	%	%	%	%	%	%	%	%	%	%
Male	31.2%	35.9%	28.9%	27.7%	30.2%	33.5%	31.9%	22.7%	20.8%	30.4%
Female	68.4%	62.2%	69.9%	71.4%	65.9%	66.2%	68.1%	77.3%	78.4%	68.4%
Missing	0.4%	1.9%	1.2%	0.9%	3.9%	0.3%	0.00%	0.0%	0.8%	0.2%
<i>Race/Ethnicity</i>	%	%	%	%	%	%	%	%	%	%
American Indian/ Alaska Native	0.2%	5.3%	3.3%	2.9%	1.0%	6.6%	0.4%	0.0%	0.8%	2.36%
Asian	3.9%	5.7%	2.3%	5.4%	4.3%	2.4%	2.9%	7.6%	2.4%	4.17%
Black/ African American	31.4%	5.5%	34.7%	32.4%	28.5%	2.8%	22.0%	28.9%	32.0%	24.46%
Native Hawaiian/Pacific Islander	1.6%	0.5%	1.0%	1.6%	---	2.1%	---	---	0.0%	0.94%
White	49.5%	66.9%	56.5%	56.8%	50.5%	30.7%	65.6%	52.9%	58.4%	52.38%
Hispanic/ Latino	7.6%	36.5%	22.7%	23.4%	5.1%	52.4%	3.3%	3.6%	---	18.56%
Other	5.8%	24.3%	6.7%	5.2%	7.3%	12.8%	4.8%	6.7%	6.4%	10.53%
<i>Descriptives</i>	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)	<i>M</i> (<i>SD</i>)
LSD	3.22 (1.30)	3.29 (1.27)	3.15 (1.25)	3.31 (1.36)	3.13 (1.28)	3.27 (1.32)	2.74 (0.86)	2.88 (1.20)	3.65 (1.19)	3.31 (1.48)
MOD	3.51 (1.39)	3.22 (1.30)	3.39 (1.37)	3.50 (1.45)	3.51 (1.32)	3.34 (1.42)	3.09 (0.70)	3.64 (1.00)	3.79 (1.32)	3.51 (1.42)
SHR	4.97 (1.22)	5.03 (1.21)	4.97 (1.27)	5.12 (1.24)	4.87 (1.29)	4.98 (1.28)	4.16 (0.83)	4.95 (1.22)	5.14 (1.19)	4.95 (1.25)
PBSS Total	3.66 (1.07)	3.61 (1.02)	3.59 (1.06)	3.73 (1.15)	3.61 (1.06)	3.64 (1.07)	3.14 (0.63)	3.54 (0.91)	4.00 (1.06)	3.71 (1.19)
Alcohol Use	8.02 (7.67)	8.64 (8.05)	9.09 (8.65)	8.20 (8.37)	9.22 (8.08)	7.33 (7.43)	10.04 (8.50)	9.06 (8.33)	7.59 (7.76)	8.58 (8.12)
RAPI	---	---	---	---	---	---	3.14 (4.04)	---	---	3.02 (4.06)
B-YAACQ	5.58 (5.19)	6.57 (5.30)	8.53 (8.61)	5.18 (4.92)	---	6.07 (5.40)	4.93 (4.96)	4.83 (4.90)	5.83 (5.12)	6.10 (5.90)
YAACQ	---	---	---	---	11.22 (10.86)	---	---	---	---	11.22 (10.85)

Note. Race/ethnicity were assessed with separate checkbox items (i.e., could select multiple options). Percentages based on race may not add up exactly to 100% due to missing data.

* These projects had Pacific Islander and Asian coded together. LSD=Limiting/Stopping Drinking; MOD=Manner of Drinking; SHR=Serious Harm Reduction; PBSS=Protective Behavioral Strategies Scale; RAPI=Rutgers Alcohol Problem Index; BYAACQ= Brief Young Adult Alcohol Consequences Questionnaire; YAACQ= Young Adult Alcohol Consequences Questionnaire.

Table 2. Main and interaction effects of protective behavioral strategies and alcohol use on consequences

Predictors	Beliefs (B-YAACQ) (n = 737)		Drinking (B-YAACQ) (n = 535)		Trust (B-YAACQ) (n = 481)		Jorge (B-YAACQ) (n = 444)		Kite 2 (B-YAACQ) (n = 414)		Kite 2 (YAACQ) (n = 290)		Brown (B-YAACQ) (n = 290)	
	β	p	β	p	β	p	β	p	β	p	β	p	β	p
LSD	-0.07	.02	-0.19*	<.001	-0.05	.25	-0.10	.03	-0.30	.29	-0.003	.80	-0.02	.68
Alcohol Use	0.47*	<.001	0.35*	<.001	0.49*	<.001	0.37*	<.001	0.26	.001	0.44*	<.001	0.47*	<.001
LSD×Use	0.04	.27	-0.10	.01	0.04	.01	0.05	.28	0.02	.32	0.05	.22	0.04	.53
MOD	-0.22*	<.001	-0.23*	<.001	-0.12	.004	-0.19*	<.001	-0.38	.19	-0.06	.20	-0.19	.001
Alcohol Use	0.42*	<.001	0.32*	<.001	0.46*	<.001	0.36*	<.001	0.32*	.001	0.42*	<.001	0.45*	<.001
MOD×Use	0.01	.70	-0.001	.99	0.09	.03	0.08	.09	-0.01	.97	0.02	.66	-0.07	.23
SHR	-0.08	.01	-0.18*	<.001	-0.12	.004	-0.13	.004	-0.32	.31	-0.12	.01	0.01	.79
Alcohol Use	0.46*	<.001	0.36*	<.001	0.44*	<.001	0.42*	<.001	0.37	.01	0.41*	<.001	0.52*	<.001
SHR×Use	-0.04	.17	-0.12	.01	-0.02	.63	0.16*	<.001	-0.01	.66	-0.25	.62	0.11	.01
PBSS total	-0.16*	<.001	-0.27*	<.001	-0.11	.01	-0.14	.001	-0.51	.14	-0.06	.21	-0.09	.12
Alcohol Use	0.44*	<.001	0.31*	<.001	0.46*	<.001	0.38*	<.001	0.28	.01	0.42*	<.001	0.46*	<.001
PBSS Total×Use	0.01	.80	-0.09	.01	0.08	.06	0.10	.03	0.01	.73	0.32	.49	0.02	.79
Predictors	Kite 1 (B-YAACQ) (n = 273)		Kite 1 (RAPI) (n = 273)		Pace (B-YAACQ) (n = 225)		Pace (RAPI) (n = 225)		Project PBS (B-YAACQ) (n = 125)		Combined Sample (OLS) (B-YAACQ) (n = 3504)		Combined Sample (NB) (B-YAACQ) (n = 3504)	
	β	p	β	p	β	p	β	p	β	p	β	p	β	p
LSD	-0.09	.09	-0.07	.22	-0.001	.99	-0.0001	.89	-0.14	.13	-0.26	.01	-0.26	.001
Alcohol Use	0.48*	<.001	0.38*	<.001	0.53*	<.001	0.45*	<.001	0.38	.001	0.29*	<.001	0.29*	<.001
LSD×Use	0.06	.14	0.05	.28	0.09	.27	0.04	.62	0.02	.87	0.01	.31	0.01	.45
MOD	-0.12	.03	-0.04	.44	-0.11	.08	-0.08	.19	-0.25	.005	-0.67*	<.001	-0.67*	<.001
Alcohol Use	0.47*	<.001	0.40*	<.001	0.50*	<.001	0.44*	<.001	0.36	.002	0.25*	<.001	0.25*	<.001
MOD×Use	0.05	.31	0.07	.19	0.11	.05	0.10	.10	0.06	.59	0.01	.15	0.01	.27
SHR	-0.06	.27	-0.17	.01	-0.08	.19	-0.11	.08	-0.03	.73	-0.36	.001	-0.36	.01

	Beliefs (B-YAACQ) (<i>n</i> = 737)	Drinking (B-YAACQ) (<i>n</i> = 535)	Trust (B-YAACQ) (<i>n</i> = 481)	Jorge (B-YAACQ) (<i>n</i> = 444)	Kite 2 (B-YAACQ) (<i>n</i> = 414)	Kite 2 (YAACQ) (<i>n</i> = 290)	Brown (B-YAACQ) (<i>n</i> = 290)
Alcohol Use	0.48* -0.04	<.001 .38	<.001 .07	0.42* 0.04	<.001 .43	0.31* -0.01	0.31* 0.01
SHR×Use							
PBSS total	-0.12 .03	-0.11 .05	-0.06 .32	-0.06 .32	-0.18 .51	-0.57* .41	-0.57* .41
Alcohol Use	0.47* 0.05	<.001 .26	0.53* 0.10	0.45* 0.06	<.001 .34	0.27* 0.01	0.27* 0.01
PBSS Total×Use							

Note. Standardized regression coefficients in bold denote statistically significant effects unadjusted for multiple comparisons (i.e., $p < .05$).

Regression coefficients bolded and with an asterisk denote statistically significant effects which were evaluated based on an adjusted critical p -value (i.e., $p = .00106$; $\alpha = 1 - (1 - \alpha)^{1/k}$; $\alpha = .05$, $k = 48$). p -values were rounded to three significant figures after the decimal but were evaluated for significance from the unrounded p -value. OLS = Ordinary Least Squares regression; NB = negative binomial regression. LSD=Limiting/Stopping Drinking; MOD=Manner of Drinking; SHR=Serious Harm Reduction; PBSS=Protective Behavioral Strategies Scale; RAPI=Rutgers Alcohol Problem Index; BYAACQ= Brief Young Adult Alcohol Consequences Questionnaire; YAACQ= Young Adult Alcohol Consequences Questionnaire.